United States Department of Agriculture
Forest Service

Upper Briggs Landscape Restoration

Environmental Assessment

Wild Rivers Ranger District, Rogue River-Siskiyou National Forest, Josephine County, Oregon

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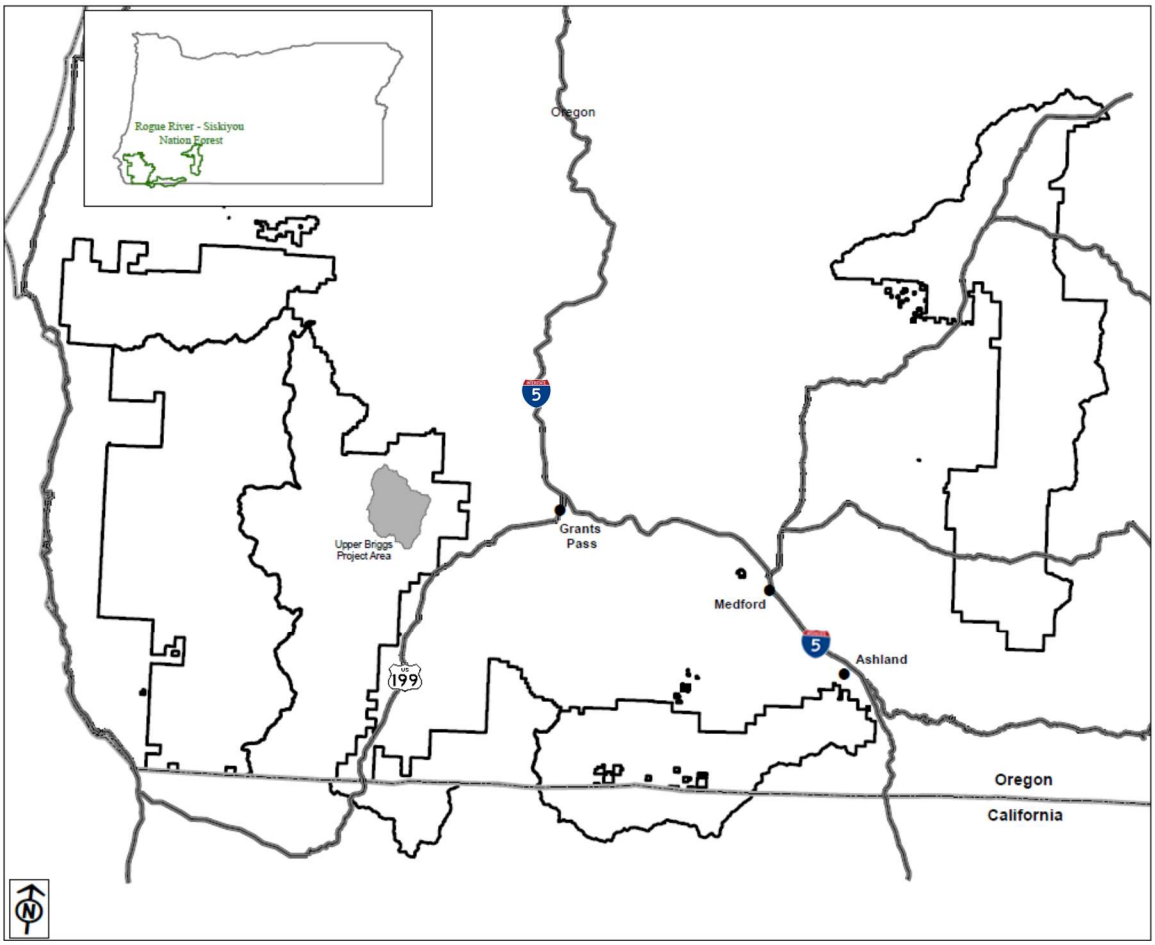


Figure 1. Vicinity Map

Table of Contents

1 Introduction 5
1.1 Decision Framework & Management Direction 8
1.2 Purpose & Need 9
1.2.1 Existing Condition 10
1.2.2 Desired Condition 14
2 Proposed Action & Alternatives 15
2.1 Alternative 1, No Action 15
2.2 Alternative 2, Proposed Action 15
2.3 Alternative 3, Reduced Treatment 16
2.4 Comparison of Alternative 2 & Alternative 3 19
2.5 Activities Common to Alternative 2 & Alternative 3 22
2.5.1 Vegetation Treatments 22
2.5.2 Logging Systems 27
2.5.3 Roads Management 28
2.5.4 Burning & Fuels Treatment 31
2.6 Review of Scoping Comments & Alternatives Not Carried Forward From the Scoping Process 32
2.7 Project Design Criteria & Mitigation Measures 33
2.7.1 Soils & Geology 33
2.7.2 Fire, Fuels & Air Quality 37
2.7.3 Hydrology 38
2.7.4 Aquatic Biota 39
2.7.5 Wildlife 40
2.7.6 Botanical Resources 42
2.7.7 Vegetation 47
2.7.8 Heritage 49
2.7.9 Recreation & Visuals 50
3 Environmental Impacts of the Proposed Action & Alternatives 52
3.1 Physical Resources 53
3.1.1 Soils & Geology 53
3.1.2 Fire & Fuels 85
3.1.3 Air Quality 97
3.1.4 Hydrology 102
3.2 Biological Resources 144
3.2.1 Aquatic Resources 144
3.2.2 Wildlife Resources 155
3.2.3 Botanical & Associated Ecological Resources 208
3.2.4 Vegetation 227
3.3 Socio-Economic Resources 245
3.3.1 Heritage 245
3.3.2 Recreation & Visuals 249
3.3.3 Economics 260
3.4 Climate Change 264
4 Public Involvement, Consultation and Coordination 266

4.1 Public Involvement 266
4.1.1 Scoping 266
4.2 Tribal Coordination 267
5 Consistency Review 268
6 References 271

List of Tables

Table 1. Past Forest Service Actions in the Planning Area. 11
Table 2. Total Acres of Past Vegetation Management in the Planning Area. 13
Table 3. Current/Ongoing & Reasonably Foreseeable USFS Activities in the Planning Area. 13
Table 12. Sensitivities of Soils in the Upper Briggs Planning Area to Selected Disturbances. 61
Table 13. Current Residual Detrimental Disturbance in Managed Stands Planned for Re-entry . 62
Table 14. Inherent Water Holding Capacity of the Soils in Alternative 2 Proposed Units, and Effective Ground Cover Minimum Protections Necessary to Protect the Soils from Erosion. 65
Table 16. Fire-Specific Actions or Events That Occurred Within the Project Area. 85
Table 17. Fire Regime Within Planning Area. 86
Table 18. Fuel Models That Are or Can Be Expected to Be in the Planning Area Over the Next 50 Years. 88
Table 19. Average Predicted Flame Lengths and Fireline Intensities and Firefighter Interpretation under Alternative 1 – No Action. 91
Table 21. Predicted Average Flame Lengths, Fireline Intensity, and Firefighter Production Rates Within Treatment Units. Alternative 2—Proposed Action. 94
Table 22. Fire Regime Protection Class for Alternative 3 95
Table 23. Average Predicted Flame Lengths, Fireline Intensities, & Firefighter Interpretation under Alternative 3. 96
Table 24. Fire-Specific Actions or Events in the Planning Area in the Past 15 Years. 98
Table 25. Acres by Subwatershed (Alternative 2). 102
Table 26. Forest Service System Roads in the Upper Briggs Project. 107
Table 27. Stream Flow. 112
Table 28 Minimum Width of Primary Shade Zone (feet) based on Slope and Tree Height. 119
Table 29. Acres by Primary Treatment Objective. 121
Table 31. Riparian Treatment Acres—Alternative 2, Proposed Action. 124
Table 32. Silviculture Modeling Results for Riparian Stands— Alternative 2, Proposed Action. 127
Table 33. Acres by Primary Treatment Objective. 130
Table 34. Treatment Summary in Riparian Reserves—Alternative 3. 132
Table 35. Riparian Treatment Acres—Alternative 3. 132
Table 36. Silviculture Modeling Results for Riparian Stands—Alternative 3. 135
Table 37. Comparison of Effects. 140
Table 38. Potentially Affected Species, Status, and Habitats Assessed (Pacific Northwest Regional Forester's Sensitive Species List (Updated July 2015). 145
Table 39. SONCC Coho Critical Habitat Essential Habitat Features & Respective Habitat Indicators. 147
Table 41. Comparison of Effects to Aquatic Species by Alternative & Activity Type. 153

Table 42. Summary of Conclusion of Effects. 154
Table 43. Acres With Dominant Hardwoods in the Upper Briggs Creek Watershed 157
Table 44. Acres of NRF Within Potentially Affected Owl Site Nest, Core & Home Range Areas. 164
Table 45. Management Indicator Species for the Siskiyou National Forest – Wildlife (USDA Forest Service 2012)..... 174
Table 46. Amount of Habitat in 2011 for Management Indicator Species for the Siskiyou National Forest..... 174
Table 47. Habitat Trends for Management Indicator Species on Siskiyou National Forest 1989 to 2011 (USDA-FS 2012)..... 175
Table 49. Acres by Primary Treatment Objective. 178
Table 51. Summary of Effects Analysis for Wildlife Species for the Upper Briggs Creek Restoration Project. 179
Table 52. NSO Habitat Pre-Treatment Condition & Alternative 2 Effects for Sites Analyzed in Upper Briggs Project Action Area. 186
Table 53. NSO Habitat Pre-Treatment Condition & Alternative 3 Effects for Sites Analyzed in Upper Briggs Project Action Area. 189
Table 54. Summary Comparison of Effects for Action Alternatives to Region 6 Sensitive Species. 190
Table 55. Management Indicator Species Habitat Affected By Alternatives 2 & 3..... 203
Table 56. Known Occurrences of RRSNF Sensitive Plant Species Within the Proposed Project Footprint..... 209
Table 57. Direct & Indirect Effects to Sensitive Fungi. 220
Table 58. Known Strategic and Survey & Manage Species in the Project Footprint..... 223
Table 59. Proposed Project Invasive Plant Infestations and FS Roads. 224
Table 61. Risk of Spread of *P. lateralis.* 241
Table 62. Comparison of Effects on Representative Treatment Units. 243
Table 63. Comparison of Effects on Tree Structure in Riparian Treatment Units. 244
Table 64. Trails in the Upper Briggs Project Treatment Areas. 256
Table 65. Costs for Figuring Project Revenue. 260
Table 66. Present Net Value and Benefit/Cost Ratio Comparison of Alternatives 262
Table 67. Scoping Notification List. 266
Table 68. Comments Received During the Scoping Period. 267
Table 69. Tribes Contacted..... 267

List of Figures

Figure 1. Vicinity Map .....
Figure 2. The Project Planning Area Is the Upper Briggs Creek 6th Level Watershed. 7
Figure 3. Treatment Units: Alternative 2, Proposed Action.....
Figure 4. Treatment Units: Alternative 3, Reduced Treatment. .....
Figure 5. Example of Microsite Variations That Occur Within Stands. 24
Figure 6. Individual. 25
Figure 7. Small Clump. 25
Figure 8. Medium Clump. 25
Figure 9. Large Clump. 25

Figure 10. Location of Proposed Road Decommissioning & Stream Crossing Improvements. ... 29
Figure 11. Geologic Map of the Upper Briggs Planning Area. ....
Figure 12. Slope Stability and Soil Erosion Risk Within the Upper Briggs Planning Area..... 56
Figure 13. Soil Map of the Upper Briggs Planning Area. ....
Figure 14. Available Water Storage of Soils in the Upper Briggs Planning Area. ....
Figure 15. Slope Stability and Soil Erosion Risk Map, With Alternative 2 Units and Road Proposals. 70
Figure 16. Slope Stability and Soil Erosion Risk Map, With Alternative 3 Units and Road Proposals. 82
Figure 17. Fire Regime Within the Planning Area. 87
Figure 18. Wildland-Urban Interface. ....
Figure 19.Fire Regime Condition Class for Alternative 2--Proposed Action ....
Figure 20. Fire Regime Condition Class for Alternative 3....
Figure 21. Upper Briggs Creek Project Area ....
Figure 22. Upper Briggs Creek Road Density.... 108
Figure 23. Road Decommissioning and Stream Crossing Improvements. ....
Figure 24. Modeled Effects of Thinning on Stream Temperature (SHADOW). 118
Figure 25. Typical Roadside Brushing. ....
Figure 26. Tree Shading. ....
Figure 27. Riparian Reserve Treatment Areas— Alternative 2, Proposed Action.... 126
Figure 28. Riparian Reserve Treatment Areas— Alternative 3, Reduced Treatment. 134
Figure 29. Upper Briggs Creek Watershed Regeneration Harvest 1987-2017. ....
Figure 30. Fish Distribution in the Upper Briggs Planning Area. ....
Figure 31. Down Wood > 5” Diameter—Comparison of Reference & Current Distributions. ....
Figure 32. Down Wood >20” Diameter—Comparison of Reference & Current Distributions. ....
Figure 33. Snags/Acre—Comparison of Reference & Current Distributions. ....
Figure 34. Snags/Acre > 20"—Comparison of Reference & Current Conditions, & Wildlife 50% TLs. ....
Figure 35. Young Stand of Primarily Douglas-Fir Located Within the Upper Briggs Restoration Project Analysis Area. ....
Figure 36. Intermediate-Age/Closed Canopy Stand of Primarily Douglas-Fir Located Within Upper Briggs Restoration Project Analysis Unit 10. ....
Figure 37. Port-Orford-Cedar Tree Group Infested With *Phytophthora lateralis*. ....
Figure 39. Meadow system Horse Creek Meadow (Credit audubonportland.org 2017)....
Figure 38. Serpentine Rock Outcrop (credit oregonencyclopedia.org 3/2017)....
Figure 40. Flatheaded Fir Borer Habitat in Northern Half of Project Area....
Figure 41. Flatheaded Fir Borer Habitat in Southern Half of Project Area....
Figure 42. Inventoried Roadless Areas and Scenic Quality (Alternative 2).... 252

1 Introduction

We are proposing to conduct landscape and watershed restoration on approximately 4,017 acres in the Upper Briggs Creek watershed to improve the overall resiliency of the watershed to short-term natural disturbance (fire, drought, storms) and long-term climate change. This would be accomplished through vegetation management, habitat and plant restoration, fuels management, and roads management. The actions are proposed to be implemented on the Wild Rivers Ranger District of the Rogue River-Siskiyou National Forest.

We prepared this environmental assessment (EA) to determine whether implementation of vegetation management, habitat and plant restoration, fuels management, and roads management may affect the quality of the human environment and thereby require the preparation of an environmental impact statement. By preparing this EA, we are fulfilling agency policy and direction to comply with the National Environmental Policy Act (NEPA). For more details of the proposed action, see the *Proposed Action & Alternatives* section of this document.

Summary of changes made to the Final Upper Briggs Restoration Landscape Project EA since publication of the Draft EA

In response to internal and external review of the environmental assessment (including public comments), the Wild Rivers Ranger District has included the following minor modifications or finalized documents for the Upper Briggs project EA. Changes not related to numbering or formatting clean up were underlined in order to provide a quick glance to updated information from draft to final EA.

Table Labels

The number for Tables for Past, Present, & Reasonably Foreseeable Non-Forest Service Actions was mislabeled as Table 7, that has been corrected as Table 4. All subsequent numbering of tables in the Final have been re-numbered to correct for this error.

During the review of BAER numbers, it was identified that there was 5 acres of overlap not previously shown during earlier analysis. For all intents and purposes of this project, treatments will not exceed 4,017 acres, though the analysis may show that greater acres of treatment were burned. (refer to appendix).

Appendixes of Economics Analysis

The contents of the Appendixes of Economics Analysis for the Logging and Transportation Report that were inadvertently omitted from this specialist report has been added and is posted to the project's website (https://www.fs.usda.gov/project/?project=45593).

Appendix A – Changed Condition Review Due to Fire Effects

A review was conducted by specialists post-fire to assess if the effects warranted a new project analysis. Due to the severity and location of which the fire burned in the project area, the occurrence of the fire did not change the proposed action. An appendix containing this analysis was added to the Final EA with a more in-depth discussion of the effects of the Taylor fire by each resource area.

Appendix B of EA - Final High Priority Site Management Plan for Red Tree Vole

A final high priority site management plan has been completed per interagency direction for the Briggs Creek 5th field watershed (May 2008). The Wild Rivers Ranger District completed a draft plan in May

of 2018, that was incorporated into the analysis for the Draft EA. The final plan has been added to the Final EA and is posted to the project's website (https://www.fs.usda.gov/project/?project=45593).
Proposed Project Location

The Upper Briggs Landscape Restoration Project (Upper Briggs project) is located approximately eleven miles west of Grants Pass, Oregon. The planning area (sometimes referred to as the project area) is the Upper Briggs Creek 6th level watershed, entirely within the Briggs Creek 5th level watershed. Elevations ranges from 2,000 feet on the valley floor to approximately 4,400 feet on both Taylor Mountain at the northwest boundary of the watershed and Onion Mountain on the southeast boundary. (Figure 2).

The analysis planning area encompasses approximately 24,650 acres. Proposed actions within the planning area would occur on up to 4,017 acres. The legal description for the action alternatives area is: Township 35 S, Range 8 W, Sections 30, 31 and 32; Township 35 S, Range 9 W, Section 25; Township.36 S., Range. 8 W., Section 4-11, 14-23, 27-29; Township 36 S, Range 9 W., Sections 1 and 2; (Willamette Meridian), Josephine County, Oregon.

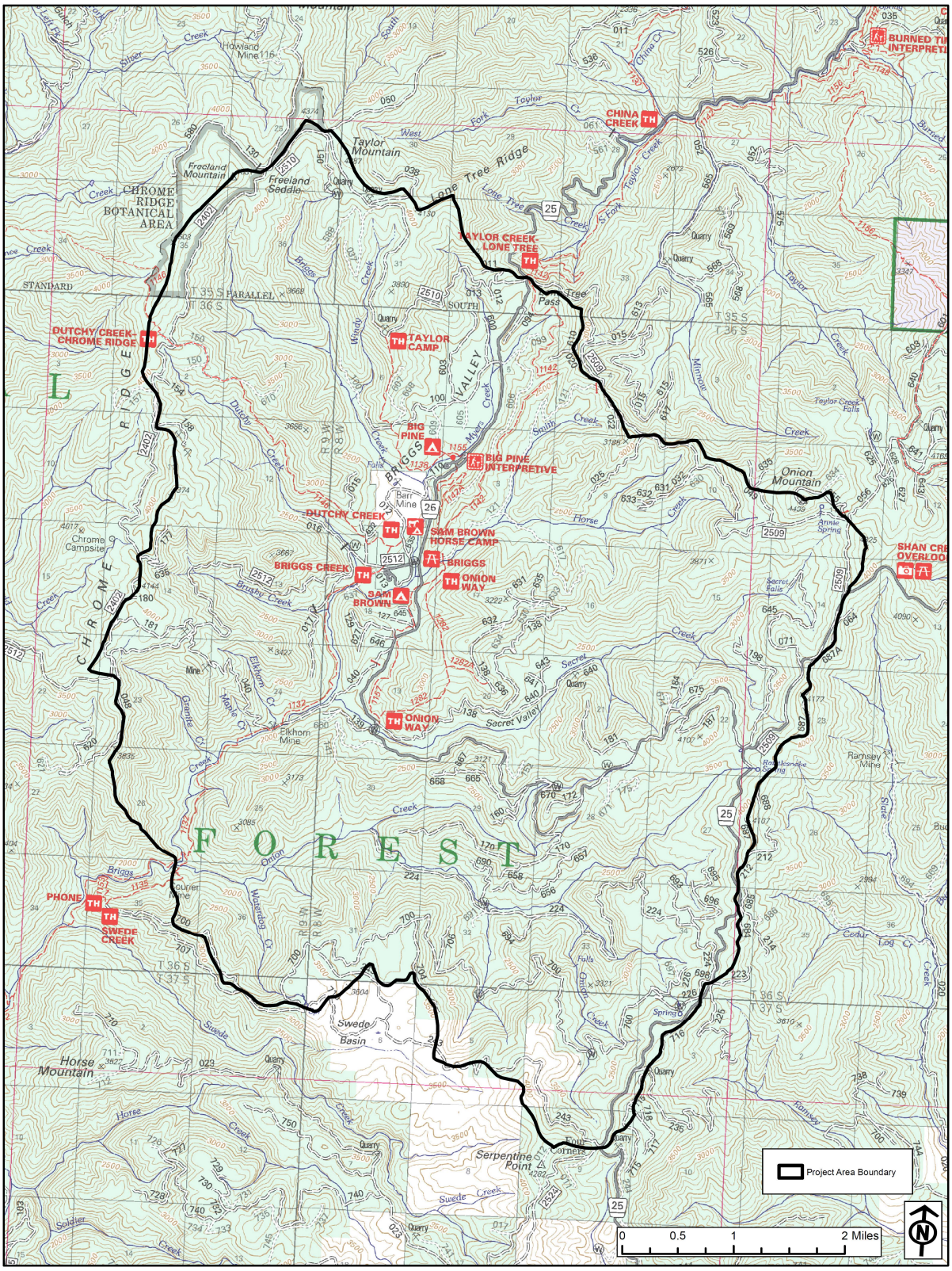


Figure 2. The Project Planning Area Is the Upper Briggs Creek 6th Level Watershed.

1.1 Decision Framework & Management Direction

The Forest Supervisor of the Rogue River-Siskiyou National Forest is the responsible official for the project presented within this assessment. He or she is charged with determining a finding regarding environmental impacts connected to the project.

The decision to authorize or deny the proposed Upper Briggs project has two essential components: decision framework and management direction. If the two essential components are found to be satisfactorily met, a finding of no significant impact (FONSI) would be issued and the selected alternative could be implemented as described within this document without further environmental review.

Decision Framework

The decision framework provides the process necessary to determine a path forward. The primary determination of finding is conducted through the environmental analysis presented within this document about any potentially "significant" (significance as defined by the NEPA[1]) environmental effects of the alternatives proposed within. Identifying and incorporating environmental concerns into the analysis allows for informed decision-making. Should the Forest Supervisor determine the proposed action as "significant," the preparation of an environmental impact statement (EIS) is required. Conversely, if the Forest Supervisor determines that the environmental impacts reported in this document are not sufficient enough to warrant a "significant" finding, an EIS is not needed. A finding determination takes into consideration whether the proposed action is found consistent and/or compliant with statutes, regulations, and other legal considerations.

The Forest Supervisor makes a finding determination based on whether the proposed action meets the purpose and need for the project and in response to the issues raised by the public or resource specialists. Findings would take into consideration whether a project is implementable at this time, determine which alternative or mixture of elements from each alternative to implement, and whether mitigation measures and/or design features are suitable for achieving desired future conditions or resource objectives.

Management Direction

Additionally, the proposed action must be found consistent with higher-order agency management direction, plans and administrative orders for national forest lands prior to determining finding and authorizing implementation of a proposed action. The management direction guiding the analysis of the proposed action within is derived from the *Siskiyou National Forest Land and Resource Management Plan* (LRMP) and the *Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl* (Northwest Forest Plan). The planning area is comprised of allocations as designated by the LRMP and the *Northwest Forest Plan*: matrix (11,363 acres) and matrix with partial visual retention (2,089 acres); riparian reserve (4,578 acres); administratively withdrawn – special wildlife area (1,799 acres); botanical area (164 acres); and late successional reserve (4,206 acres). Approximately 446 acres within the planning area is privately-owned. Forest Plan land use allocations in the watershed include objectives for wildlife habitat management. Over 50% of the watershed is Matrix and 17% is Late Successional Reserve. Riparian

[1] 40 CFR 1508.27 states that: "'Significantly' as used in NEPA requires consideration of both context and intensity of an action."

reserves make up approximately 20% of the watershed and are composed of a mix of seral stages with approximately 32% in managed stands.

Management objectives for projects implemented within the allocations are provided below.

Matrix: This allocation emphasizes obtaining a full yield of timber within the capability of the land. Most scheduled timber harvest and other silvicultural activities would be conducted in that portion of the Matrix with suitable forest lands (NWFP, page C-39). Matrix lands allocated under the NWFP that include all areas not otherwise designated to a more protective status under the LRMP. The project area primarily includes lands allocated to Matrix, as carried forward from the 1989 LRMP as General Forest Prescription (Management Area 14). Within this area, several areas are further managed for visual resources. The Partial Retention Visual is intended to be restrictive to the application of regeneration harvests which uses partial retention to mitigate the visual concerns. Since the silviculture prescriptions are to meet the objectives by thinning, the visual concerns are accounted for.

Riparian Reserve: Riparian Reserve includes lands along all streams, lakes, ponds, wetlands, unstable areas, and potentially unstable areas that are subject to special Standards and Guidelines designed to conserve aquatic and riparian-dependent species. The NWFP establishes a minimum protection buffer equal to the height of one site-potential tree, along each side of the riparian feature. For perennial fish-bearing streams this distance is two site-potential trees.

Administratively Withdrawn: Administratively Withdrawn areas are identified in current Forest and District Plans or draft plan preferred alternatives and include recreation and visual areas, back country, and other areas where management emphasis precludes scheduled timber harvest and which are not included in calculations of allowable sale quantity (ASQ). The Horse Creek meadows and surrounding uplands and riparian reserves have been designated this land allocation. The information sign near the closure gate accessing the 2500-121 road describes the management of this area.

1.2 Purpose & Need

This project is needed because post-industrial human management has disrupted the disturbance regime and watershed function leading to the existing conditions present in the Upper Briggs Creek watershed. Under indigenous management, which persisted for at least several thousand years, fires from human and natural ignition were frequent, generally burning with low to mixed severity. Vegetation was patchier, more varied, and more structurally diverse than exists today. Streambanks and hillslopes were more stable, less subject to erosion, and more resilient to storms; instream habitat and riparian communities were more complex and better developed.

The purpose of this project is to reach desired conditions by improving the overall resiliency of the Upper Briggs Creek watershed to short-term natural disturbance (fire, drought, storms) and long-term climate change. Identified objectives include:

1. Strategically manage fuels to reduce the risk of large stand-replacing fires and reintroduce controlled fire use to the landscape.
2. Maintain and restore structural and vegetation diversity (species composition and successional stages) as appropriate to abiotic and biotic site characteristics in upland areas (prolonging the persistence of legacy trees, accelerating development of later seral forest structure; restoring pine/oak, meadow habitats and rare plant populations).
3. Conserve and enhance habitat for the northern spotted owl and other wildlife species.

4. Maintain and restore the species composition and structural diversity of plant communities in riparian reserves and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface, bank erosion, and channel migration; supply amounts and distribution of coarse woody debris sufficient to sustain physical complexity and stability (Aquatic Conservation Strategy objective 8).
5. Re-establish more natural subsurface flow patterns and improve overall watershed function.

1.2.1 Existing Condition

Existing conditions specific to each resource are provided throughout Chapter 3 of this EA.

The general condition of the Upper Briggs planning area is considered to be highly modified by human influence. The practices of fire suppression, timber harvesting, road building, trapping, mining, and homesteading have simplified habitats and lead to extreme fluctuations in the frequency and intensity of fire and other disturbance processes.

Prior to the 20th century, fires from human and natural ignition were frequent throughout the region. Generally burning with low to mixed severity, these fires regulated stand densities, maintained open meadows and favored pines and hardwoods. With the disruption of Native American traditional burning practices, and adoption of aggressive fire suppression practices, important changes occurred in these forests.

From a fire and fuels standpoint, the general result has been development of dense understories and a heavy buildup of forest floor fuels, resulting in a dramatic increase in severe (stand-replacing) wildfires.

From a forest vegetation perspective, the general result has been a change in the structure and composition of forest stands. They now have much higher densities of small trees. Young or open stands have much higher densities of tall brush. Stands of large (legacy) mixed conifers, black oak and madrone, are experiencing a shift in species composition to predominantly Douglas-fir. Meadows are shrinking due to encroachment by conifers. Large legacy trees, especially pine and oak, are dying from insects and disease.

Human influence has changed the hydrology of the watershed. Streams are wider, shallower, and more incised because large wood and overhanging shade are lacking. Watershed changes, combined with beaver trapping, have resulted in less retention of water, more erratic stream flows, poor aquatic habitat, and increased damage from high flows.

The entire watershed is designated critical habitat for the northern spotted owl with current and historic occupancy. While some areas of high quality habitat are present, in many places large trees and snags and the desired forest structure is lacking. Historic fire regime under indigenous management is believed to have benefitted spotted owls, however, currently severe wildfire is considered the greatest threat to owl habitat.

Mining, hiking, mountain biking, ATV and motorcycle riding, dispersed camping, hunting and firewood collection are all popular uses of the watershed year-round and continue to increase. The planning area includes approximately 20 miles of recreational trails, and Sam Brown Campground.

The majority of the private lands in the project area are heavily managed.

A general summary of past, present and reasonably foreseeable future actions in the planning area is provided in Table 1. Unless otherwise noted by specialists, this information serves as the basis for the cumulative effects analysis provided within their report.

Table 1. Past Forest Service Actions in the Planning Area.

Action	Decade	Acres/Miles/Permits	Description/Extent of Activity
Animal Control Reforestation	1990s	**397 acres**	The use of fencing, tubing, bud caps, seed caps, repellents, trapping, killing, or otherwise controlling animals so as to protect or enhance the growth of established forest vegetation not past the sapling stage. 10 separate units were treated.
Burning of Piled Materials	2000-2008 2009-2015	29 acres 799 acres **828 acres**	A method used to reduce logging debris post-harvest that involves either machine or hand-piling material and burning the piles. 17 different areas were treated.
Commercial Thin	1990s	**39 acres**	An intermediate harvest with the objective of reducing stand density primarily to improve growth, enhance forest health, and other resource objectives.
Final Removal	1970s 1980s	36 acres 860 acres **897 acres**	Removal of overstory after the establishment of a new cohort.
Hazardous fuels thinning	2010s	**1520 acres**	Thinning dense stands, removing underbrush mechanically or manually.
Invasive plant treatment	1990s	**268 acres**	Manual and mechanical treatment of invasive plants, include pulling, cutting and digging.
Overstory Removal Cut	1990-2000s	**31 acres**	The cutting of trees constituting an upper canopy layer to release understory trees. The primary source of regeneration is advanced reproduction.
Partial Removal	1960-1969 1970-1979 1973-1989	115 acres 608 acres 115 acres **837 acres**	Removal of only part of a stand for purposes other than regenerating a new age class, synonym selective cutting
Piling/chipping of fuels and rearrangement of fuels	2010-2015 Unknown	721 acres 28 acres **157 acres**	Hand-piling and machine-piling of woody debris for fuel load reduction. Rearrangement and redistribution of Debris resulting from natural or human activities. 20 separate units were treated.
Plant trees	1990s	**392 acres**	The establishment or re-establishment of forest cover artificially by planting seedlings and/or cuttings with or without site preparation. 12 areas were planted.
Plantation Thinning	2009-2015	**214 acres**	Thinning of trees in plantations.
Precommercial Thin	1990-2000	**407 acres**	The cutting of trees not for immediate financial return but to reduce stocking. 10 areas were thinned.
Pruning	2010s	**721 acres**	Raise canopy height and discourage crown fire. 23 instances of this action occurred.
Recreation & Trails	Past & Ongoing	**19 miles** of trail **250 acres** are used for general recreation use **25 acres** thinned in recreation sites	Establishment of trails and campgrounds. The primary dispersed recreation activities within the planning area include: hiking, vehicle camping, viewing scenery, hunting, berry picking, mushroom picking, and off-highway vehicle use. These uses overlap with the roads system.

Action	Decade	Acres/Miles/Permits	Description/Extent of Activity
Roads system management and Road vegetation reduction	Past & Ongoing	17.2 miles of ML1 road 86.5 miles of ML2 road 8.1 miles of ML3 road 9.1 miles of ML4 road **120.9 miles** **92 acres**	Ongoing maintenance of various surfaces of road system in the watershed.
Salvage cut (intermediate treatment, not regeneration)	1960-1969 1970-1979 1980s 1990s	22 acres 163 acres 67 acres 168 acres **421 acres**	Cutting made to remove injured or killed trees following a natural disturbance. 26 cases.
Shelterwood removal	1970s 1980s	235 acre 13 acres **248 acres**	A type of cut that removes trees except those needed for the purpose of seed production. Prepares the seed bed and creates a new age class in a moderated microenvironment.
Stand clearcut	1959 1960-1969 1970-1979 1980-1989 1990s	327 acres 533 acres 324 acres 540 acres 285 acres **2,008 acres**	An even-aged regeneration or harvest method that removes all trees in the stand producing a fully exposed microclimate for the development of a new age class in one entry. 67 instances of this action occurred.
Seed cut	1990s	**69 acres**	Similar to shelterwood removal. A type of cut that removes trees except those needed for the purpose of seed production.
Special Use Permits	1900-2011	Unspecified acres/ **43 permits**	43 of the permits were issued for recreational events. 4 were issued for non-commercial group use. 2 were issued under an uncategorized use. 2 were issued for water transmission or irrigation ditches. 1 for a forest land management and policy permit. 1 was issued for a concession campground. The most recent permit expired in 2011.
Tree Release	1990s 2000s	260 acres (39 acres were treated twice) 395 acres **655 acres**	Tree release involves the cutting of trees in young plantations to release the trees from competition and thinning around healthy trees to promote health and vigor of remaining trees.
Thinning	1970-1979 1990-2000	7.6 acres 2.9 acres **10.5 acres**	The cutting of trees not for immediate financial return but to reduce stocking. 10 areas were thinned.
Wildlife habitat pre-commercial thinning	1990s	**10 acres**	Activities where the primary focus was to enhance various habitat conditions for wildlife species. 3 separate areas were treated.
Wildfire	1939 1949 1957 1958 2002 2010 2014	Unnamed fire, 6/ 6 acres Unnamed fire. 44/ 44 acres Unnamed fire, 13/ 13 acres Unnamed fire, 8/ 8 acres Biscuit fire, 287/ 499,945 acres Oak Flats Fire, 6,415/ 7,494 acres Onion Mountain Fire, 1,338/ 4,106 acres **511,616 acres**	Some fires were started by lightening or were arson starts. The overall size of the fires may have extended outside the planning area; fire acres are reported as acres within planning area/ total fire acres.

Table 2. Total Acres of Past Vegetation Management in the Planning Area.

Decade	Clear-cut	Salvage	Shelter-wood	Thin	Partial Removal	Overstory Removal	Final Removal	Seed Cut
1950 - 1959	326.6	0	0	0	0	0	0	0
1960-1969	532.7	22.1	0.0	0	114.9	0.0	0	0
1970-1979	323.9	163.0	234.7	7.6	607.6	0.0	36.2	0.0
1980-1989	539.5	67.2	12.6	0.0	114.7	0.0	860.4	0.0
1990-2000	284.8	168.2	0.0	2.9	0.0	30.7	0.0	69.0
total	**2007.5**	**420.5**	**247.3**	**10.5**	**837.3**	**30.7**	**896.7**	**69.0**

Table 3. Current/Ongoing & Reasonably Foreseeable USFS Activities in the Planning Area.

Activity Type	Acres/Miles/Permits	Description/Extent of Activity
Minerals	89 active placer claims along streams in the Upper Briggs planning area	An active claim is a mining claim that the paper work is up to date on making it a valid mining claim, doesn't mean that someone is active mining it. The Upper Briggs area is a hot spot for small type mining, panning, sluicing, and suction dredging-since this area is not closed to suction dredging per the state of Oregon. Patrol has not found a big enough operation to considerate it a substantial disturbance (if an operation is big enough, this is the point that patroller asks a miner to stop their activity and to submit a Plan of Operation to the FS).
Recreation	*See Roads System	Decommissioned roads may lead to a shift in dispersed recreation and camping sites within the project planning area.
Roads system	Maintenance and Decommissioning of 11.1 miles of ML1 road Downgrade 1.6 miles of road to ML1	Ongoing road maintenance. Some roads will be decommissioned and closed from further use as per the MVUM.
Tree plantings	121 acres	The establishment or re-establishment of forest cover artificially by planting seedlings and/or cuttings with or without site preparation.

Table 4. Past, Present, & Reasonably Foreseeable Non-Forest Service Actions in the Planning Area.

Ownership	Past/Present/Future Actions
Private Land Holdings	Past: There 11 tax lots owned by 5 private entities within the planning area. • 4 are owned by limited corporation holdings. The corporations are likely forest product companies. • One is the old Bar Mine, a private in-holding, which is a patented placer mine owned by a private landowner. The landowner has a wash plant and heavy equipment. • Approximately 1.2 miles of roads are in place on private land holdings.
	Present/Future: The placer mine has not operated for several years. It is reasonable to infer that current actions and road use occurring on private lands will continue.

1.2.2 Desired Condition

Improvement in habitat and watershed resiliency to short-term natural disturbances and long-term climate change is desired. This would be accomplished by increasing the diversity of vegetation, prolonging the persistence of legacy trees, and accelerating the development of later seral forest structure.

Restoration of plant communities in wetland and riparian reserves would promote improved physical complexity and stability of the watershed. The watershed vegetation regime would become patchier, more varied, and more structurally diverse. Improved vegetation diversity would help stabilize streambanks and hillslopes. Instream habitat and riparian communities would become more complex and better developed, in turn supporting overall watershed function.

Based on the *Briggs Creek Watershed Analysis* and the *Siskiyou National Forest Plan* as amended by the *Northwest Forest Plan*:

- Late-seral stands constitute approximately 18% of this watershed. It is desired to increase this to a minimum of 45%.
- Mid-seral stands exist on approximately 27% of the watershed. This is well above the historic range of 10% -15% for mid-seral stands in this watershed. These mid-seral stands in the project area are overstocked and are at high risk from loss to fire, insects, and disease; the desired condition is to reduce the risk of landscape-level loss to fire, insects, and disease.

The desired condition from a fuels standpoint is for the landscape to have areas of lower fuel loadings; while continuing to provide habitat for wildlife species that are dependent upon late seral, old forest habitat with high fuel loading. “Fireproofing” the watershed is not reasonable and is not an objective of this project. Management of fuel loading would reduce the potential for large stand-replacing fires and allow for the reintroduction of controlled fire to the landscape, which in turn would promote development of successional habitat and create diverse landscape conditions. The broad objectives are to:

- Increase tree growth rates and vigor of all tree species but especially shade-intolerant species such as ponderosa/sugar pine and black/white oak.
- Increase the amount of open habitat conditions and species dependent on such, and reduce down fuel loading and ladder fuel.
- Create conditions that would support the long-term forest health by limiting the long-term accumulation of heavy fuels, and restoring fire to its natural role in the ecosystem.
- Reduce surplus activity fuels that remain after meeting wildlife, riparian, soil and other environmental needs.
- Manage natural and activity fuel loading, distribution and arrangement for low flame lengths and rate of spread. The low-density stand conditions which were historically more prevalent in this area are not being re-established because of the lack of fire or other stand disturbances. This results in loss of species (both plant and animal) dependent on such conditions within many areas. The high vegetative density condition also increases the potential for this area to experience a high intensity wildfire.

2 Proposed Action & Alternatives

2.1 Alternative 1, No Action

The no action alternative is analyzed in this document primarily to provide a baseline for comparison for the effects, both positive and negative, on the human environment that would likely occur if the proposed action or alternative 3 were not implemented. No vegetation management activities as proposed in the action alternatives would occur.

2.2 Alternative 2, Proposed Action

We propose to treat approximately 4,017 acres of National Forest Service land in the Upper Briggs Creek watershed. Specific acreage of treatment for each element is provided in section 2.4 of this EA. The proposed treatments are categorized by objectives in the following subsection. Numbers listed at the end of each action element indicate which objective the action meets. The objectives are outlined in section 1.3 of this EA.

Develop & Enhance Late Seral Habitat (DELSH)

- Implement treatments (e.g., group selection, patch creation, variable density or radial thinning) to promote sustainable multi-storied stand structure and development of large trees with desirable crown depth in existing mid-seral stands or habitats that lack characteristics of high quality nesting/roosting/foraging (NRF) habitat for northern spotted owls (2,3). (Northern spotted owl recovery action 10).
- Use group selection to create small openings or enhance existing small openings in areas with homogenous habitat that lack desired species and structural diversity for owl habitat (2, 3).
- Enhance and protect species diversity through control of the spread of disease agents (dwarf mistletoe and root rot). Increase stand resiliency to western pine beetle and *Ips pini* by using variable density thinning (1, 2, 3, 4).

Restore Pine-Oak Communities

- Use a combination of variable density thinning and radial thinning of healthy dominate large trees to: 1) reduce mortality of shade-intolerant species such as ponderosa pine, sugar pine, black oak, and white oak and; 2) to create conditions where shade-intolerant species can establish. Thinning would include commercial trees, pre-commercial trees, and woody understory species (2, 3).
- Retain and restore pine-oak habitats by removing encroaching species and reducing competition for light and nutrients from existing and remnant pine-oak habitat and assure its persistence in the watershed (1, 2, 5).

Restore Sensitive Plant Habitat

- Reduce canopy cover and create openings for shade-intolerant sensitive plants (2).
- Use techniques to mimic natural disturbances that perpetuate these species, including fire (1).

Restore Meadow Systems

- Remove encroaching trees and shrub species to restore and maintain meadow boundaries (2).
- Improve habitat transition between meadow and forested boundaries (2, 5).

- Utilize broadcast burning to replicate natural meadow disturbance processes (1,5)

Restore Riparian Reserves

- All project activities within riparian reserves will maintain or improve Aquatic Conservation Strategy (ACS) objectives (4, 5).
- Increase instream coarse woody debris where deficient and ensure adequate future delivery of coarse woody debris to stream channels (2, 4, 5).
- Increase the amount of large downed wood and number of snags in riparian reserves where deficient (4, 5).
- Use variable density or radial thinning, group selection, prescribed fire, directional falling, and/or targeted herbicide use to improve the diversity and composition of plant species within the riparian reserve to provide adequate temperature regulation, nutrient filtering, streambank stability, and amounts of coarse woody debris (2, 4).

Create and Maintain Strategically Located Fuel Management Zones (FMZ)

- Create and maintain strategically located shaded fuel breaks based on prevailing fire weather conditions and fire behavior. Ridgetop fuel breaks will extend to both sides of the ridge (1, 2, 3, 4).
- Reduce ladder fuels through mechanical treatment and underburning (1, 2, 3, 4).
- Reduce hazardous fuels, reduce crown fire potential, and create conditions that reduce the probability of stand-replacing wildfire. Focus treatments on hotter and drier south and west-facing aspects (1, 2, 3, 5).

Decrease Road Impacts to Watershed Function

- Maintain and repair existing roads (5).
- Close, obliterate, or convert to another use roads that are no longer needed for access. For roads that are obliterated or placed into long term storage use treatments to improve hydrologic function, including: remove culverts at stream crossings; re-contour channels to mimic the natural condition; sub-soil the road bed where necessary to improve water infiltration, soil productivity, and revegetation ; place woody debris to decrease erosion and enhance vegetation recovery (5).

2.3 Alternative 3, Reduced Treatment

Alternative 3 was created based on key issues identified during public scoping. An alternative was developed to address concerns related to northern spotted owl habitat, removal of large trees from the landscape, and commercial logging in riparian reserves. This action alternative would conduct the same type of treatment listed in the proposed action alternative but to a lesser extent. Alternative 3 actions cover approximately 2,628 acres within the analysis area. Acreage of treatment for each element is provided in section 2.4 of this EA.

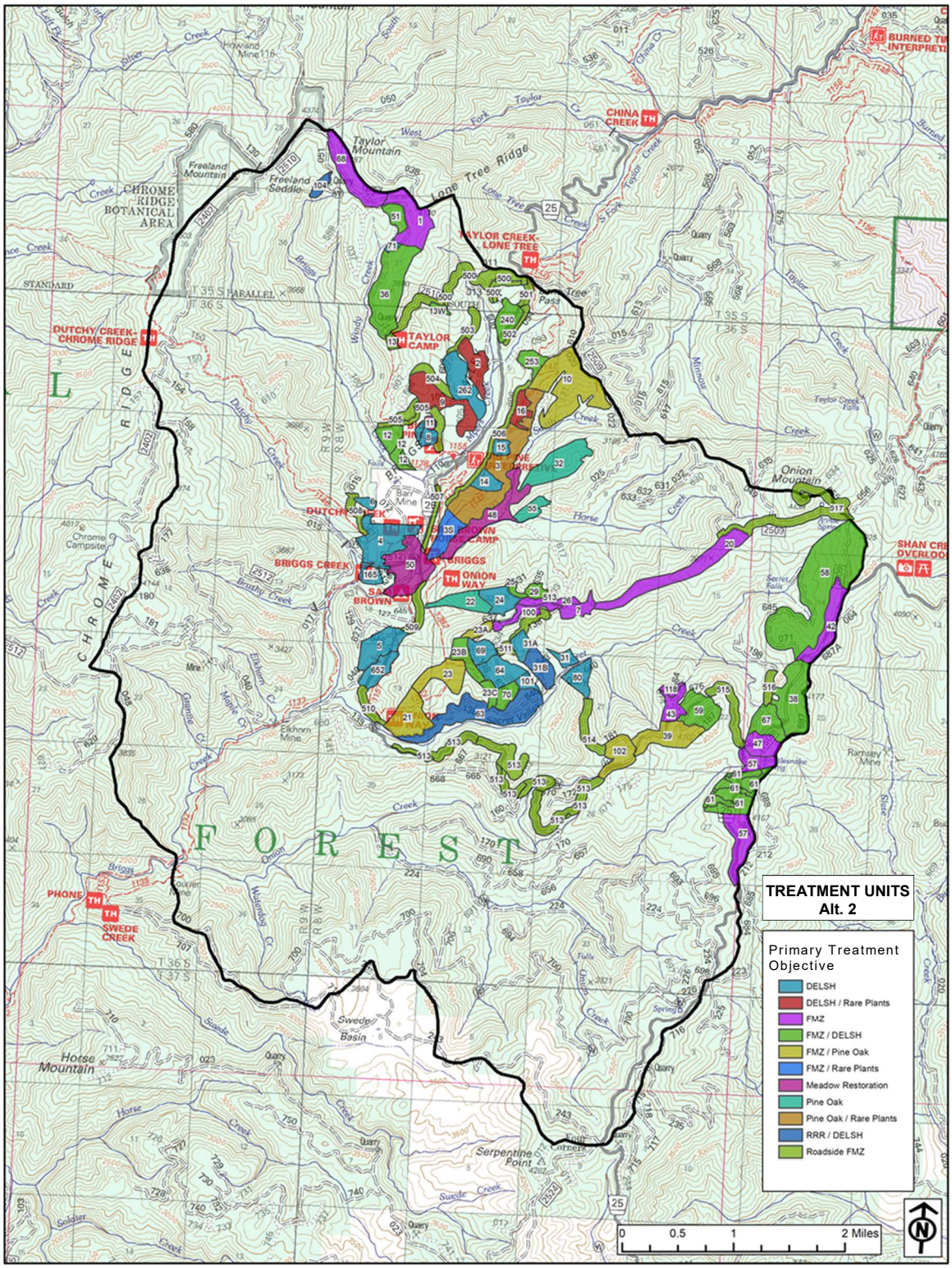


Figure 3. Treatment Units: Alternative 2, Proposed Action.

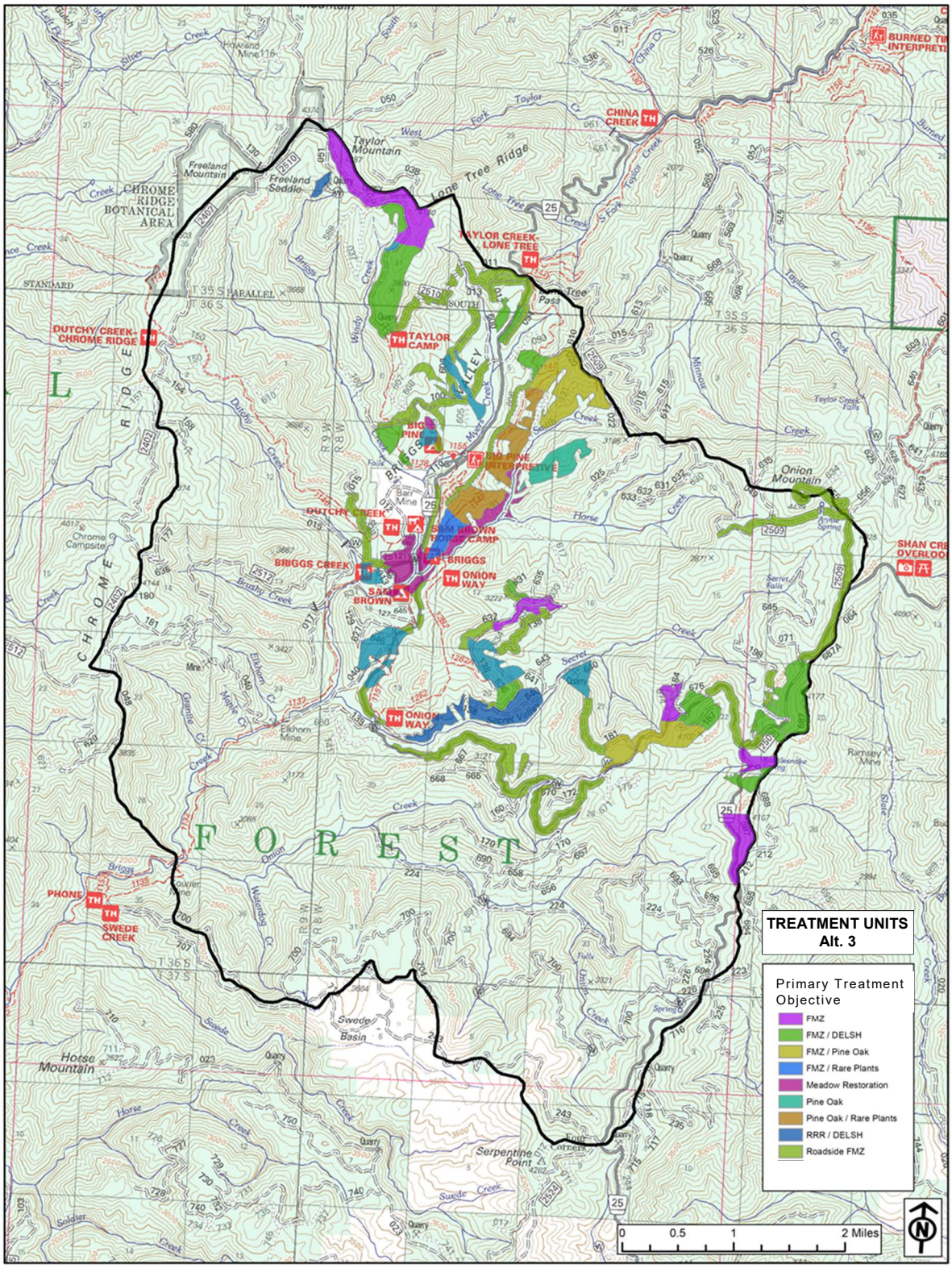


Figure 4. Treatment Units: Alternative 3, Reduced Treatment.

2.4 Comparison of Alternative 2 & Alternative 3

Alternative 2 would treat 4,017 acres; Alternative 3 would treat 2,628 acres. Table 5 breaks down these acreages by primary treatment objective, which is useful for a broad comparison. However, it does not show the total acreage treated per objective. This is because many units are designed to meet multiple objectives (not just their designated "primary" objective)[2]. For a comparison of the total acreage to be treated per objective, see Table 6. And for a detailed comparison of treatment activities, see Table 7.

Table 5. Acres by Primary Treatment Objective.

Primary Treatment Objective of Unit	Alternative 2 Acres	Alternative 2 % Watershed	Alternative 3 Acres	Alternative 3 % Watershed
DELSH	1053	4%	556	2%
Riparian Restoration	183	<1%	128	<1%
Roadside FMZ	713	3%	794	3%
Pine Oak	706	3%	479	2%
Rare Plants	42	<1%	42	<1%
Meadow Restoration	188	<1%	126	<1%
Ridgeline FMZ	1132	4%	503	2%
Total Acres	**4017**	**16%**	**2628**	**11%**

Note: this table displays the total number of acres for which each objective is the primary objective. However, many units are designed to meet multiple objectives. Refer to Table for the total number of acres to be treated for each objective.

Table 6. Amount of Treatment in the Action Alternatives.

Treatment Objective	Activities	Alt. 2	Alt. 3
Develop & Enhance Late Seral Habitat (DELSH)	Variable density thinning, gap creation, thin from below; commercial & non-commercial material; maintain with underburning where appropriate	1796 acres	1026 acres
Pine-Oak Restoration	Thin from below, pruning, lop & scatter, pile burning; commercial & non-commercial material; maintain with underburning	714 acres	518 acres
Rare Plant Enhancement	Habitat creation & enhancement; maintain with underburning in open habitats	333 acres	197 acres
Meadow Restoration	Removal trees encroaching meadow; variable density thinning in meadow-forest interface; lop & scatter, pile burning; commercial & non-commercial material; maintain with underburning	188 acres	188 acres
Riparian Reserve Restoration	Variable density thinning, to enhance structural diversity & accelerate late seral development; limited commercial material; underburn where appropriate	957 acres	451 acres
Fuel Management Zones	Thin from below with variable density thinning; pruning, lop & scatter, pile burning; commercial & non-commercial material; maintain with underburning	2640 acres	1633 acres
Roads Management	*Forest System Roads* Maintenance Level Change Decommissioning	 1.6 miles 11.1 miles	 1.6 miles 11.1 miles
	Temporary Roads	Up to 3 miles	Up to 0.61 miles

Total acres designed to meet an objective. Many units are designed to meet multiple objectives, so *total acres exceeds the total amount proposed to be treated*.

[2] For example, Units 2 and 9 were designed to meet many objectives, but their designated primary objective in Alternative 2 is develop and enhance late successional habitat (DELSH). Since this objective was not included in these units' design under Alternative 3, one of their remaining treatment objectives (Roadside FMZ) was designated as primary.

Table 7. Comparison of Treatments for the Action Alternatives.

DELSH	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Reduced Treatment
Canopy Cover Retention	No Cut	**NRF** 60% Canopy Cover Variable density thin “free thin”	**NRF** No Treat
		Dispersal 40% Canopy Cover Variable density thin “free thin”	**Dispersal** **Stands < 80** 40% Canopy Cover Variable density thin “free thin”
Hardwood Retention	No Cut	Hardwood retention >10” DRC	Hardwood retention >10” DRC
Fuels Treatment	No Cut	Prune, Pile and Burn 1 year post treat, Under Burn 1 to 5 years Post treatment	Prune, Pile and Burn 1 year post treat, Under Burn 1 to 5 years Post treatment
Maximum Cut Limit	N/A	120 years of age	80 Years of age
Patchcut Size	No Cut	Dispersal units 3/4 acre max, 20% stand based upon existing vegetation	Dispersal units 3/4 acre max, 20% stand based upon existing vegetation
Treatment Method	N/A	Mechanically or Manually	Mechanically or Manually
Treatment Acres	**0**	**532**	**245**

DELSH /FMZ	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Reduced Treatment
Percent of unit cut	No Cut	**Ridgeline FMZ** 40% Canopy Cover Variable density thin “free thin”	**Natural Stands** thin from below maintain 60% Canopy Cover
		Roadside FMZ not on Ridgeline **NRF** 60% Canopy Cover Variable Density	**Roadside FMZ not on Ridgeline** **Natural Stands** thin from below maintain 60% Canopy Cover
		Dispersal 40% Canopy Cover Variable density	**Managed Stands** 40% Canopy Cover Variable Density
Hardwood Retention	No Cut	Hardwood retention >10” DRC	Hardwood retention >10” DRC
Patchcut Size	No Cut	3/4 acre max, 20% stand based upon existing vegetation	3/4 acre max, 20% stand based upon existing vegetation
Fuels Treatment	No Cut	Prune 9ft., 18ft lift, Pile and Burn 1 year post treat, Under Burn 1 to 5 years Post treatment	Prune, Pile and Burn 1 year post treat, Under Burn 1 to 5 years Post treatment
Maximum Cut Age Limit	N/A	120 years of age	80 years of age
Treatment Method	No Cut	Mechanically or Manually	Mechanically or Manually
Treatment Acres	**0**	**957**	**465**

Pine/ Oak Restoration Treatment	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Reduced Treatment
Percent of unit cut	No Cut	40% Canopy Cover Variable density thin "free thin"	**Natural Stands** 60% Canopy Cover Remove (natural stands) **Managed Stands** 40% Canopy Cover
Patchcut Size	No Cut	3/4 acre, 20% stand based upon existing vegetation	3/4 acre, 20% stand based upon existing vegetation
Fuels Treatment	No Cut	Prune, Pile and Burn 1 year post treat, Under Burn 1 to 5 years Post treatment	Prune, Pile and Burn 1 year post treat, Under Burn 1 to 5 years Post treatment
Maximum Cut Limit Age	N/A	120 years of age	80 years of age
Treatment Method	No Cut	Mechanically or Manually	Mechanically or Manually
Treatment Acres	**0**	**303**	**218**

Meadow Restoration Treatment	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Reduced Treatment
Maximum Conifer Cut Limit	N/A	Remove all conifers retain hardwood >10" DRC	Remove all conifers retain hardwood >10" DRC
Maximum Cut Limit Age	N/A	120 years of age	80 years of age
Fuels Treatment	N/A	Prune, Pile and Burn 1 year post treat, Under Burn 1 to 5 years Post treatment	Prune, Pile and Burn 1 year post treat, Under Burn 1 to 5 years Post treatment
Treatment Acres	**0**	**188**	**126**

Riparian Restoration Treatment	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Reduced Treatment
Buffer Distance	No Cut	**Intermittent streams:** wetlands, unstable areas: 25 foot "no cut" buffer for channel protection and 100 foot infiltration buffer (to protect soils against compaction) **Perennial streams:** 25 foot "no cut" buffer for channel protection and 100 foot infiltration buffer (to protect soils against compaction). ● 25 to 85 foot - Primary Shade Zone (defined by tree height and slope), provide overstory protection. Allow limited treatments in the understory. **Outside Primary Shade Zone** (i.e. Riparian Treatment Zone-Secondary Shade zone), implement 60% Canopy Cover Variable Density thin "free thin" Riparian upland	120 foot stream buffer (no Action) 60% Canopy Cover Variable density thin "free thin" riparian upland >120 ft
Patchcut Size	No Cut	3/4 acre 20% stand based upon existing vegetation	3/4 acre 20% stand based upon existing vegetation
Fuels Treatment	No Cut	**Intermittent streams:** Prune, Pile and Burn ● **Perennial streams:** Primary Shade zone— Prune, Pile and Burn 1 year post treat, Under Burn 1 to 5 years Post treatment	≥120 feet: Prune, Pile and Burn 1 year post treat, Under Burn 1 to 5 years Post treatment
Hardwood Retention	No Cut	Hardwood retention >10" DRC	No Treat
Maximum Cut Limit Age	N/A	80 years of age	80 years of age
Treatment Method	No Cut	Mechanically or Manually	Mechanically or Manually
Treatment Acres	**0**	**957**	**451**

2.5 Activities Common to Alternative 2 & Alternative 3

2.5.1 Vegetation Treatments

The Upper Briggs Project vegetation report (Barnhart 2017) provides a full description of the vegetation treatment actions. The information provided in this EA is summarized from the vegetation report and is available here: http://www.fs.fed.us/nepa/nepa_project_exp.php?project=45593.

Within the planning area, vegetation treatment units were identified that would provide the most benefit to important species and fuels management. The proposed silvicultural and fuels treatments are designed to approximate the historic (pre-20th century) stand structure, composition, and arrangement of the treated stands in order to meet the project's purpose and need of:

- Strategically manage fuels to reduce the risk of large stand-replacing fires and reintroduce controlled fire use to the landscape;
- Maintain and restore structural and vegetation diversity (species composition and successional stages) as appropriate to abiotic and biotic site characteristics in upland areas (prolonging the persistence of legacy trees, accelerating development of later seral forest structure; restoring pine/oak, meadow habitats and rare plant populations).
- Conserve and enhance habitat for the northern spotted owl and other wildlife species.
- Maintain and restore the species composition and structural diversity of plant communities in riparian reserves and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface, bank erosion, and channel migration; supply amounts and distribution of coarse woody debris sufficient to sustain physical complexity and stability (Aquatic Conservation Strategy objective 8) developing and enhancing late serial habitat, reducing competition to fire adapted species, broadcast burning, restoring tree species and structural composition consistent with historic disturbance regimes.

2.5.1.1 THINNING TREATMENTS

Thinning treatments would focus on trees less than 120 years of age that would not have been exposed to frequent fires. The young (<120 year cohort) would have not have had the same growing conditions that their fire adapted cohorts had been exposed through their development. Frequent low severity fires to a mix severity fire regime dominated the landscape prior to 1906 (Metlen 2016). Proposed silvicultural prescriptions are tailored to meet the identified ecological need for each treatment unit (e.g. conserve and enhance NSO habitat, retain and restore structural and species diversity, strategically manage fuels to reduce fire risk and reintroduce prescribed fire use to the landscape, etc.). Each objective's prescription is described in more detail below.

VARIABLE DENSITY THINNING

Variable density thinning is prescribed for stands less than 80 years of age that are single-canopied and lack diversity. This low diversity stand structure would continue unless it were physically modified by a natural or man-made disturbance. Variable density thinning is primarily an intermediate thinning that retains components of a stand that contribute to ecological diversity and stand variability. For example, a 65 year old plantation would generally be composed of Douglas-fir, and form an even-aged layer with little within-stand species or structural diversity. Diversity would be restored to these stands by thinning to:

- increase the growing space for minor species,
- clump groups of trees to provide vertical diversity in swales and draws,
- retain clusters of trees around snags and down wood,
- reduce vegetation densities along ridge tops, etc.

Treatment scenarios would differ by plant association group, site conditions and harvest system.

- Stands that would maintain at least 60 percent canopy cover where helicopter yarding is proposed would see gap-only commercial treatments ranging in size from 1/5- to 3/4-acre across 20% of the treatment area. Noncommercial thinning from below would occur to enhance species diversity and reduce understory fuels.
- Stands within dispersal habitat with conventional yarding would maintain at least 40 percent canopy cover and reduction of basal areas to 40- to 160-ft^2 BA/AC (40 ft^2 would occur in canyon live oak, and pine/oak associations).
- Stands with conventional yarding that maintain at least 60 percent canopy cover in nesting, roosting, and foraging habitat (NRF) would generally retain from 120-240 ft^2 BA/AC.

Thinning would create canopy gaps, and vary tree sizes and species in order to promote complex structural development in the stand. In some instances younger plantations or simplistic natural stands are proposed for heavy thinning (widely spaced residual trees) in order to maximize growing space for these young trees to grow into large dominant trees with large, complex crown structures. The primary rationale for this early, aggressive thinning is drawn from research on the development of old-growth forest stands in the Cascade and Siskiyou Mountains of southwestern Oregon. These stands were primarily developed by the interactions of low severity fires reducing tree densities thereby allowing a few dominant trees to grow very large early in their lifespan, which in turn created the foundation for future multi-aged, old-growth or late-seral stand conditions (Sensenig et al 2013). Because crown classes are defined and differentiated by light, stands with more sunlight penetration allow for more vertical distribution of leaf area. This in turn produces the most layering and the diverse structure desired in late successional forests.

Untreated areas would be left around features such as preexisting concentrations of coarse woody debris, topographical swales unique to the stand, small wet areas (i.e. seeps or springs) and other features uncommon to the remaining stand. Conversely, equally sized heavier treated areas would occur as complete openings in the stand, hybrid openings to release any remnants of legacy trees centered within the opening, and natural openings credited toward gaps. See Figure 5 for an example of microsite variations within stands.

Some overstocked stands also contain larger trees that could benefit from a reduction of competing subordinates. In some cases, these subordinate trees are greater than 20” DBH due to high site productivity and are 80 years old or less. The condition to remove trees over 20 inches DBH would be to promote and cultivate a larger, adjacent (from within 10-15 feet) legacy trees. This treatment is designed primarily to retain large (>20 inch DBH) fire resilient trees (namely ponderosa pine, sugar pine, and Douglas-fir), reduce loss of species diversity, maintain vigor of the larger tree for optimum late-successional development, and modify the stocking level of the stand to reduce large-scale loss of existing late-successional structure. If harvesting these trees and entering older stands results in a negative short-term effect to late-successional forest-related species, this would be outweighed by the long-term benefits to such species.

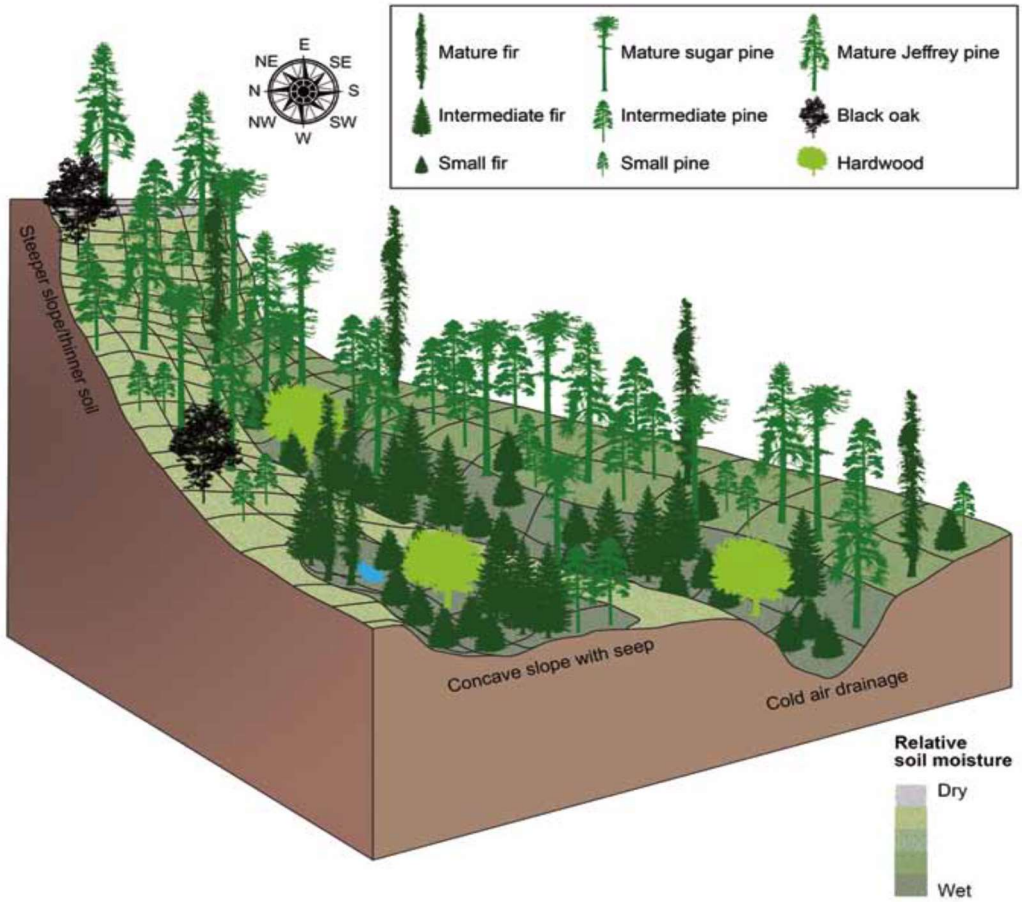


Figure 5. Example of Microsite Variations That Occur Within Stands[3].

LEGACY TREE CULTURING BY RADIAL THINNING

Legacy tree culturing is proposed in both moist and dry forest conditions to maintain key ecological species on the landscape. This treatment is utilized to release legacy individual and clumps from fire suppression ingrowth. Clumps can be as small as two legacy trees with interlocking crowns and or bowls, or as large continuous clumps (see images below for examples of clump sizes).

[3] North et al., 2009, GTR 220

Figure 6. Individual.

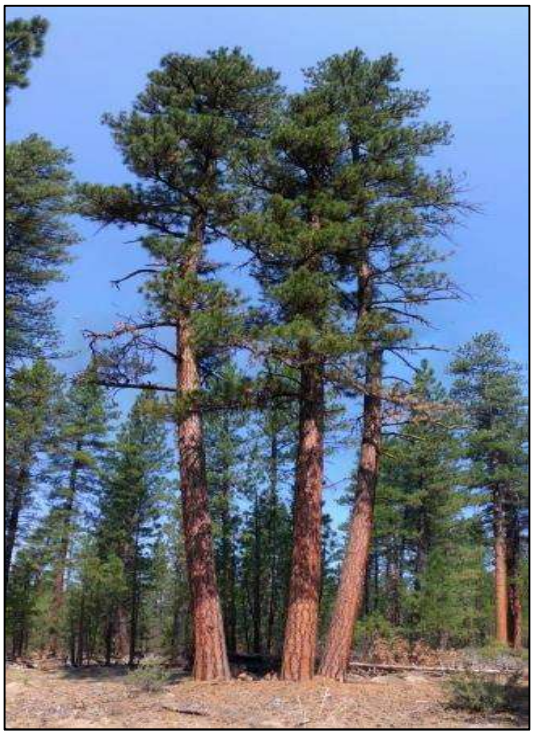


Figure 7. Small Clump.

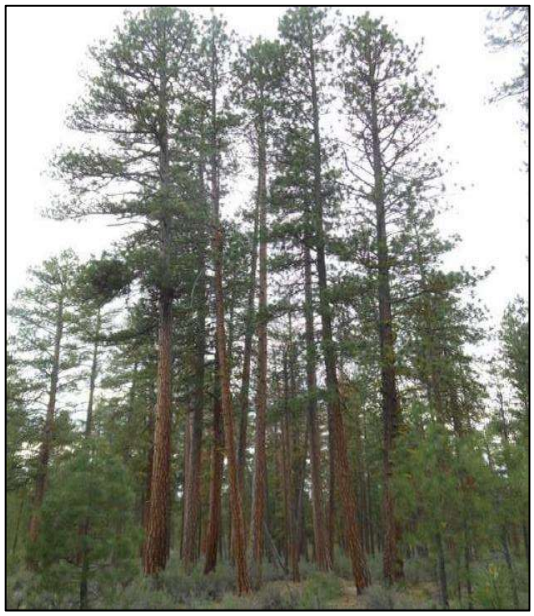


Figure 8. Medium Clump.

Figure 9. Large Clump.

(Source SW-OR ICO Workshop Presentation D. Churchill October 2016)

Legacy tree culturing involves the reduction of competing trees around super dominant old growth Douglas-fir, ponderosa pine, oak, and incense cedar individuals and legacy groups. Cultivating these thick-barked fire resilient trees would contribute to their persistence on the landscape for maintaining or improving biological diversity. Radial and or dripline thinning around these legacy components would reduce the risk of high intensity fire within close proximity and would increase the chance of

successful regeneration of their genetics. Openings would decrease competition for resources for legacy trees (York et al 2007). Openings around legacy trees may range in size from ¼ to ¾ acre and would provide potential conditions for regeneration in the larger openings. Subsequent inter-plantings of fire resilient and drought tolerant ponderosa pine, sugar pine and black oak may occur if natural regeneration fails due to lack of seed source. Areas where reforestation may occur would be where evidence of the species occurred prior to fire suppression (evidence would include snags and downed woody material i.e. California black oak). This regeneration would provide for their reestablishment and long-term persistence on the landscape. The prescription limits this treatment so that not all legacy trees in the project receive radial thinning including the following areas: riparian no treatment buffers, rare plant populations that do not require disturbance and or are light intolerant, logging systems that are not feasible or would cause a high amount of damage to legacy trees and red tree vole high priority habitat locations.

RESTORATION THINNING

This prescription involves habitat management in dry forest stand conditions. These stands contain higher levels of ponderosa pine, incense cedar and black or white oaks. Dry forests have been highly impacted from fire suppression resulting in substantial in-growth of competing vegetation, primarily Douglas-fir. Basal areas would range from 40-180 ft^2 BA/AC (high degree of variation exist due to position on slope, higher BA would occur on toe slope or next to a riparian conversely lower BA would occur on ridge tops).

With the proposed restoration thinning, fire and drought tolerant species (ponderosa pine, incense cedar canyon live, California black and Oregon white oaks) would be retained, cultured, and favored over Douglas-fir to improve biological diversity at the landscape scale. Treatments would retain components of understory and intermediate trees for complex structural development. Thinning would be distributed across canopy layers and tree classes, create canopy gaps, and vary tree sizes and species. The restoration thinning treatments would result in a mixture of treat and maintain or a downgrade of nesting, roosting, and foraging (NRF) habitat, or a treat and maintain of dispersal habitat. In the cases where this prescription would result in a downgrade of NRF habitat the treatment is proposed to emphasize ecological restoration (lower tree density and spacing similar to pre-fire suppression conditions) and is consistent with recommendations included in the “Restoring Dry Forest Ecosystems” section of the Revised Recovery Plan for the Northern Spotted Owl (USDI 2011, pp. III-32-38).

2.5.1.2 MEADOW TREATMENTS

Treatments in meadow systems would target encroaching conifers and decadent shrubs for removal or re-sprout. Treatments may include cutting, pruning, piling, sectioning, pile burn and broadcast burning. Legacy trees that are located within meadow systems would be maintained by pruning to prepare for burning activities (unless large lower limbs are present for roosting—in these cases fuel pull back would occur to protect limbs). Once cutting and preparation work is complete, fire would be used to maintain meadow systems. Special attention would be place on timing of burning due to the potential of invasion of noxious weeds where sources already exist or could be transported. These areas have mapped nesting, roosting, and foraging (NRF) habitat for northern spotted owls, but the areas are small (< 2.5 acres) and would not serve as functional NRF habitat.

2.5.2 Logging Systems

The Upper Briggs Project economics resource report (Crum 2017) provides a full description of the logging systems used to implement vegetation treatment. The information provided in this EA is summarized from the economics report and is available here: http://www.fs.fed.us/nepa/nepa_project_exp.php?project=45593

2.5.2.1 GROUND-BASED TRACTOR SYSTEM

Tractor logging is a system where a cutter will fall to lead toward designated skid trails, then limb and buck the tree in the bed where it landed when it was felled. Three methods of skidding can then be utilized, loader or shovel yarding, grapple skidding, or choker skidding. Shovel yarding consists of a heal boom loader grabbing the logs and swinging them towards the landing in stages. Grapple skidding uses swing grapples attached to the rear of the tractor. The clamps pick up one end of the log and the operator positions the log for skidding. When several logs are bunched, the grapple can pick up several ends at one time and skid the turn to the landing. The third method involves chokers that are attached to the logs and a tractor equipped with a winch pulls the logs from their beds into the skid trail. When a group of logs are assembled into a turn, the chokers are gathered together, the leading ends of the logs are suspended above the ground behind the tractor by way of an integrated arch or similar apparatus, and the trailing end of the logs drag along the ground on the way back to the landing. At the landing, a front-end or a knuckle-boom loader is used to sort and load logs decked at the landing onto log trucks.

2.5.2.2 SKYLINE LOGGING SYSTEM

Skyline or cable logging is a system that transports logs from stumps to landings using a wire rope cable that is suspended between a tower and a tail tree. This cable (or skyline) functions as an overhead track for a load-carrying carriage. Logs are lifted by cables or other devices attached to the carriage and pulled into a skyline corridor. The carriage is then pulled to the landing by a mainline powered by a yarder. The skyline provides vertical lift so that the logs have their leading end suspended above the ground during inhaul. In some cases, the entire log may be suspended above the ground.

Skyline logging is generally specified where road access is available, on slopes greater than 35%, and/or where soil or water conditions are a concern. Typical skyline systems can effectively yard logs out to 1,000 to 1,200 feet. This capability inherently affects road locations where the yarder is positioned.

In all cases, one-end log suspension would be required in all skyline units. Where logs are to be yarded across specified stream channels or wet areas, full log suspension would be required over the designated stream channel. In order to get adequate deflection in some units, the skyline may have to be rigged across major streams and/or existing roads.

Skyline landings would mostly be located in the road prism. Landing orientation would utilize both parallel and centralized (radial) configurations. In some cases, landings would need to be placed on narrow roads, therefore, a swing boom type yarder would be necessary. If the project specifies that tops be left attached to the top log in skyline units, some log processing will be needed on the landings (i.e., the whole tree system). This would require slightly larger landings and/or the back-haul of slash in order to accommodate the residual slash from the top log and residual limbs. Log processing could be accomplished by a relatively small and inexpensive “pull-thru” log processor or a more expensive and more efficient mechanical processor. Hand felling of trees is generally used in this system, because steeper slopes are not conducive to mechanized felling operations. Cable yarding methods

have the lowest impacts on soil resources, but are more expensive treatment method than ground based logging.

2.5.2.3 HELICOPTER LOGGING SYSTEM

Helicopters can be used to move material from the treatment area sites, and move them to processing areas (i.e., landings). From the landings, material can then be removed from the forest by trucks, utilizing roads suitable for such use. Helicopters have high operating costs and are usually utilized where there are concerns for ground disturbance or where road building is not desired. Aerial systems (e.g., helicopters) would be a system used to accomplish commercial density management where existing access systems are not available or would cause extensive resource damage if utilized. The use of helicopters allows for full suspension of trees or material from the treatment area to the landing area and does not create excessive ground disturbance via skid trails or skyline corridors.

This system can be utilized where there is no directly adjacent road access. There are limitations however on the flight distance and elevation change from the landing to the stand where material would be transported. Landings should be within a distance of approximately 1/2 mile from the treated stand. There are also other factors to consider regarding helicopter systems and economic feasibility, including turn size, maintenance and fuel storage landings, etc.

Potential log and service landing areas are available. Helicopter landings, in general, have an average size of about 80 feet by 200 feet and are located as close as possible to the harvest units they serve. However, the actual landing size and location can vary widely depending on terrain, slope, volume flown per acre, and flight direction. In general, landings should be cleared of trees and stumps and leveled as much as possible. In some cases, some surrounding green trees might have to be removed to facilitate flight direction. Some of the proposed landings associated with project area may be located on existing system roads, but others would need a temporary spur and a landing constructed. These locations would need approval from the Forest Service if proposed to be used. A typical helicopter side would need 2 landings, one primary and one secondary. For this system to be operating at maximum production, an alternate log landing would be needed. If the primary log landing is jammed up, the turn would drop its load at the secondary landing. Safety for the public, ground crew and the flight crew is essential. Since these helicopters are operating within the “dead man’s curve” and autorotation options are limited, it is essential that the long line load lifting, flight path and drop zones are carefully considered. Service landing(s) need to be no more than 1 mile from the treatment units (less if possible) and accessible by highway fuel trucks.

2.5.2.4 HAULING

Primary haul routes for both alternatives are National Forest Service roads. Roads will be reconstructed to meet safety and environmental concerns. There are private inholdings and mining claims that use the same road systems, and the roads need to remain open during operations where appropriate. All haul routes would require normal road maintenance and be returned to their normal maintenance level after operations are complete.

2.5.3 Roads Management

The Upper Briggs Project economics resource report (Crum 2017) and soils report (Brazier 2017) provides a full description of the roads management action. The information provided in this EA is summarized from these reports and are available here:
http://www.fs.fed.us/nepa/nepa_project_exp.php?project=45593

2.5.3.1 FOREST SERVICE SYSTEM ROAD MANAGEMENT

Proposed road decommissioning and stream crossing improvements are shown below in Figure 10 and Table 8.

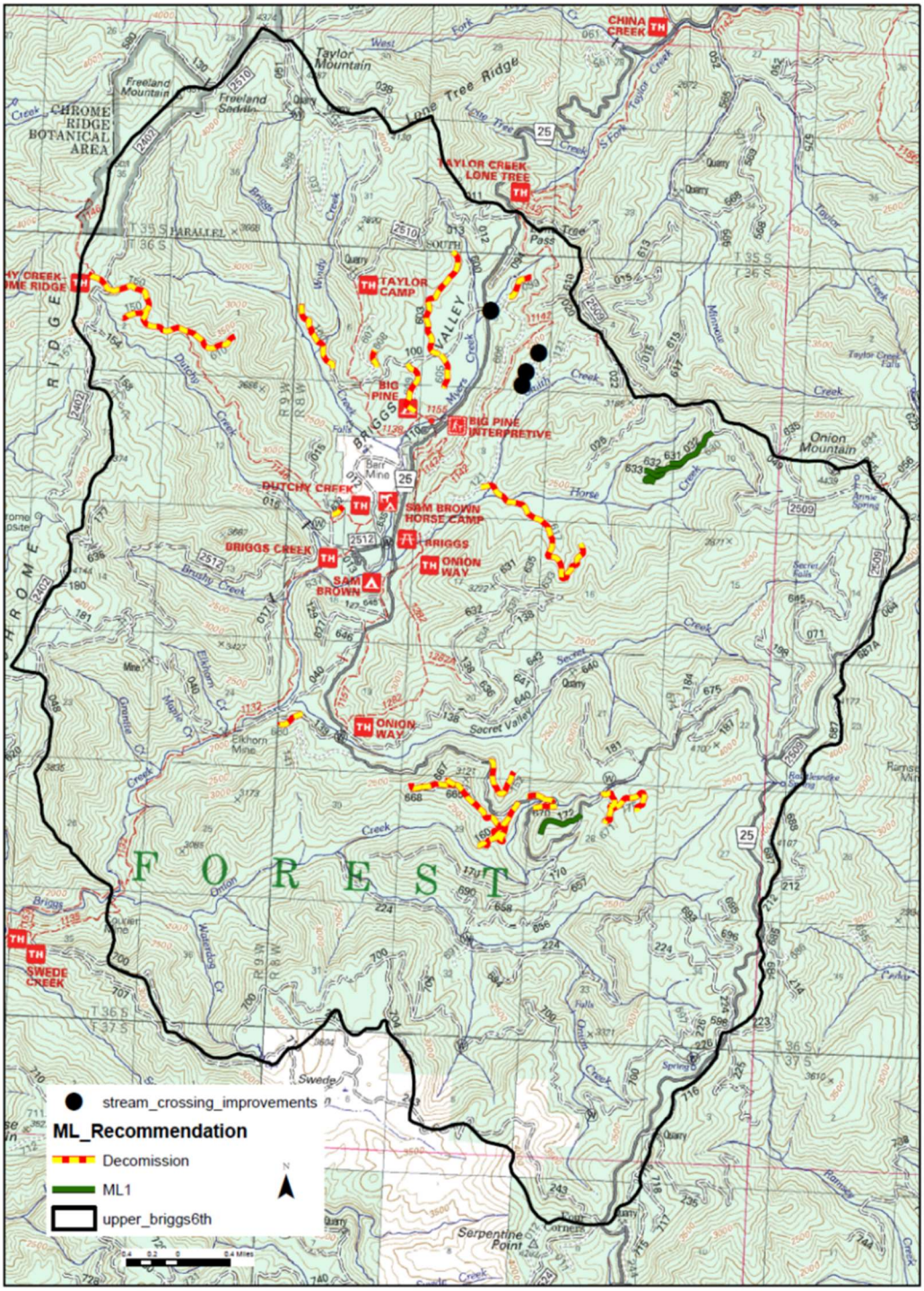


Figure 10. Location of Proposed Road Decommissioning & Stream Crossing Improvements.

Table 8. Roads Proposed for Decommissioning, Storage, and/or Stream Crossing Improvement.

Road Number	Current ML*	Summary of Actions	ML Recommendation	Miles of ML Change
2402149	ML1	Relocate Trail 1146 Dutchy Creek-Chrome Ridge TH to FSR 2402; restore roadbed, convert to trail 1146	Decommission	0.3
2402150	ML1	Relocate Trail 1146 Dutchy Creek-Chrome Ridge TH to RSR 2402; restore roadbed, convert to trail 1146	Decommission	0.7
2402610	ML1	Relocate unofficial 1146 TH to FSR 2402; restore roadbed	Decommission	0.9
2500099	ML1	Improve hydrologic function of Myers Creek tributary stream crossing; restore roadbed from 2500606 junction to end	ML1/Decommission	0.3
2500100	ML2	Restore roadbed from Windy Creek to end; pull 5 foot culvert & restore Windy Creek channel	Decommission starting at Windy Creek culvert, to end	0.7
2500121	ML1	Improve hydrologic function at 3 tributary stream crossings to Smith Creek	ML1	n/a
2500152	ML1	Restore roadbed	Decommission	0.7
2500160	ML2	Restore roadbed	Decommission	0.8
2500162	ML2	Restore roadbed	Decommission	0.2
2500163	ML2	Restore roadbed; pull landing fill out of stream channel	Decommission	0.1
2500172	ML2	Place road into Storage	ML1	0.4
2500175	ML1	Restore roadbed	Decommission	0.7
2500603	ML2	Restore roadbed; pull 3 stream crossing culverts and restore channels	Decommission	1.0
2500605	ML1	Restore roadbed	Decommission	0.5
2500608	ML1	Restore roadbed from 2500607 junction to end	Decommission	0.1
2500609	ML1	Restore roadbed; pull 1 stream crossing culvert and restore channel	Decommission	0.4
2500617	ML1	Restore roadbed; pull Smith Creek, Horse Creek, and 6 tributary culverts, restore channels	Decommission	1.5
2500660	ML1	Restore roadbed	Decommission	0.2
2500665	ML2	Restore roadbed	Decommission	1.2
2500667	ML2	Restore roadbed	Decommission	0.1
2500668	ML2	Restore roadbed	Decommission	0.1
2500670	ML2	Restore roadbed	Decommission	0.2
2500671	ML1	Restore roadbed	Decommission	0.2
2509032	ML2	Place road into Storage	ML1	0.8
2509631	ML2	Place road into Storage	ML1	0.1
2509632	ML2	Place road into Storage	ML1	0.1
2509633	ML2	Place road into Storage	ML1	0.2
2512632	ML2	Restore roadbed; convert to trail 1146	Decommission	0.2

*ML = Maintenance Level

Restore Roadbed–includes any combination of the following potential actions for road decommissioning: shallow ripping, deep subsoiling, partial to full roadfill pullback/recontouring, mulching/placing slash, pulling cross-drain and drainage culverts and associated fill, shaping stream crossings to natural channel dimensions, water-barring, seeding, planting, and blocking the entrance with a barrier (such as berm construction and/or boulder placement). No ground disturbing actions may be needed where a roadbed is already on a successful passive restoration trajectory.

Storage–includes any combination of the following potential actions for converting a road to ML1: pulling cross drain and drainage culverts and associated fill, ripping or subsoiling a portion of the

roadbed, installing rolling dips, waterbarring, seeding, mulching/placing slash, and blocking the road entrance with a barrier (such as berm or gate).

Improve Hydrologic Function–includes standard road maintenance storm-proofing treatments that reduce road impacts to water quality and improve road drainage and stream crossing function, such as adding aggregate, upgrading stream crossings to withstand a 100-year storm event, adding rolling dips, improving the ditch line and adding ditch relief culverts.

2.5.3.2 TEMPORARY ROAD CONSTRUCTION, RECONSTRUCTION, & DECOMMISSIONING

Temporary roads are proposed where one-time access is needed as part of a single treatment. Temporary roads are constructed when permanent roads are not required or needed as part of the Forest Service Road System. Temporary roads are generally short and are usually open for one season during a treatment operation.

When the treatment is completed and temporary road use is no longer needed, the roads would be decommissioned. Decommissioning the temporary roads reduce compaction impacts and surface erosion. Temporary roads would be decommissioned via out-sloping, scarification, subsoiling, the installation of cross-ditches (water bars), the scattering of slash on disturbed soils, and/or the blocking of the road entrance with ditching and native materials.

2.5.4 Burning & Fuels Treatment

Intended fire and fuels treatments in the Upper Briggs Creek Watershed serve many objectives. The main objective from a fire and fuels standpoint is to modify fire behavior and severity, reintroduce the role of low-severity fire to the ecosystem, create resilient forest structures that mimic historical conditions and provide opportunities to safely manage wildfires on the landscape. In order to maintain these objectives into the future, restoring the role of low-severity fire on the landscape is important. Returning low intensity surface fire to the landscape at a historic interval not only would help achieve the desired ecological function, but would also reduce the risk of uncharacteristic wildfire in the future. Prescribed fire integrated with mechanical manipulation or used alone is the most favored treatment. In areas where underburning is not practical due to property boundaries, wildlife concerns or other values at risk alternative treatments such as piling and burning would be utilized. With thoughtfully developed and carefully applied prescriptions, fire can be an effective tool for improving ecosystem function (USDA 1996).

Wildfire presents the greatest risk of late-successional habitat loss in this CHU (USDA USDI 1999). This was exemplified in the summers of 2002, 2009, 2011 and 2015 with the Biscuit, Oak Flat, Horse Mountain and Onion Mountain Fires along with various lightning strikes located along ridge tops (i.e. Rattlesnake springs southwest portion of the proposed ridge top Roadside FMZ.

Recommended fuels treatments will reduce canopy bulk density and raise height to live crown. Low-severity prescribed fire will reduce the amount of surface fuel. Thinning in the action alternatives can facilitate drying of the surface fuels. Removal of trees from the canopy and understory can increase surface wind movement and facilitate the drying of live and dead fuel.

The proposed treatments will reduce surface fuels and counter the effect of enhanced drying. Agee and Skinner (2005) observed that sufficient surface fuel treatment after thinning provides an overall reduction in expected fire behavior and fire severity that usually outweighs the changes in wind speed and fuel moisture.

- **Lop and Scatter** is a method of slash reduction where accumulations and concentrations are broken up (usually with chain saws) and dispersed away from dense locations.
- **"Leave Tops Attached"** is a method, sometimes referred to as whole tree yarding or logging with tops attached, would effectively reduce fuel loading within units and would transfer most of the slash to landings, where it would be treated.
- **Handpile**, with subsequent burning of piles is a fuels treatment where accumulated harvest activity slash is piled (by hand); the resulting piles are burned (typically in the winter) when the risk of escaped fire has subsided, and resulting smoke can be managed in coordination with weather conditions.
- **Jackpot Burning** is a term for prescribed ignition and burning of resulting concentrations of slash and fuels. It is a technique used where concentrations of slash are higher, but typically not continuous. Only the heaviest concentrations of fuels are ignited; burn patterns would not be continuous, nor expected to affect more than 20-30 percent on an activity area. This method emulates conditions often found under natural regimes where fire has been a part of the ecosystem and resulting burns are light and incomplete.
- **Grapple Piling** is term used to describe the use of equipment for piling of excess slash on tractor skidder units. Burning of piles is a fuels treatment where accumulated harvest activity slash is piled (by machine); the resulting piles are burned (typically in the winter) when the risk of escaped fire has subsided, and resulting smoke can be managed in coordination with weather conditions.

2.6 Review of Scoping Comments & Alternatives Not Carried Forward From the Scoping Process

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). After carefully reviewing the public comments received in response to the proposed action, the interdisciplinary team (IDT) identified a reasonable alternative method to achieve the proposal's purpose and need. This alternative was developed for further analysis, and is herein known as Alternative 3, Reduced Treatment.

Other suggested alternatives were outside the scope of the proposed action, duplicative of the alternatives considered in detail, or determined to be components that would not facilitate the desired conditions. One commenter requested that the Forest Service actively manage recreation and dispersed camping along Briggs Creek and its tributaries. This suggestion was considered, but eliminated from further consideration because it was outside the proposed project's scope of improving the overall resiliency of the Upper Briggs Creek watershed to short-term natural disturbance (fire, drought, storms) and long-term climate change.

Another commenter proposed that the purpose and need statement in Chapter 1.2 be revised to include local economic viability and support to local infrastructure. These values are important, and this suggestion was considered. It was eliminated from further consideration because the purpose and need statement (and therefore the proposed project) focuses on the complex problem of restoring resiliency to habitats so they can persist on the landscape over time. The project's economic effects are important, and they are addressed in Chapter 3 of this draft EA. They will be considered carefully in any decision to proceed with the project.

2.7 Project Design Criteria & Mitigation Measures

Project design criteria (PDC), best management practices (BMPs), and mitigation measures specific to each resource were considered and incorporated during the development of the action alternatives (Table 9). On-the-ground implementation of projects should be conducted in a manner consistent with the overall resource management objectives for the Forest Service. Management principles for this project are derived primarily from the LRMP and the Northwest Forest Plan with each resource considering design criterion from additional applicable sources.

Table 9. Project Design Criteria & Mitigation Measures.

2.7.1 Soils & Geology

The following best management practices/mitigation measures/project design criteria are required to ensure compliance with the regulatory framework for the soil resource and/or to reduce the risk of adverse impacts to the soil resource. A description is provided as to when, where and how the design feature should be applied and/or what conditions would trigger the need to apply the design feature.

The effectiveness and feasibility of the following mitigation measures are assessed based upon the following rating system, shown below. These ratings are applied to all mitigation measures. Each measure identifies the code for effectiveness and feasibility at the end of the statement or paragraph. Ratings were determined by professional resource specialists, based on current scientific research and/or professional experience or judgment.

EFFECTIVENESS (E)

E1	Unknown or experimental; logic or practice estimated to be less than 75% effective; little or no experience in applying this measure.
E2	Practice is moderately effective (75 to 90%). Often done in this situation; usually reduces impacts; logic indicates practice is highly effective but there is minimal literature or research.
E3	Practice is highly effective (greater than 90%). Almost always reduces impacts, almost always done in this situation; literature and research can be applied.

FEASIBILITY (F)

F1	Unknown or experimental; little or no experience in applying this measure; less than 75% certainty for implementation. May be technically difficult or very costly. May be legally or socially difficult.
F2	Technically probable; greater than 75% certainty for implementation as planned; costs moderate to high in comparison to other options. Legally or socially acceptable with reservations.
F3	Almost certain to be implemented as planned; technically easy; costs low in comparison to other options. Legally or socially expected.

The following discussion by specific resource areas, provide additional mitigation and further explanation of the methodology, effectiveness, and feasibility of the mitigation measures.

a. Geology

- The Northwest Forest Plan Aquatic Conservation Strategy includes unstable and potentially unstable areas within Riparian Reserves. No commercial activities will occur within unstable and potentially unstable terrain. A Geologist, Soil Scientist, or Hydrologist will assist in field validation and identification of additional unstable areas during layout of stand treatments (BMP T-6). **E3/F3**

- The FS Sale Administrator will consult with a geologist or soil scientist on any planned new temporary road or landing construction locations before they are approved by the FS. New construction traversing across drainage headwalls and slopes delineated as High or Very High Risk on the slope stability and erosion risk map shall generally be avoided. **E3/F3**

b. Soils

Mitigation Measures designed for the protection of soils, site productivity, and water quality are generally referred to as Best Management Practices (BMPs) as described in *General Water Quality Best Management Practices,* Pacific Northwest Region, November 1988 (USFS 1988), in concert with the National Core BMP Technical Guide (USFS 2012). While the terminology in the 1988 BMPs is dated (for example Streamside Management Unit now falls under Riparian Reserve), they are still considered effective under today's management direction. Per the National Core BMP Technical Guide, this analysis includes site specific BMPs that have been developed for the Upper Briggs project using national, regional, and forest guidance as well as local knowledge of the project area.

- Prelocate skid roads in all ground based treatment units; up to 150 feet endlining required to designated skid roads. Skid road locations are to be approved by the Forest Service (BMP T-11). Ground-identified pre-designated skid trail patterns are to be authorized that will limit the area used for harvest access skid trails when employing ground-based harvest systems to ensure compliance with Standards and Guidelines to protect the soil resource and long-term site productivity. **E3/F3**
- During operations, heavy machinery use within a treatment unit shall be planned and approved by the Contract Administrator to be consistent with Forest Plan Standard and Guidelines for Soils. The maximum percent of area for detrimental soil conditions under the LRMP is 15% for an activity area (SNF LRMP S&G 7-2). This standard includes roads and landings. **E3/F2**
- The use of vehicles and equipment shall be limited to dry soil conditions to minimize compaction. Operating vehicles and harvest equipment on moist soils will cause compaction to be more severe and at greater depths in the soil. Percent moisture levels are to be determined by a Soil Scientist or trained Sale Administrator, using standard soils methodology (such as "Feel Method"), during project layout and implementation. Operations would be suspended when any soil caking, smearing, and/or rutting of approximately 4 to 6 inches begins to occur. **E3/F2**
- During implementation, management activities will be designed to retain effective ground cover to protect the soil resource, as specified in the SNF LRMP (1989), and to leave coarse woody material in accordance with the silvicultural prescription. **E3/F2**
- Conventional ground-based systems are restricted to slopes of 35% or less. Designated skid trails and skyline corridors are to be spaced at a distance approved by the Forest Service to keep detrimental soil conditions to within the maximum percent of area for detrimental soil conditions under the LRMP; 15% for an activity area (SNF LRMP S&G 7-2). (BMP T-5, T-9, T-11, T-13, VM-1, VM-4). **E3/F2**
- All skyline logging will be done with equipment capable of suspending one end of the log; up to 150 foot lateral yarding required to skyline corridors (BMP T-12). Whenever feasible, parallel yarding corridors are preferred over 'fan' settings in order to minimize soil/vegetation disturbance immediately below the yarder. Yarding corridors shall target a spacing of no closer than 150 feet as much as possible (BMP T-12). An effective slash cover and/or water bars in skyline corridors and skid trails will be installed following the completion of operations for erosion control (BMP T-16). **E3/F3**
- During implementation, complete maintenance and erosion control on landings/roads/trails prior to the onset of extended periods of wet weather (BMP T-13, R-18). Restrict haul on roads during extended periods of wet weather. (BMP R-20). **E3/F3**
- During implementation, ground-based heavy equipment used for cutting/ skidding/forwarding will be restricted to Forest Service-designated or approved skid trails that are obligated for this use, or to locations where thick slash mats are created using mechanized limbing/topping systems, or to periods when the ground is snow-covered and/or frozen to a depth that minimizes soil compaction. **E3/F3**
- During implementation, pre-existing (legacy) skid trails, temporary roads and landings shall be re-used to the extent practicable, so as to minimize additional ground impacts (detrimental soil conditions). Potential re-use of pre-existing templates that are within riparian reserves shall be reviewed by a FS hydrologist and/or soil scientist and would only be approved if long-term benefits of

post-treatment restoration of the template outweighs short-term impacts of re-use during project implementation. (BMP T-11). **E3/F2**

- No new temporary roads or landings shall be permitted within riparian reserves, to avoid the creation of detrimental soil disturbance and the potential for sediment to reach live water and to maintain ACS objectives for management of riparian reserves. **E3/F3**
- One or more of the following soil restoration methods shall be used (alone or in combination) to rehabilitate soil conditions on detrimentally disturbed ground (for example, on legacy or newly-designated skid trails, landings and temporary roads) where compaction tests or other monitoring identifies a need for a remedial or impact containment action. (BMP T-14, T-15, T-16, R-23) **E3/F2**:
  - After completion of logging, deep subsoiling of heavily compacted skid trails, landings and temporary roads may be employed, where soil conditions are feasible. This operation would use a specially-designed subsoiler implement, mounted on a -tracked excavator, to fracture and loosen compacted soil layers to re-establish water infiltration and deep root penetration. Mechanized equipment used for subsoiling would be restricted to the ground areas already disturbed to avoid creating additional ground impacts.
  - After completion of logging, scarification (ripping) of skid trails and other disturbed soil areas may be employed. This operation would use standard rock rippers or similar equipment, to superficially cultivate the surface of tractor skid trails as a way to promote natural herbaceous re-vegetation by providing seed catchments and shallow water infiltration.
  - During subsoiling or scarification, 5 to 10 tons per acre of woody material and/or slash may be placed on top of disturbed ground areas, either manually or with a machine. Dispersing organic material evenly across tractor skid trails, landings, and other bare soil areas reduces erosion and increases water infiltration.
  - Following completion of logging operations, and in situations where rapid (within months) protection of bared soils is necessary, mulching, grass seeding, shrub planting or tree planting may be conducted using native, non-invasive (and weed-free) grass seed or local native plants (as recommended by a botanist). Optionally, or in combination, sediment capture devices, such as rice straw wattles or bales, may be used to control erosion and reduce sediment movement.
  - Selection and use of these actions would be based on the existing condition of the site following completion of logging operations. These actions do not result in instant restoration; rather they begin the process of restoration. **E3/F2**
- All re-constructed or newly-constructed temporary roads would be reclaimed as soon as practical by the contractor before the storm season, unless mitigated with prescriptions provided on a case-by-case basis from a soils/geology/hydrology specialist. **E3/F2**
- Reclamation of temporary roads may include one or more of the following actions: removal of temporarily installed culverts, excavating cross ditches (water bars) to drain water captured by the former running surface, placing large logs or rocks onto the running surface to deter vehicle use, or re-contouring the road template to near-natural ground conditions, as well as any of the soil restoration methods discussed above. (BMP R-23). **E3/F2**
- Plan pile burning and prescribed fire operations for when litter, duff, and soil moistures are high enough to minimize consumption of soil organic matter and minimize soil heating. Minimize the size of individual slash hand piles scattered in the units to less than 10 ft. by 10 ft. Distribute piles to reduce severe burn impacts from concentrated fuel. (BMP F-2, F-3). **E3/F2**
- During prescribed fire operations, minimize erosion off of constructed firelines by implementin erosion control measures before extended periods of wet weather, and rehabilitating the fire line after the completion of operations. (BMP F-3). **E3/F2**

Additional PDC's/Mitigation Measures for Ground-based mechanized felling, pre-bunching, and/or forwarding on Steep Slopes

- Use of mechanical cutting/pre-bunching machines will be limited to 35% slopes or less, and shall be approved on a unit-by-unit basis on slopes up to 45% prior to the start of operation, depending on local soil properties, potential for effective slash matting, and proposed equipment. The objective is to limit soil compaction and displacement, to protect the topsoil for vegetative growth, and provide water infiltration. Mechanical cutting/pre-bunching machines shall:

a) Not exceed limits on slope steepness, measured by percent slope (not grade of trail/road). Slope maximum limit is 45 percent, when approved on a unit-by-unit basis, including short steep pitches. **E2/F2**

b) Reduce or eliminate turning and traveling across the slope to minimize soil gouging. **E3/F2**

c) Operate on a slash mat of ground cover or limbs and tops as thick and continuous as practical to minimize soil displacement and compaction. A minimum of 24-inch slash depth is typically necessary to achieve objectives. **E2/F2**

d) Maximize use of single pass trails within the unit; avoid use of multiple pass trails (greater than 2 passes) as much as practicable. Trail spacing for mechanical cutting/pre-bunching will be designed in a manner such that soil disturbance is less than 15% of the activity area. **E3/F2**

- The pre-sale layout or marking crew will clearly delineate on the ground, and GPS areas for inclusion on Sale Area Maps prior to operations as much as practicable, where treatment is planned for slopes greater than 35% to avoid excessive soil disturbance from heavy equipment machinery. **E3/F2**
- Skid trail percent slope cannot exceed that which the equipment needed to complete erosion control measures (such as construct waterbars, distribute slash cover) can safely travel without causing more negative resource impacts, otherwise erosion control measures must be installed by hand. **E3/F2**
- Soil Resource PDC's/Mitigation Measures can be site-specifically adjusted by the soil scientist, in collaboration with other resource specialists, during project implementation if monitoring of soil effects provide data to inform effective adaptive management that continues to meet the objectives of soil resource management, as well as all other resources, in the Upper Briggs analysis. **E3/F3**

Road decommissioning, storage (convert to ML1), and stream crossing improvement

- During decommissioning and storage activities, unstable road fill slopes will be pulled back adequately to prevent future failure. **E3/F3**
- Decommissioned roadbeds and project staging areas are to be left in a condition that prevents channeling of surface flows and allows infiltration suitable for revegetation. **E3/F3**
- Stockpile any slash generated from vegetation clearing during road decommissioning, storage, and stream crossing improvement activities to scatter over disturbed sites. Seed exposed soils with an appropriate native seed mix, particularly areas with minimal residual slash cover. **E3/F2**
- Before the onset of extended wet weather, install appropriate temporary erosion control measures at incomplete project sites with exposed soil, such as silt fencing or mulch. **E3/F3**

2.7.2 Fire, Fuels & Air Quality

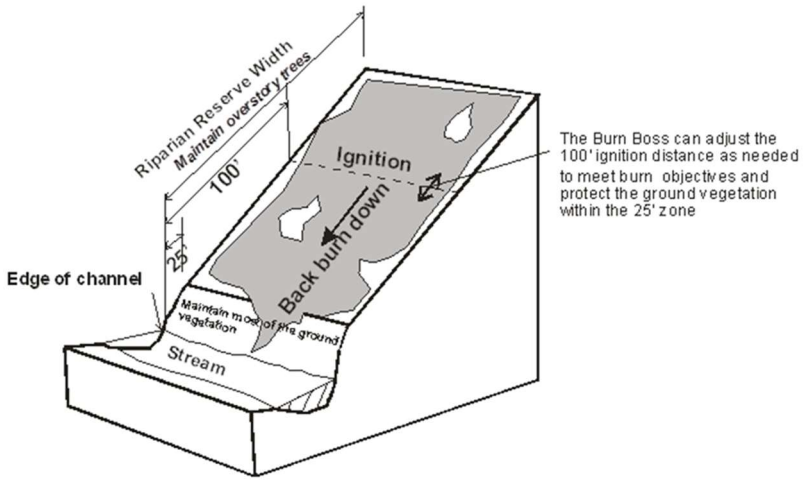
Design & Mitigation Measures

Burning will not take place during visibility protection period of July 1 to September 15 or during weather conditions when smoke could travel to areas containing air quality restrictions.

Alternative 2, Proposed Project

Riparian Reserves:

- Use mechanical treatment and pile burning as needed prior to under burning to protect the overstory trees.
- Pile and burning should be no closer to the stream than 25 ft. to maintain ground vegetation.
- Pump chances: Fire, engineering and aquatic resource personnel will work together to determine suitable pump chances and the measures needed for the protection of aquatic resources.

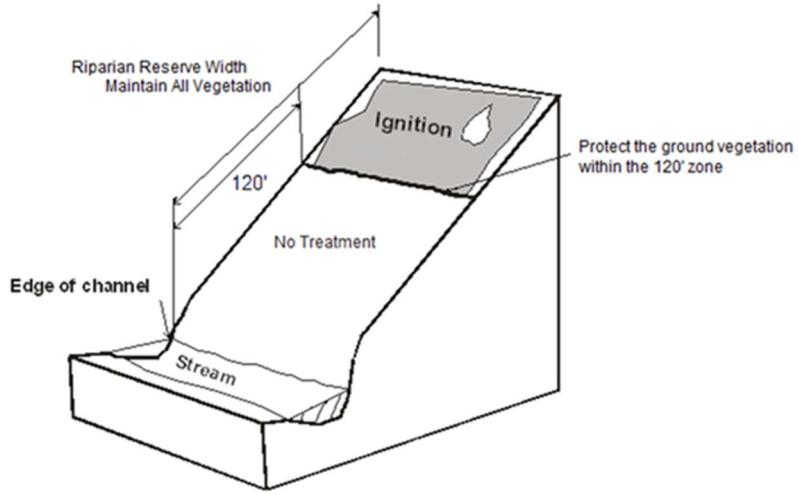


- Refuel 100 ft. from a stream, or use measures to assure fuel does not reach flowing water.
- Water withdrawal Equipment must have a 3/32 intake screen in order to avoid fish entrapment.

Alternative 3, Reduced Treatment

Riparian Reserves:

- Use mechanical treatment and pile burning as needed prior to under burning to protect the overstory trees.
- Pile and burning should be no closer to the stream than 120 ft. to maintain ground vegetation.
- Pump chances: Fire, engineering and aquatic resource personnel will work together to determine suitable pump chances and the measures needed for the protection of aquatic resources.



- Refuel 100 ft. from a stream, or use measures to assure fuel does not reach flowing water.
- Water withdrawal Equipment must have a 3/32 intake screen in order to avoid fish entrapment

2.7.3 Hydrology

Design & Mitigation Measures	Objective
Riparian Reserves: Fish-bearing and permanently flowing non-fish-bearing streams	
1. Apply direction in the Northwest Forest Plan Temperature TMDL Implementation Strategies. The table below establishes the distance (feet) from the active stream channel where no removal (thinning) of the overstory canopy will occur to protect shade on perennial streams. Minimum Width of Primary Shade Zone (feet) based on Hill Slope and Tree Height: **HILL SLOPE** **TREE HEIGHT** / **<30%** / **30% – 60%** / **>60%** **<20 feet** / **12** / **14** / **15** **20 – 60 feet** / **28** / **33** / **55** **>60 – 100 feet** / **50** / **55** / **60** **>100 – 140 feet** / **70** / **75** / **85** The Temperature Implementation Strategies allows the distances above to be less if one of the following conditions applies: • The trees are located on a south facing slope and therefore do not provide stream shade • An appropriate level of analysis is completed and documented, such as shade modeling, using site specific characteristics to determine the primary shade tree width • Field monitoring or measurements are completed to determine the width where optimum Angular Canopy Density (65% or greater) is achieved Within the primary shade zone: • Trees may be limbed; • Understory may be thinned and removed or hand piled and burned; • Overstory may be thinned on south facing aspects only.	Maintain existing stream shade (primary shade zone).
2. During **fuels treatment** back down fire and do not burn ground vegetation within 25 feet of a stream (any slope, low intensity burn). No removal of understory vegetation within 25 feet. No ignition points within 100 feet.	Maintain bank integrity to prevent erosion during high flows.
3. **Fuels treatment** - hand piles will not be burned closer than 25 feet from a stream	Maintain bank integrity to prevent erosion during high flows.
4. **Timber harvest** – No timber harvest as set by mitigation 1. From that distance to 100 feet of a stream use management practices that maintain 90% of pre-harvest infiltration rates. No harvest on unstable areas.	Prevent sediment delivery to stream and prevention of concentration of overland flow.

Design & Mitigation Measures	Objective
5. **Large wood recruitment** – wood contribution zone need to be considered on a site specific basis.	Maintain and improve fish habitat complexity by recruitment of large wood material.
Riparian Reserves: Intermittent Streams	
1. During **fuels treatment,** minimize burning ground vegetation within 25 feet of a stream (any slope, low intensity burn). Minimize removal of understory vegetation within 25 feet.	Maintain bank integrity to prevent erosion during high flows.
2. **Fuels treatment** – No hand piles will be located or burned in the channel. Minimize hand pile burning closer than 25 feet from a stream. No ignition points within 100 feet.	Maintain bank integrity to prevent erosion during high flows.
3. **Timber harvest** – No timber harvest within 25 feet of a stream. From 25 to 100 feet of a stream use management practices that maintain 90% of pre-harvest infiltration rates. No harvest on unstable areas.	Prevent sediment delivery to stream and prevention of concentration of overland flow.
4. **Large wood recruitment** – wood contribution zone need to be considered on a site specific basis.	Maintain and improve fish habitat complexity by recruitment of large wood material.

2.7.4 Aquatic Biota

Design & Mitigation Measures

Stream Enhancement

- Place large wood (LW) and boulders only in those areas where they would naturally occur and in patterns that closely mimic that which would naturally occur for that particular stream type.
- LW includes whole conifer and hardwood trees, logs, and root wads. LW size (diameter and length) should account for bankfull width and stream discharge rates. When available, trees with rootwads should be a minimum of 1.5 x bankfull channel width, while logs without root wads should be a minimum of two times the bankfull width. Place wood in a manner that most closely mimics natural accumulations of LW for that particular stream type. Structures may partially or completely span stream channels or be positioned along streambanks.
- No conifers should be felled in the riparian area for in-channel large wood placement unless conifers are fully stocked and are consistent with project design criteria in vegetation treatment categories. Felled hazard trees can be used for in-channel wood placement.
- LW may be buried into the streambank or channel but shall not constitute the dominant placement method of LW.
- Tree Removal for LW Projects:
    - Trees may be removed by cable, ground based equipment, or felled directly into the stream. Felled trees may be stock-piled for later instream enhancement projects.

- Individual trees or small groups of trees (<5) should come from the periphery of permanent openings (roads, etc.) or from the periphery of non-permanent openings (e.g. plantations, along recent clear-cuts, etc.).
- Trees selected for LW enhancement projects must be spaced at least one site potential tree height apart and at least one crown width from any trees with potential nesting structure for ESA-listed bird species.

- Instream work will occur during the Oregon Department of Fish and Wildlife (ODFW) instream work period.

2.7.5 Wildlife

Species	Design & Mitigation Measures	Objective	Applies to
NSO	**Treatment timing of any commercial thinning** for certain units are to be staggered over at least two years to minimize effects to prey base for particular known NSO sites, see project biological opinion for more details.	Minimize adverse impacts to federally listed species (spotted owls).	Units: 8, 9, 12, 12A, 262, 504, 505, 3, 3S, 14, 15, 16, 23B, 23C, 31 31A, 31B, 63, 64, 69, 70, 80, 101
NSO	**Unit specific treatments for units 101 (entire) and 31B between Secret Creek and road 2500643 –** underburn only, minimize ignition, hand thinning may occur to reduce ladder fuels where needed to prevent crown fire. No construction of landings or temp roads in these areas.	Minimize adverse impacts to federally listed species (spotted owls).	Units 101 and 31B
NSO	**Nest patches (70 acres) –** commercial thinning or temporary road or landing construction will not occur within any NSO nest patches.	Minimize adverse impacts to federally listed species (spotted owls).	All treatment units.
NSO	**High Quality NRF (RA32) –** no treatment activities will occur in patches identified as high-quality NRF per recovery plan RA32 implementation guidance.	Maintain habitat for federally listed species (spotted owl dispersal habitat).	
NSO	**Gaps** - Created forest openings will be 3/4 acre or smaller. Gap acreage will not exceed 20% of the unit area inclusive of landings, roads, yarding corridors and other operational openings.	Maintain habitat for federally listed species (spotted owl dispersal habitat).	All treatment units.
NSO	**Noise above ambien**t (chain saws, felling, yarding, road construction, heavy equipment) within disturbance distances - Work activities (tree felling, yarding, road construction, etc.) that produce loud noises above ambient levels will not occur within restricted distances of any spotted owl nest site or unsurveyed NRF habitat between 1 March and 30 June (or until two weeks after the fledging period) – unless protocol surveys have determined the nest site or habitat not occupied, non-nesting, or failed in nesting attempt. Buffer distance for chain saws is 65 yards; for heavy equipment is 35 yards.	Minimize adverse impacts to federally listed species (spotted owls).	All project activities within disturbance distances of NRF habitat.
NSO	**Helicopter or blasting operations** - Follow the project design criteria in the relevant biological assessment.	Minimize adverse impacts to federally listed species (NSO).	Area of disturbance.

Species	Design & Mitigation Measures	Objective	Applies to
NSO	**Hauling** on roads not generally used by the public (usually ML 1 & 2) and within 65 yards of an owl nest site or unsurveyed NRF habitat– is restricted from 1 March through 30 June (or as determined by a wildlife biologist).	Minimize adverse impacts to federally listed species (spotted owls).	Haul on ML 1 & 2 roads (typically) and within 65 yards of an owl nest site.
NSO	**Danger trees** along roads - Limit number of trees to be felled within spotted owl habitat (NRF or dispersal) to no more than 10 trees per road mile. Limit number of trees to be felled within owl nest patch to no more than 5 trees per known nest site.	Maintain habitat for federally listed species (spotted owl)	Haul routes
NSO	**Burning** will not take place within 1/4 mile of a spotted owl site or unsurveyed NRF habitat between 1 March and 30 June (or until two weeks after the fledging period) unless substantial smoke will not drift into the NRF habitat or protocol surveys have determined the habitat is not occupied, or a known site is non-nesting, or failed in their nesting attempt.	Minimize adverse impacts to federally listed species (spotted owls).	All treatment areas.
NSO	**If new NSO occupied sites are found during implementation,** notify the district biologist and contract officer to implement work stoppage and further evaluation to ensure compliance with consultation (See project BA p 25).	Minimize adverse impacts to federally listed species (spotted owls).	All treatment areas.
Pacific fisher	A **timing restriction** on thinning, yarding and burning activities is recommended from March 1 through June 30, unless protocols are implemented to determine that fishers are not denning in any given unit.	Minimize adverse impacts to federally proposed species	All treatment areas.
RTV	**Red tree vole nest trees outside of high priority sites** - Do not cut known nest trees (see map, Allison 2018, appendix A, map 1) and retain canopy connectivity to adjacent trees.	Minimize adverse impacts to red tree voles.	Units 2,3,4,6,9,10,15,16,23b,48, 253,504,505,508 652
Early seral	**Seed** landings, decommissioned roads, meadows and other openings with appropriate native grasses, forbs and shrubs to benefit pollinators, ungulates and other early-seral species.	Provide for species dependent on grasses and flowering/fruit producing plants; such as, butterflies, bees, some birds and mammals, ungulates etc.	All treatment areas.
Misc.	**Damaged, cull or defective trees** - Do not fell or remove. Leave for wildlife tree and snag recruitment.	Provide for species reliant on decadent trees or snags; such as, owls, fisher, bats and woodpeckers.	All treatment areas.
Misc.	**Existing dead wood; standing and down** - Avoid and protect existing snags and down wood ≥10 inches dbh to the greatest extent possible. Use treatment skips to avoid large dead wood (>20 inches dbh) or areas of accumulated standing and down dead wood.	Preserve existing dead wood to provide for species reliant on it; such as, owls, fisher, bats, woodpeckers, etc.	All treatment areas, especially DELSH and pine oak restoration

Species	Design & Mitigation Measures	Objective	Applies to
Misc.	**Create hard snags and large down wood** - in units where snags or down wood are deficient (< 4 snags per acre) and where it is desireable to eliminate trees >10″ dbh, (eg. girdle a Douglas fir to favor a black oak) Distribute as singles and clumps, across all treatment types. Leave snags cut as operational danger trees for down wood.	Provide hard, dead wood until the stand resumes producing dead wood through natural processes. Provide for species reliant on snags and large down wood; such as, owls, flying squirrels, fisher, bats, woodpeckers, cavity nesting birds, etc	All treatment areas, especially DELSH, pine oak and meadow restoration
Misc.	**Underburning –** avoid spring burning serpentine habitat with potential host plants (*Viola halli*) for coronis fritillary.	Minimize impacts to at-risk species	Serpentine within treatment areas
Misc.	**Incidental sightings** of sensitive species - Follow the design criteria and mitigation measures in relevant wildlife consultation documents, recovery documents, management plans or Forest Service policy.	Minimize adverse impacts to at-risk species.	All treatment areas.
Misc.	**Legacy trees** – greater than 120 years in age based on tree characteristics described in project marking guidelines would be retained in all treatment units.	Maintain legacy trees for heterogeneity, future large dead wood and benefit multiple species.	All treatment areas.
Misc.	Retention of large hardwoods – will be implemented per marking guidelines for all treatment units.	Maintain habitat diversity and benefit multiple species.	All treatment areas.
Misc.	Untreated buffers of active bird nests encountered during project activities would be large enough to avoid soliciting a stress response that causes and adult to flush from incubating eggs or nestlings, avoid feeding young or exhibit defensive behavior until young have fledged.	Minimize adverse impacts to breeding migratory birds and raptors.	All treatment areas.

2.7.6 Botanical Resources

Design & Mitigation Measure	Applies to
Sensitive Species	
RRS Botanists will flag all appropriate sensitive plant occurrences RRS Botanists will be adequately notified prior to implementation to ensure flagging is in place If any additional sensitive species occurrences are located prior to or during implementation they will be flagged, buffered, and avoided. The specific area of the buffer will be determined on a site specific basis. The goal of the buffer will be to prevent direct disturbance to the plants and to protect the local habitat by minimizing disturbance to the soils, hydrology, and mychorrhizal communities.	All units and all sensitive botanical species occurrences
Cypripedium fasciculatum	Units:

Design & Mitigation Measure	Applies to
All occurrences of *Cypripedium fasciculatum* will be buffered and flagged by up to a 100 foot radius. RRS botanists will flag the buffer. No project activities will occur within the buffered area. Project activities prohibited within the buffered/flagged areas include: • No ground disturbance • No temp roads • No road decommissioning • No landings • No machinery (including ground based tree removal systems) • No skid trails • No tree/brush/plant removal • No canopy disturbance • No skyline/cable logging over buffered areas • No fuel piling • No pile burning • No underburning or fire • Directional fell trees away from buffered areas	3, 21, 22, 23A, 24, 63, 508 and 509
Iliamna latibracteata The occurrence of *Iliamna latibracteata* will be buffered and flagged by a 30 foot radius from individuals. RRS botanists will flag the buffer. There are occurrences in Units 3, 14, and 50. Hand thinning of overstory and underburning within the buffered area desired. Material will be piled outside the buffered areas. Lop and scatter material is acceptable and may be underburned within the buffered area. Individuals will be flagged avoided. **The occurrence in Unit 50 is directly on the edge of the FS Road 2500. Pullouts and other vehicle and equipment activities will be prohibited within the buffered areas. Staging, decking, piling of timber are prohibited within the buffered areas.** Project activities prohibited within the buffered/flagged areas include: • No ground disturbance such as ground based tree removal systems • No temp roads • No road decommissioning • No landings • No machinery (including ground based tree removal systems) • No skid trails • No skyline/cable logging over buffered areas • No slash piling • No fuel piling • No pile burning • Directional fell trees away from buffered areas	Units: 3, 14, and 50
Sophora leachiana Lop and scatter is permitted with underburning. Underburning is desirable. Western sophora needs open areas to thrive. Creating ½ to ¾ acre openings adjacent to plants (but not on existing plants) within the sophora area is desirable and recommended. **In Unit 2 and other units where there may be tractor logging within Sophora areas:** • Individuals will be buffered up to 30 feet in radius determined by RRS Botanists • This buffer will prohibit tractor logging and prohibited activities listed below	Units: 2, 3, 3S, 5, 9, 14, 15, 16, 35, 48, 240, 262, 503, 504, 505, 506, 510, and 652

Design & Mitigation Measure	Applies to
• Trees will be directional felled away from buffered areas • Underburning is desirable **All Sophora Units - Project activities prohibited within the Sophora areas include:** • No temp roads • No road decommissioning • No landings • No machinery such as ground based tree removal systems • No skid trails • No slash piling • No fuel piling within 30 feet of individuals • No pile burning within 30 feet of individuals **Road decommissioning activities** • Flag, buffer, and avoid population on FS road 2500-100 past Windy Creek • Flag, buffer, and avoid population on FS road 2500-606	
Pyrola dentata All occurrences of *Pyrola dentata* will be buffered and flagged by a 30 foot radius. RRS botanists will flag the buffer. No project activities will occur within the buffered area. Project activities prohibited within the buffered/flagged areas include: • No ground disturbance • No temp roads • No road decommissioning • No landings • No machinery (including ground based tree removal systems) • No skid trails • No tree/brush/plant removal • No canopy disturbance • No skyline/cable logging over buffered areas • No fuel piling • No pile burning • No underburning or fire • Directional fell trees away from buffered areas	Unit 47
Strategic and Survey & Manage Species	
If any target species are found during pre-implementation surveys, flagging will be placed to delineate a protective boundary, which will include up to a 100-ft “no activity” buffer. All known strategic and survey and manage species will be flagged to delineate a protective boundary, which will include up to a 100-ft “no activity” buffer. Rogue River-Siskiyou Botany Department will delineate and flag the protective species boundaries.	All Units
***Piperia candida* (white piperia)** Occurrences will be buffered and flagged up to a 50 foot radius. RRS botanists will flag the buffer. No project activities will occur within the buffered area. Project activities prohibited within the buffered/flagged areas include:	Units 7, 22, 38, 13W

Design & Mitigation Measure	Applies to
• No ground disturbance • No temp roads • No landings • No machinery (including ground based tree removal systems) • No skid trails • No tree/brush/plant removal • No canopy disturbance • No skyline/cable logging over buffered areas • No slash piling • No fuel piling • No pile burning • No underburning or fire • Directional fell trees away from buffered areas	
Strategic and Survey & Manage Fungi	Units
Elaphomyces reticulatus, Otidea leporina, Ramaria rubripermanens, Sparassis crispa, Spathularia flavida, Tylopilus porphyrosporus are strategic and survey and manage fungi species that is dependent on the mycorrhizal soils. Fire can impact the mycorrhizal soil profiles altering the viability of individuals and localized occurrences ultimately leading to mortality. Soil compaction negatively alters the below fungi mycelium as well as mycorrhizal soils. Threats to this species include timber harvest, road construction, decommissioning of roads, trail construction, creation of recreation sites, and fire. Threats also include actions that alter the hydrology, moisture, and temperature regimes, disturb the soil and litter layers. All Strategic and Survey and Manage fungi occurrences will be buffered and flagged up to a 100 foot radius. RRS botanists will flag the buffer. No project activities will occur within the buffered area.	8, 12, 14, 48, 57, 505, 510
Invasive Plants	
RRSNF Botanists will be notified adequately (minimum of two weeks) prior to any project implementation of unit or road area to treat and/or properly flag infested areas in field season. If implementation is to occur outside of field season then schedule should be relayed to Botany Department in previous field season to adequately treat infestations.	All Invasive Plant Infestations, Units, and Project Area

Design & Mitigation Measure	Applies to
All WRRD target invasive plants and noxious weed infestations within the project area or along travel routes near the project area will be hand treated where feasible or "flagged and avoided" according to the species present and project constraints. Roadside invasive plant sites would be flagged and/or staked by the RRSNF Botanist/Invasive Plant Coordinator. Infested sites will be avoided or the FS Contracting Officer's Representative or other FS Representative (representatives may include COR/ER/FSR/SA, etc.) would direct contractor to blade or ditch in a manner that reduces the potential spread from infested to un-infested sites (e.g. blading into instead of through from infestations). <u>Units with known invasive plant infestations</u> 2, 3, 4, 5, 9, 10, 12, 19, 20, 23A, 31B 39, 48, 50, 55, 63, 64, 69, 165, 262, 500, 501, 505, 510, 513, 517; FS Road 2500 Haul Route to North <u>Roads with known invasive plant infestations</u> FS Road 2500 Haul Route to North, 2500000, 2500100, 2500110, 2500121, 2500128, 2500138, 2500141, 2500603, 2500609, 2500617, 2500640, 2500643, 2509000, 2509021, 2509025, 2509032, 2509049, 2509630, 2509631, 2509632,2509633, 2510000 ,2512000, 2512013, 2512017, 2512040,2512635	All Units and Project Area
All off-road equipment used on this project shall be washed and cleaned before moving into the project area to ensure that the equipment is free of soil, seeds, vegetative material, or other debris that could contain or hold seeds of noxious weeds. "Off-road equipment" includes all logging and construction equipment (bull dozers, graders, etc.) and such brushing equipment as brush hogs, masticators, and chippers; it does not include log trucks, chip vans, service vehicles, water trucks, pickup trucks, and similar vehicles not intended for off-road use. However, it is recommended that all vehicles, especially large vehicles, are cleaned when they come onto the Forest Service lands or come from a known weed infested area. This is to reduce the potential for spreading invasive plants. The Forest Service will inspect all off-road equipment used on this project prior to entry onto NFS lands. • All parts of equipment must be clean including the undercarriage and chassis before transport to the project area or between project areas. • Equipment will be considered clean when visual inspection by FS Contracting Officer Representative (or other FS Representative) does not reveal soil, seeds, plant material, or other such debris. • When working in known weed infested areas equipment shall then be cleaned before moving to other Forest Service system lands that are un-infested or which do not contain the same invasive plant species.	All Units and Project Area
In order to be in compliance with the 2005 R.O.D. for managing invasive plants, all earth-moving equipment, gravel, fill, or other materials are required to be weed-free. Use onsite sand, gravel, rock, or organic matter when possible. Otherwise, obtain weed-free materials from gravel pits and fill sources that have been surveyed and approved by a RRS Botanist/Invasive Plant Coordinator.	All Units and Project Area
Minimize the amount of ground and vegetation disturbance in the implementation areas. Reestablish vegetation where feasible on disturbed bare ground to minimize weed establishment and infestation. Re-vegetation is especially important in staging areas.	All Units and Project Area

Design & Mitigation Measure	Applies to
Use weed-free mulches, and seed sources. All activities that require seeding or planting must utilize locally collected native seed sources when possible. Plant and seed material should be collected from or near the project area, from within the same watershed, and at a similar elevation when possible. This requirement is consistent with the Forest Service Manual 2000 (Chapter 2070-Vegetation Ecology) policy that directs the use of native plant material for re-vegetation and restoration for maintaining "the overall national goal of conserving the biodiversity, health, productivity, and sustainable use of forest, rangeland, and aquatic ecosystems." Seed mixes must be approved by a RRSNF Botanist.	All Units and Project Area
Soil moved from an infested site to be disposed of at designated site coordinated by engineers and the District Botanist/Invasive Plant Coordinator.	All Units and Project Area
Landings or staging areas for equipment, materials, or crews will not be sited in invasive plant or noxious weed infested areas.	All Units and Project Area
Disturbed areas will be re-vegetated to prevent the establishment or spread of invasive plants and noxious weeds. Areas may be re-vegetated dependent on the requirement and need of each individual site influenced by the activity that would occur at these sites (refer to Upper Briggs Restoration Project Re-Vegetation Plan for specifics).	All Units and Project Area
Areas with medusahead infestations will be avoided by equipment and operations. If prescribed fire is to be utilized in these areas it will be coordinated with RRS Botanist • FS road 2500121 • FS road 2512013 (Sam Brown Campground) • FS road 2512 (Sam Brown Horse camp parking lot) • Any new infestations discovered	All Units and Project Area
After the project phase is completed the WRRD Botanist must be notified so that the project area can be monitored for 3 years subsequent to project implementation to ensure additional invasive plant species do not become established in the areas affected by the project and to ensure that known weeds do not spread. Monitoring will result in early detection and treatment of invasive plant sites, thus reducing the cost of treatment and the long-term environmental impacts of invasion.	All Units and Project Area
Any new invasive plants found in the project area will be documented and the Wild Rivers District Botanist will be notified of the infestation location.	All Units and Project Area

2.7.7 Vegetation

Design & Mitigation Measures	Objective	Applies to
Project Scheduling: Schedule project activities during the dry season (June 1 – September 30**)** **Unit Scheduling:** Conduct work on roads where *P. lateralis* is not present before working on sites infested with *P. lateralis.*	Minimize risk of introducing new *P. lateralis* infestations to uninfested Port Orford cedars	ALL uninfected Port Orford cedar populations

Design & Mitigation Measures	Objective	Applies to
Access: Designate access and egress routes to minimize exposure to *P. lateralis.* **Washing Project Equipment**: a) Wash project equipment, work boots and hand tools before entering National Forest land for the first time in the work period. Wash equipment again before entering National Forest lands if work is halted and equipment is taken to another job site, or for any reason equipment is taken to another job site away from this project. b) Wash project equipment, work boots and any hand tools after working in each area where *P. lateralis* is already known to be present and before working on the next scheduled site. c) Wash stations will be established through coordination with the botanist and the contract inspector on the project. d) Wash stations will follow the design recommended in the Attachment 2: General Specifications for a Washing Station and Equipment Cleaning Checklist POC FSEIS ROD 2004. This design will consist of a 6" rock lift from the existing road surface and be at least 1.5 times the length of the longest truck used in operations. Water would be caught at the lowest point off of the road in a hole lined with bio mesh that would be disposed of by burning or bagged and disposed to a landfill to remove any invasive weed seeds. e) A wash station may also be a mobile wash station that can be moved from site to site for cleaning of the equipment. The mobile wash station mush use treated water following the below criteria for bleach concentration. Wash station filters would be bagged and disposed of in a landfill to prevent spread or establishment of invasive plant seeds or materials. **Utilizing Uninfested Water**: Use uninfested water sources for planned activities such as equipment washing, road watering, and other water-distribution needs, or treat water with Ultra Clorox®, at a rate of 1 gallon of bleach/1000 gallons of water. **Summer Rain Events:** Apply permit or contract clause or otherwise require cessation of operations when indicators such as puddles in the roadway, water running in roadside ditches, or increase in soils moisture (as by moisture meter or equivalent) indicate an unacceptable increase in the likelihood of spreading *P. lateralis.*		
Resistant POC Planting: Site specific based on uninfected areas where the proposed action treatment for a road either storage or decommission. (See Upper Briggs Restoration Project Revegetation Plan)	Introduce resistant POC into uninfested locations where vegetation removal occurs in the project area.	ALL roads that receive Storage or Decommissioning Treatments
Routing Recreation use: Route new trails (off-highway vehicle, motorcycle, mountain bike, horse, and foot) away from areas with POC or PL, or provide other mitigation such as seasonal closures. Trailheads will be relocated and/or established trails will be rerouted in the same matter where trails present serious risk to POC, or provide other mitigation such a site hardening.	Minimize risk of introducing new *P. lateralis* infestations to uninfested Port Orford cedars	2500-100 Decommissioning road

Design & Mitigation Measures	Objective	Applies to
Felled material is to be either removed, lopped and scattered and or piled and burned. Do not leave felled material to stay in treatment unit over one season.	Minimize risk of new insect infestation (Pine (*sp*) Bark Beetle)	

2.7.8 Heritage

Design & Mitigation Measure	Applies to
• Unevaluated sites will be treated as eligible for all actions. • No use of vehicles or other mechanized equipment within sites boundaries that are designated for avoidance. • No staging of equipment or materials within site boundaries. • In the event that cultural materials or human remains are discovered, all activities in the immediate area will stop, the area secured and the Forest Archaeologist and District Ranger will be notified immediately. Work will not resume in that area until the Forest Archaeologist has evaluated the material and has notified the District Ranger that the applicable requirements of 36 CFR 800 and NAGPRA have been completed.	All Activities
No treatments or ground disturbance are permitted within site boundaries, except in these cases, and provided: • If hand thinning is necessary within site boundaries, an archaeologist will identify features for avoidance Trees are felled away from all site features (i.e. buildings, ditches, trails). • No dragging of logs, trees, or thinned material across or within site boundaries or features. Forest archaeologist or Zone archaeologist will identify places to cross over eligible and unevaluated ditches and trails where there will be no effect to the site. • No landings or staging of equipment or materials within site boundaries • Harvested and thinned material may be removed and crossed over the Taylor Creek Trail. The proposed treatment area along Taylor Creek has been harvested before. Proposed landings along the Taylor Creek Trail should be located to maximize the least disturbance to the physical route and tread of the trail. • No staging or piling of slash and waste materials resulting from harvesting and thinning on site. • Slash material may be lopped and scattered within site boundaries. • Vegetation may be removed adjacent to historic trails and ditches to reduce fuel loading. Trees should be directionally felled away from feature. Very large trees (i.e. over 150 years old) should be retained if present. • Hauling routes, yarding and skid trail crossings of historic eligible and unevaluated ditches and trails will be avoided or minimized. If crossings are necessary for the removal of timber an Archaeologist or archaeological technician will work with timber staff to identify the minimal locations appropriate to cross eligible and unevaluated ditches and trails to avoid any impacts to significant[4] characteristics and the physical integrity of the site.	Vegetation Removal

[4] "Significant" as defined by the National Register Bulletin #15 (USDI 1990)

Design & Mitigation Measure	Applies to
• Eligible and unevaluated ditches and non-motorized historic trails will not be used for skid trails, temporary roads, or hauling routes.	
Broadcast burning over non-combustible sites is allowed, provided: • No ignition points within site boundaries • No staging of equipment within site boundaries • No slash piles within site boundaries. One or more of the following measures will be implemented to protect fire-sensitive sites: • No slash piles within or adjacent to site features. • Exclude site from burn unit area. • Hand line • Black line • Wet line • Foam retardant • Structural fire shelter • Remove heavy fuels from site by hand. • Prevent in-situ heavy fuels that cannot be removed from ignition (e.g., flush-cut & bury stumps). The same protective measures will be implemented for future maintenance burns.	Prescribed Fire Treatments
• Avoid ground disturbance to historic eligible and unevaluated trails and ditches; trail alignments will not be rerouted. • Maintenance of historic trail tread surface materials will not be changed from the existing type of materials; intact contributing segments of ditches will not be obliterated or rerouted. • Large boulders, vegetation or berms may be placed on top of or next to trails and ditches to close area from motorized access.	Road Decommissioning
See measure listed under vegetation removal No protection measures for Onion Mt. Road (06102200759/ SK-0759). Road was determined not eligible with SHPO concurrence.	Existing roads, and construction of temporary roads for hauling
N/A, No sites present.	Stream Crossing Improvements

2.7.9 Recreation & Visuals

Objective	Design & Mitigation Measure
A. Minimize conflicts between recreationists (other forest visitors) and harvest activities.	A1. Utilize partial area closure during harvest operations to minimize the potential for accidental injury to recreationists during logging operations (recreation). A2. Utilize signing, press releases, and work with local user groups to redirect recreation activities to safe use areas during harvest operations (recreation). A3. Purchaser will be required to set up logging operation warning signs. A4. Restrict log hauling during high recreation use periods (weekends, holidays).

Objective	Design & Mitigation Measure
B. Minimize conflicts between harvest operations and permitted special use recreation events.	B1. Restrict log hauling on roads involved with permitted special use events during the scheduled events (recreation).
C. Protect Recreation Improvements (trails, trailheads, signs, etc.)	C1. Identify recreation improvements on sale area map; protect, repair and restore any damage caused by harvest operations. C2. Trees should be directionally felled away from trails and skidded across trails, not down to minimize impacts to trail tread.
D. Minimize impacts to Scenic Quality.	D1. Low cut stumps along roads in High Visual Sensitivity Level areas and adjacent to trails. D2. Pile and burn slash at least 50 feet from trail tread to retain small trees and vegetation adjacent to the trail. D3. Pile and burn slash at least 300 feet away from roads in High Visual Sensitivity Level areas.

3 Environmental Impacts of the Proposed Action & Alternatives

This section summarizes the physical, biological, and social environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. This section also presents the scientific and analytical basis for comparison of alternatives. Affected environment (existing condition) and environmental consequences sections have been divided by resource areas and then by alternative. Further, effects analyses that are required by law are discussed per alternative.

Existing conditions are used to evaluate the potential effects of each alternative. The no action alternative would be the state of the project area under the anticipated future condition if no action is implemented. The proposed action alternative and alternative 3 would be the state of the proposed project area under the anticipated future condition if either alternative is implemented. Direct and indirect effects to the existing conditions are described for the no action alternative. Direct, indirect and cumulative effects to existing conditions are described for the proposed action alternative and alternative 3. The following conditions are described within this chapter: physical, biologic and socio-economic resources. Specialist reports are incorporated by reference, but not included as appendixes to this document. Instead, referenced specialist reports are provided here: https://www.fs.usda.gov/project/?project=45593.

3.1 Physical Resources

3.1.1 Soils & Geology

The Upper Briggs Restoration Project soils resource report (Brazier 2017) evaluates the soil conditions within the planning area and provides a full explanation of measurements and metric used in evaluating the information for the no action and action alternatives. The information provided in this EA is summarized from the soils report and is available here: http://www.fs.fed.us/nepa/nepa_project_exp.php?project=45593.

3.1.1.1 EXISTING CONDITIONS

GEOLOGY

The Upper Briggs planning area is within the Klamath Mountains Physiographic Province. The bedrock geology of the Upper Briggs planning area consists of three main northeast-trending bands, dissected by multiple northeast-trending faultlines. The western band is made up of the Illinois River Plutonic complex, which includes the Briggs Creek amphibolite, which is thought to be a tectonic slice of metamorphosed oceanic crust. The middle band is made up of rocks of the Galice and Rogue formations, a combination of marine sedimentary and volcanic rocks. Myers Creek, Horse Creek and Secret Creek valleys are located in this area. The eastern band consists of the Onion Camp complex, made up of Applegate amphibolite and a mix of metamorphosed sedimentary and volcanic rocks. Along the fault zones between the Rogue/Galice formation and the Onion Camp complex is a well-defined band of serpentinite. Information for this summary was gathered from Orr et al. (1992), the *Briggs Creek Watershed Analysis, Version 1.0* (USFS 1997), and the Oregon Department of Geology and Mineral Industries (DOGAMI) OGDC-5 geographic information systems (GIS) geology layer. Figure 11 displays the geologic mapping of the planning area, and Table provides definitions of the map unit symbols.

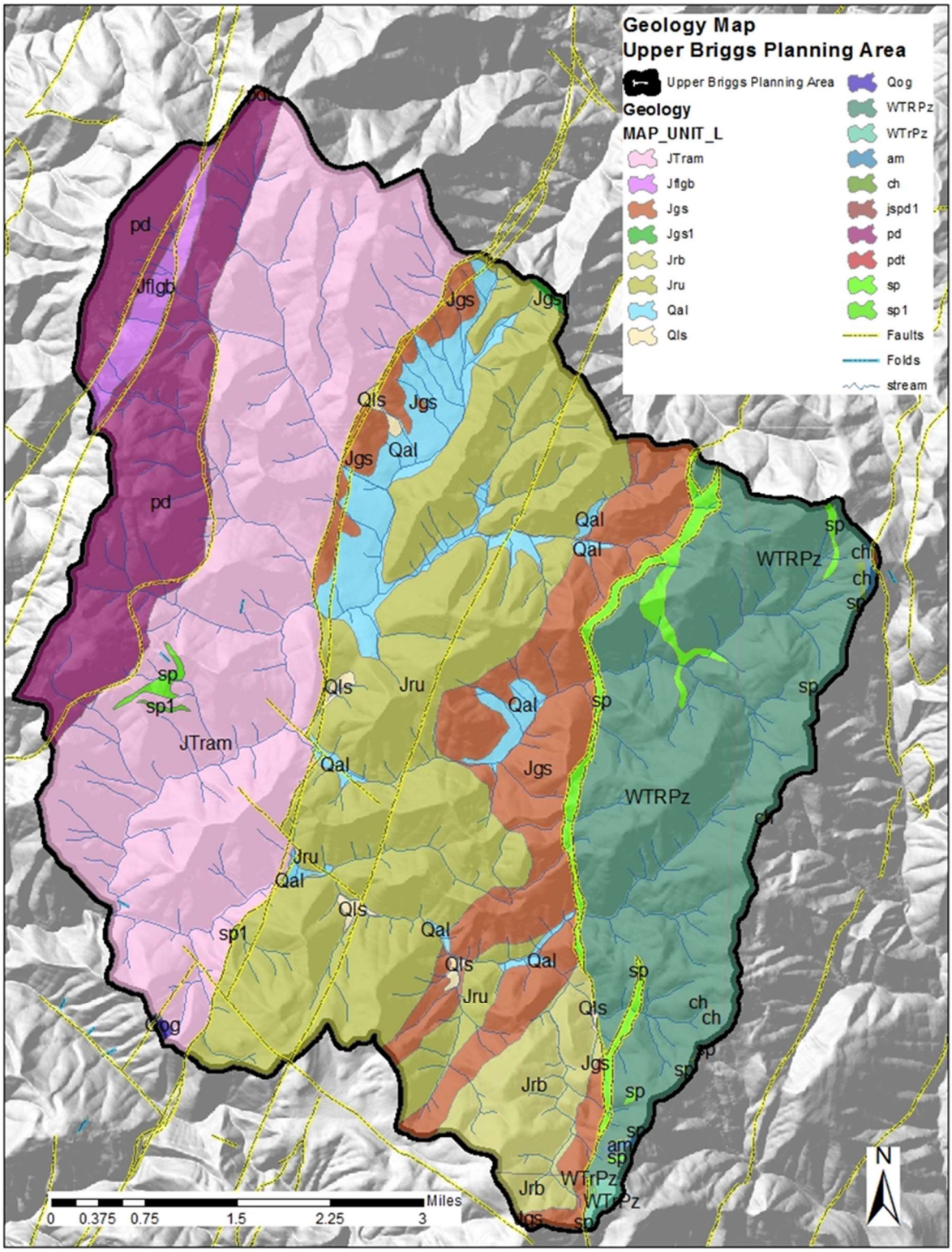


Figure 11. Geologic Map of the Upper Briggs Planning Area.

Table10. Map Unit Descriptions - Geologic Map of the Upper Briggs Planning Area (Figure 11).

Map Unit Symbol	Map Unit Description	Map Unit Symbol	Map Unit Description
am	Onion Camp complex, amphibolite gneiss	ch	Onion Camp complex, chert
Jflgb	Illinois River plutonic complex	Jgs/Jgs1	Galice Formation, siltstone, sandstone, shale and chert
Jrb	Rogue Formation, volcanogenic turbidites	Jru	Rogue Formation, undivided marine sedimentary rocks
jspd1	Josephine Ophiolite, serpentinized peridotite	JTram	Country rocks of the Illinois River plutonic complex, Briggs Creek Amphibolite
pd	Country rocks of the Illinois River plutonic complex, harzburgite, dunite	pdt	Peridotite
Qal	Alluvial deposits	Qls	Landslide debris
Qog	Old river gravel deposits	sp/sp1	Onion Camp complex, serpentinite
WTrPz	Western Triassic and Paleozoic Belt, undivided (Applegate Amphibolite; metamorphic/sedimentary/volcanic rocks)	WTRPz	Onion Camp complex, undivided (Applegate Amphibolite; metamorphosed sedimentary/volcanic rocks)

(DOGAMI OGDC-5)

SLOPE STABILITY

Mass movement in the Upper Briggs planning area is most commonly shallow landslides, ravel, small-scale slumping and rockfall on steep slopes, particularly in relation to headwater drainages or where disturbance has removed all vegetative cover, and when these steep slopes experience high ground saturation such as during rain-on-snow events. There are four locations in the planning area where large earthflows or deep-seated landslides have occurred in the geologic past at a large-enough scale to be geologically mapped – they are identified in Figure 11 with the symbol “Qls”, landslide debris.

GIS modelling of the planning area was conducted to help identify the range of risk for potential slope instability and soil erosion risk. This modeling analyzes slope gradient, slope aspect, slope curvature, and upslope contributing area based on the Digital Elevation Model in ArcMap (explained in more detail under the “Methodology” section of this report), to estimate the potential for instability across the planning area landscape. Figure 12 displays the estimated risk, broken out by low, moderate, high, or very high risk for instability.

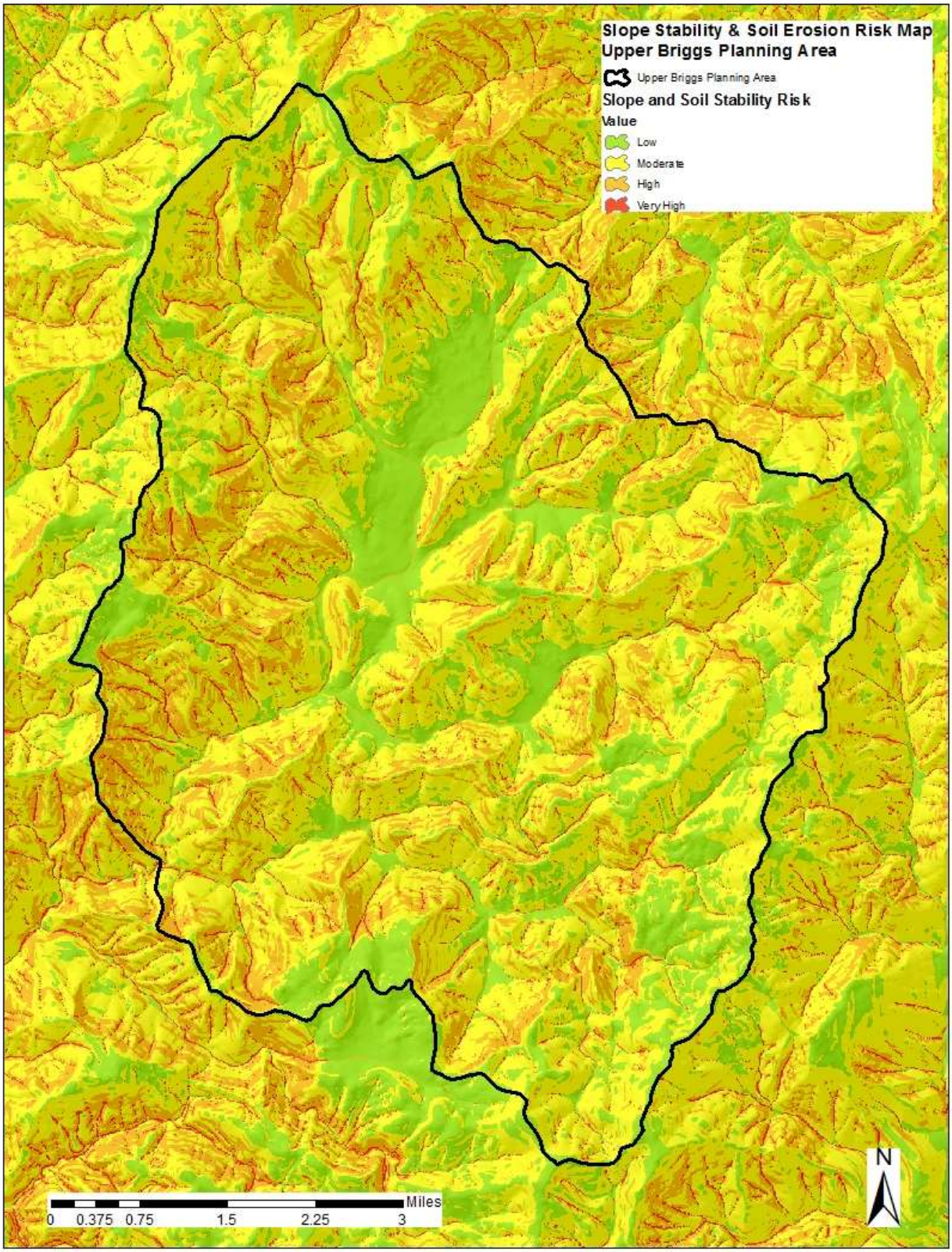


Figure 12. Slope Stability and Soil Erosion Risk Within the Upper Briggs Planning Area.

During field reviews of the project area, the most noted evidence of relatively recent instability (i.e. within the last several decades) were small isolated slumps occasionally encountered in previously managed stands on particularly steep slopes. In particular, proposed Units 63, 64, 118, and 253. They are not widespread or numerous enough to be considered to be affecting overall site productivity, but do indicate the sensitivity of these steep slopes and soils to instability under the right conditions.

A rotational slump is located in the headwall of a headwater tributary to Smith Creek (tributary to Horse Creek), in proposed Unit 10, with a large slug of soil/rock debris in the stream drainage where the two uppermost tributaries fork. Based on a review of aerial photography and an extensive field review of the slope and drainage, it appears this slump was last triggered after the stand replacing fire that occurred in the early 1900's (likely 1930's). The stand that has grown up on the slope since does not exhibit evidence of active slope movement, and the debris deposit is also vegetated.

Only one of the geologically mapped landslide deposits is in or near any of the proposed activities. Proposed meadow restoration in Unit 11 is on the debris fan of an ancient large-scale hillslope failure associated with tectonic fault zones at the contact between the Illinois River plutonic complex/Briggs Creek Amphibolite and the Galice Formation made up of weaker sedimentary rocks.

One of the roads (FSR 2500617) examined for potential decommissioning shows evidence of fillslope cracking and slumping, posing a risk for failure into a tributary stream of Horse Creek.

SOIL PRODUCTIVITY

Soils within the Upper Briggs planning area were first mapped as part of the Siskiyou National Forest Soil Resource Inventory (SRI) (Meyer and Amaranthus 1979). The SRI provides soil landtype unit information and interpretations that were specifically geared towards forested landscape management, and this information is still pertinent for forest management today. The area was later mapped by the Soil Conservation Service (now the Natural Resources Conservation Service) as part of the Josephine County Oregon Soil Survey (SCS 1989), providing soil survey data that is consistent with national soil survey standards. This analysis utilizes data generated from the Josephine County Oregon Soil Survey, unless specifically noted.

Soils in the planning area are developing on Dissected Mountains landform association, at an elevation range of approximately 2000 to 4400 feet, with average precipitation ranging from 50 to 90 inches, predominately as rain and snow in the winter. Soils are mostly in a mesic soil temperature regime, with highest elevations in the frigid soil temperature regime.

Table 111 lists the soil map units, map unit names, and taxonomy of the soils in the project area for Upper Briggs.

Figure 13 displays the soil map units and their soil taxonomic classification in the Upper Briggs planning area. Alifisol, Inceptisol, Mollisol, and Ultisol soil orders are represented in the planning area. Alfisols form primarily under forest or mixed vegetative cover, and are a result of weathering processes that leach clay minerals and other constituents out of the surface layer and into the subsoil, where they can hold and supply moisture and nutrients to plants. Inceptisols are soils that generally exhibit only moderate degrees of soil weathering and development. Mollisols characteristically form under grass in climates with a moderate to pronounced seasonal moisture deficit, and are soils that have a dark colored surface horizon relatively high in organic matter, are base rich, and quite fertile. Ultisols are soils that form in humid areas, from fairly intense weathering and leaching processes that result in a clay-enriched subsoil dominated in minerals, which, in some of the ultisols in Upper Briggs area, is kaolinite. Ultisols are typically acid soils in which most nutrients are concentrated in the upper

few inches. The kaolinitic ultisols in the Upper Briggs area are thought to be remnant alluvial soils that formed along the ancient Illinois River system before the range was uplifted to its present configuration.

Serpentinitic soils in the planning area are those that are forming in ultramafic peridotite/serpentinite parent geologies. These soils are droughty due to high rock content and are very low in fertility. Due to the minerology of the parent rock, the soils have a very high content of magnesium and are very low in calcium, which limits plant growth.

Table 11. Soil Map Units in the Upper Briggs Project Area.

Soil Map Unit	Soil Map Unit Name	Taxonomy
1B	Abegg gravelly loam, 2-7% slopes	Loamy-skeletal, mixed, mesic Ultic Haploxeralfs
4	Banning Loam	Fine-loamy, mixed, mesic Pachic Argixerolls
6F	Beekman-Colestine complex, 50-80% N. slopes	Loamy-skeletal, mixed, mesic Dystric Xerochrepts
7F	Beekman-Colestine complex, 50-75% S. slopes	
8G	Beekman-Vermisa complex, 60-100% N. slopes	
9G	Beekman-Vermisa complex, 60-100% S. slopes	
21F	Cornutt-Kubakella complex, 35-55% S. slopes	Fine, mixed, mesic Ultic Haploxeralfs
28F	Dubakella-Pearsoll complex, 35-75% N. slopes	Clayey-skeletal, serpentinitic, mesic Mollic Haploxeralfs
29F	Dubakella-Pearsoll complex, 35-70% S. slopes	
47E	Josephine gravelly loam, 20-35% slopes	Fine-loamy, mixed, mesic Typic Haploxerults
48F	Josephine gravelly loam, 35-55% N. slopes	
58F	Pearsoll-Rock outcrop complex, 20-60% slopes	Clayey-skeletal, serpentinitic, mesic Lithic Xerochrepts
60F	Perdin cobbly loam, 30-50% S slopes	Fine, serpentinitic, frigid Ultic Haploxeralfs
61B	Pollard loam, 2-7% slopes	Clayey, kaolinitic, mesic Typic Haploxerults
61C	Pollard loam, 7-12% slopes	
61D	Pollard loam, 12-60% slopes	
63F	Pollard-Beekman complex, 12-70% slopes	
72F	Speaker-Josephine gravelly loams, 35-55% S. slopes	Fine-loamy, mixed, mesic Ultic Haploxeralfs
80G	Vermisa-Beekman complex, 60-100% N. slopes	Loamy-skeletal, mixed, mesic Lithic Xerochrepts
81G	Vermisa-Beekman complex, 60-100% S. slopes	
82G	Vermisa-Rock outcrop complex, 60-100% S. slopes	
84F	Witzel-Rock outcrop complex, 30-75% slopes	Loamy-skeletal, mixed, mesic Lithic Ultic Haploxerolls
85G	Woodseye very gravelly loam, 50-90% S. slopes	Loamy-skeletal, mixed, frigid Lithic Xerumbrepts
86G	Woodseye-Jayar complex, 50-90% N. slopes	
87F	Woodseye-Rock outcrop complex, 20-60% slopes	

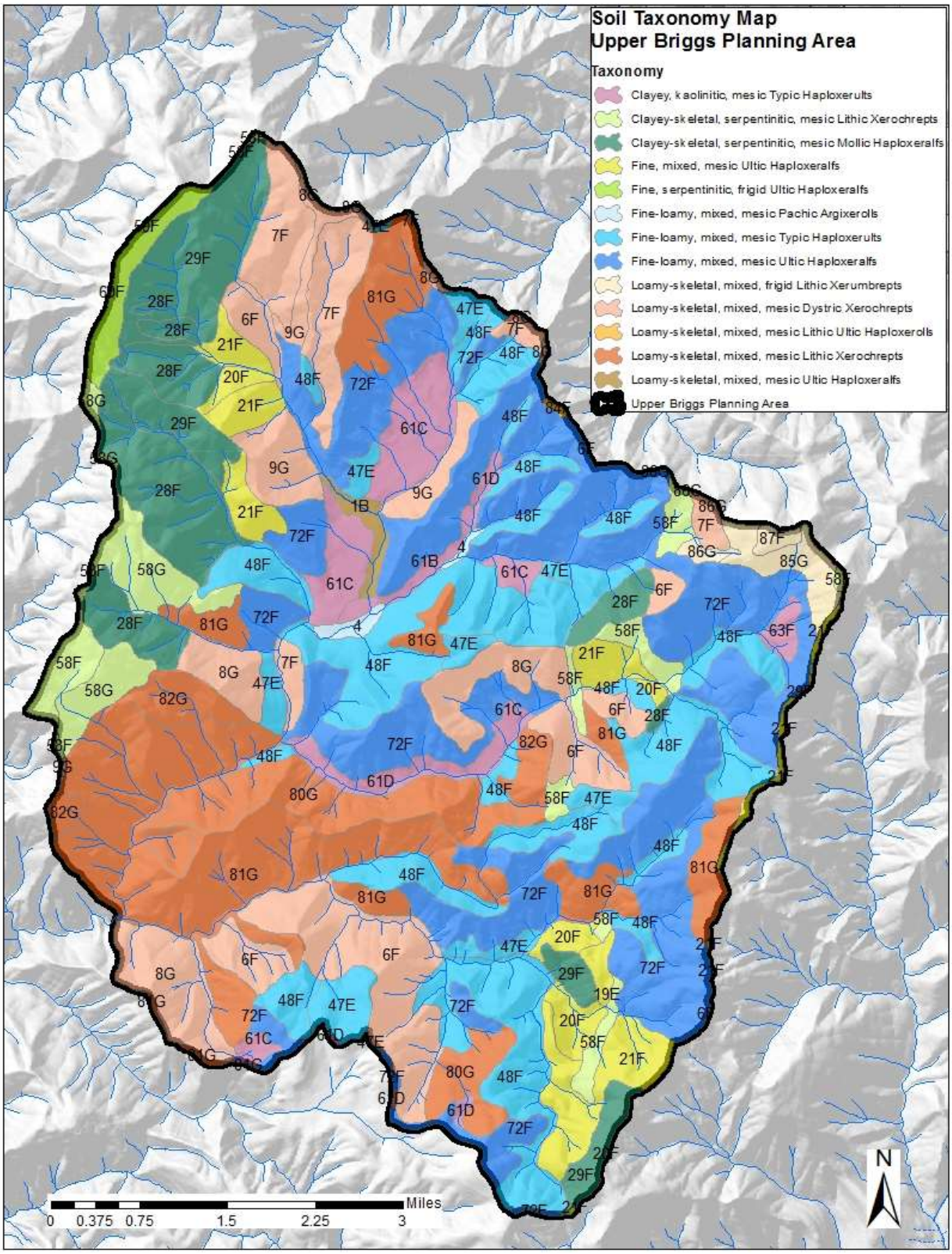


Figure 13. Soil Map of the Upper Briggs Planning Area.

Soil Disturbance

Table 42 displays the relative sensitivities to disturbance of each of the soil map units associated with proposed activities, (Web Soil Survey: http://websoilsurvey.nrcs.usda.gov/), based off of various soil properties.

The following paragraphs give a brief explanation of each rating, summarized from the Descriptions in the Web Soil Survey. Refer to the complete descriptions for more detail.

Site Degradation Susceptibility: Rates each soil for its susceptibility for soil degradation to occur during disturbance, seen conversely is the soil's buffering capacity to resist change. Ratings represent relative risk of water and wind erosion, salinization, sodification, organic matter and nutrient depletion and /or redistribution, and loss of adequate rooting depth.

Soil Compaction Resistance: Rates each soil for its resistance to compaction, which is predominantly influenced by moisture content, depth to saturation, percent of sand, silt, and clay, soil structure, organic matter content, and content of coarse fragments.

Soil Rutting Hazard: This rating indicates the hazard of surface rut formation through the operation of forestland equipment. Soil displacement and puddling may occur simultaneously with rutting. "Slight" indicates soil is subject to little or no rutting; "Moderate" indicates rutting is likely; "Severe" indicates that ruts form readily.

Erosion Hazard (Road/Trail): Ratings indicate the hazard of soil loss from un-surfaced roads and trails. Ratings are based on soil erosion factor K, slope, and content of rock fragments. "Slight" indicates that little or no erosion is likely; "Moderate" indicates some erosion is likely, and roads/trails may require occasional maintenance, and that simple erosion-control measures are needed; "Severe" indicates that erosion is expected, roads/trails require frequent maintenance, and costly erosion-control measures are needed.

Erosion Hazard (Off-Road, Off-Trail): Ratings indicate the hazard of soil loss from off-road and off-trail areas after disturbance activities that expose the soil surface. Ratings are based on slope and soil erosion factor K, with soil loss caused by sheet or rill erosion where 50 to 75 percent of the surface has been exposed by logging, grazing, mining, or other kinds of disturbance.

Soil Restoration Potential: Rates each soil for its inherent ability to recover from degradation (i.e., soil resilience). Soil resilience is dependent upon adequate stores of organic matter, good soil structure, low salt and sodium levels, adequate nutrient levels, microbial biomass and diversity, adequate precipitation for recovery, and other soil properties.

Overall, the soils within the Upper Briggs planning area are sensitive to disturbances that can have an adverse effect to soil productivity. Interestingly, these soils also show an inherent ability to recover well from these disturbances, either naturally or through implementation of restoration activities. This has been apparent in field reviews throughout the Upper Briggs project area looking at the residual effects of past actions, discussed in the Current Condition Assessment, below.

Table 4. Sensitivities of Soils in the Upper Briggs Planning Area to Selected Disturbances.

Map Unit	Site Degradation Susceptibility	Soil Compaction Resistance	Soil Rutting Hazard	Erosion Hazard (Road/Trail)	Erosion Hazard (Off-Road, Off-Trail)	Soil Restoration Potential
1B	Slightly	Moderate	Slight	Slight	Slight	High
4	Slightly	Low	Severe	Slight	Slight	High
6F 7F 8G 9G	Highly	Low	Moderate	Severe	Very severe	High
21F	Highly	Moderate	Severe	Severe	Severe	High
28F 29F	Highly	Low	Severe	Severe	Very severe	High
47E	Highly	Moderate	Slight	Severe	Moderate	High
48F	Highly	Moderate	Slight	Severe	Severe	High
58F	Highly	Low	Moderate	Severe	Severe	Moderate
60F	Highly	Moderate	Severe	Severe	Severe	High
61B	Slightly	High	Severe	Moderate	Slight	High
61C	Slightly	High	Severe	Severe	Slight	High
61D	Moderately	High	Severe	Severe	Moderate	High
63F	Highly	High	Severe	Severe	Moderate	High
72F	Highly	Low	Moderate	Severe	Severe	High
80G 81G 82G 84F	Highly	Low	Slight	Severe	Very severe	Moderate
85G 86G	Highly	Moderate	Slight	Severe	Very severe	Moderate
87F	Highly	Moderate	Slight	Severe	Severe	Moderate

Fourteen of the proposed treatment units are in previously managed stands. Soil monitoring was conducted in 2016 to determine the current condition of the soil resource in these stands based on past management activities that had the potential to create detrimental soil conditions. The monitoring was conducted using the Forest Soil Disturbance Monitoring Protocol rapid assessment (Page-Dumroese et al. 2009). Table 53. Current Residual Detrimental Disturbance in Managed Stands Planned for Re-entry summarizes the management history and the results of the soil disturbance monitoring.

Table 53. Current Residual Detrimental Disturbance in Managed Stands Planned for Re-entry

Note that some units were subdivided for soil disturbance monitoring based on unit size and/or differences in site characteristics across the unit.

Unit or Sub-unit No.	Soil Map Units	Management History Summary	Soil Disturbance Monitoring – Proportion of Unit/Sub-unit per Severity Class (%)				Proportion of Unit or Sub-Unit Currently Detrimentally Impaired (%)
			0	1	2	3	
8	61C	HCC, 1988	90	0	10	0	10
63 SE	8G, 61C, 61D, 72F	HSH, 1972	83	7	3	7	10
63 NE			83	10	7	0	7
63 Mid			87	10	3	0	3
63 West			87	10	3	0	3
64 East	8G, 72F	HCC, 1968	97	0	3	0	3
64 West			83	17	0	0	0
71	7F	HCC, 1967	80	10	7	3	10
80*	6F, 61C, 72F, 82G	HCC, 1969	100	0	0	0	0
102 N	6F, 47E, 48F, 58F	HCR, 1995; HCC 1980	77	17	7	0	7
102 S		HSV, 1972; HSV, 1990	93	7	0	0	0
103	8G, 47E, 48F	HFR, 1983	93	7	0	0	0
104	7F, 29F	HCC, 1958	93	7	0	0	0
118	6F, 28F, 48F	HCC, 1968 (west side of unit)	83	10	7	0	7
165	4, 48F, 61B, 61C, 72F	HCC, 1954	83	17	0	0	0
240 E	47E, 48F, 72F	HCC, 1959	49	40	9	3	3
240 W*			44	44	11	0	0
253	48F, 72F	HCC, 1959	69	28	3	0	3
262 N	61C, 72F	HFR, 1982 (most of unit)	83	3	13	0	13
262 S			73	10	17	0	10
652 E	48F, 72F	HSV, 1990	60	17	23	0	17
652 W			70	10	20	0	10

*Unit 240W only 18/30 sample points taken; Unit 80 only 23/30 sample points taken

The eastern half of Unit 652 exhibited residual disturbance that exceeds the Forest Plan standards and guides for no more than 15 percent detrimental disturbance. In this unit in particular, design criteria and mitigations for activities require that no new disturbance occur, and to mitigate through activities to restore soils in the stand, such as subsoiling to break up compaction. In addition, other stands that are approaching 15 percent, such as Units 262, 71, or 8, are encouraged to re-use residual disturbed areas, such as legacy skid trails, as much as possible to minimize increase in detrimental soil disturbance.

Soil Water Holding Capacity & Resilience to Drought

The available water holding capacity of soils is the soil water that is available for plant uptake. It is limited by inherent soil characteristics including soil depth, rock content, texture, and bulk density, as well as influenced by organic matter content. Water storage can be affected by management activities that erode soil, increase bulk densities (i.e. compact the soil, resulting in a loss of pore space), and reduce soil organic matter content. Utilizing available soil survey data, Oregon State University, in cooperation with Region Six of the U.S. Forest Service, created a map displaying the inherent soil water holding capacities of soils in Oregon and Washington, based on the dominant soils in soil map units. Figure 14 displays the available water storage of the soils within the Upper Briggs planning area.

A large portion of soils in the Upper Briggs planning area exhibit very low and low inherent capacity for available water storage. When precipitation is not a limiting factor, such as during an average wet season, or during exceptionally wet years, then despite the inherent droughty nature of the soils, vegetation have access to enough water and there is less competition for this normally limiting resource. However in the Mediterranean climate that is in Southern Oregon, with typically warm, dry summer months, water often becomes a limiting factor during the warm portion of the year. During drought cycles, competition for scarce available water on inherently droughty slopes typically results in vegetation stress and resultant mortality, which becomes exacerbated by stands that have grown more dense during wet periods and from suppression of regular wildfire disturbance.

Moderate and high water holding capacity soils in the Upper Briggs planning area are the deeper and finer textured soils found in the valley bottoms and immediate toe slopes, as well as some north-facing slopes that, through aspect influences on moisture retention, are weathering into deeper soils. These soils have the inherent capacity to hold more available water for plant uptake, for a longer period of time throughout the year. They have a little more resiliency to buffer the effects of drought cycles, though competition between vegetation in stands that have grown up with the suppression of regular wildfire disturbance can still result in stress and mortality during drought periods.

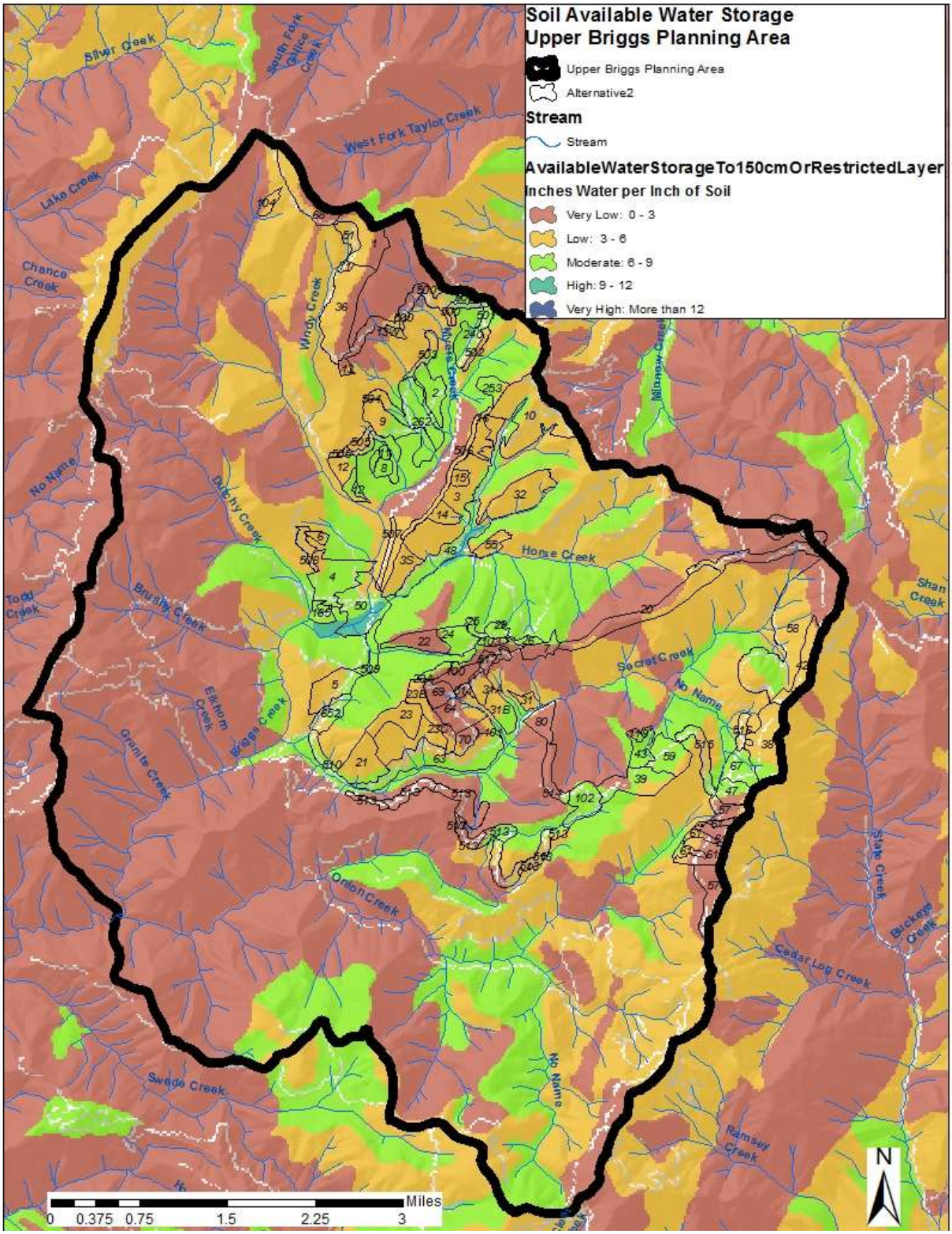


Figure 14. Available Water Storage of Soils in the Upper Briggs Planning Area.

Table 6 identifies the dominant soil water holding capacities for each proposed unit in the Upper Briggs project area. It also identifies the minimum effective ground coverage needed to protect the soils from erosion, based on forest plan standards and guidelines. This organic matter is also important for aiding in the capture and retention of soil moisture. Slopes dominated by low and very low water holding capacities that are currently supporting closed canopy forests that were able to get established during wet climatic cycles and have lacked regular disturbance due to wildfire suppression are not resilient over time due to competition for limited soil water that becomes acute during drought periods. By contrast, High areas are the most resilient. Refer to the Silviculture Report for more information regarding stand productivity in regards to drought vulnerability and stand health.

Table 6. Inherent Water Holding Capacity of the Soils in Alternative 2 Proposed Units, and Effective Ground Cover Minimum Protections Necessary to Protect the Soils from Erosion.

Unit	Primary Objective (Alt. 2)	Soil Map Units	Dominant Soil Water Holding Capacity	EGC Minimum Protections*
1	FMZ	7F, 8G, 9G, 47E, 81G	Very Low, Low	85%
2	DELSH	72F, 61C	Moderate	70%
3	Pine Oak/Rare Plants	61B, 72F, 61D	Low	70%
3S	Rare Plants	61B, 72F	Low	70%
4	DELSH	61C, 1B, 72F	Moderate, some Low	70%
5	DELSH	72F, 48F	Low, some Moderate	70%
6	DELSH	61C, 72F	Low	70%
7	FMZ	8G, 48F	S. slopes – Very Low, N. slopes - Moderate	85%
8	DELSH	61C	Moderate	60%
9	DELSH	72F, 61C	Moderate & Low	70%
10	Pine Oak	48F, 84F, 72F, 61D	Low; some Very Low & Moderate	85%
11	Meadow Rest.	47E, 61C	Moderate	60%
12	DELSH	72F, 47E, 1B, 61C	Low & Moderate	70%
12A	DELSH	47E, 61C	Moderate	60%
13	DELSH	81G, 72F, 7F	Very Low & Low	85%
13W	DELSH	81G, 72F	Low	85%
14	DELSH	61B, 72F	Low	70%
15	DELSH	72F	Low	70%
16	DELSH	72F	Low	70%
20	FMZ	58F, 6F, 28F, 21F, 8G, 72F, 48F	Very Low & Low	85%
21	Pine Oak	72F, 61D	Low; toe slope Moderate	70%
22	Pine Oak	47E, 48F, 81G	Very Low	85%
23	Pine Oak	72F, 48F	Low	70%
23A	FMZ	47E, 8G, 48F	S. slope – Very Low; N. slope – Moderate	85%
23B	FMZ	72F, 8G, 48F	Low & Very Low	85%
23C	FMZ	72F, 8G	Low & Very Low	85%
24	DELSH	47E, 48F, 81G	Moderate	85%
25	FMZ	47E, 48F	Moderate	70%
26	FMZ	8G, 48F	Moderate	85%
29	FMZ	47E, 48F	Moderate	70%
31	DELSH	72F, 61C	Low	70%
31A	DELSH	72F, 8G	Low & Very Low	85%
31B	Riparian Rest.	72F, 61C	Upper slope – Low; Lower slope - Moderate	70%

Unit	Primary Objective (Alt. 2)	Soil Map Units	Dominant Soil Water Holding Capacity	EGC Minimum Protections*
32	Pine Oak	48F, 72F	Low	70%
36	DELSH	81G, 7F	Low & Very Low	85%
38	FMZ	48F, 21F, 72F	Low & Moderate	70%
39	Pine Oak	48F, 72F, 6F, 47E	Very Low, Low, & Moderate	85%
42	FMZ	29F, 85G, 21F, 72F, 48F	Low	85%
43	FMZ	48F, 28F	Moderate	85%
47	FMZ	48F, 21F, 81G	Moderate, Low, & Very Low	85%
48	Meadow Rest.	4, 48F, 61B, 72F, 61D	High & Moderate	70%
50	Meadow Rest.	61C, 4, 61B, 72F, 1B, 48F	High, Moderate, & Low	70%
51	DELSH	7F	Low	85%
55	Pine Oak	61C, 48F, 72F	Low	70%
57	FMZ	48F, 72F, 21F, 81G	Very Low & Low	85%
58	FMZ	85G, 58F, 21F, 63F, 72F, 48F	Very Low, Low, & Moderate	85%
59	DELSH	48F, 72F	Moderate; some Low	70%
61	FMZ/DELSH	72F, 48F, 21F, 81G	Very Low & Low	85%
63	Riparian Rest.	72F, 61D, 61C, 8G	Upper slope – Low; Lower slope – Moderate	85%
64	DELSH	72F, 8G	Very Low & Low	85%
67	FMZ	48F, 21F, 72F	Moderate	70%
68	FMZ	7F, 8G, 9G	Very Low & Low	85%
69	DELSH	8G	Very Low	85%
70	DELSH	72F, 8G	Very Low; some Low	85%
71	DELSH	7F	Low	85%
80	DELSH	72F, 6F, 82G, 61C	Very Low	85%
100	FMZ	47E, 8G, 48F	S. slope – Very Low; N. slope - Moderate	85%
101	DELSH	72F, 8G, 61C	Upper 1/3 – Very Low; Mid 1/3 – Low; Lower 1/3 - Moderate	85%
102	Pine Oak	6F, 58F, 47E, 48F	Moderate	85%
103	FMZ	47E, 8G, 48F	Very Low & Moderate	85%
104	Riparian Rest.	29F, 7F	Low & Very Low	85%
118	FMZ	6F, 48F, 28F	Very Low & Moderate	85%
165	DELSH	72F, 61C, 48F, 4, 61B	Moderate	70%
240	DELSH	47E, 72F, 48F	Moderate	70%
253	DELSH	48F, 72F	Moderate; some Low	70%
262	DELSH	72F, 61C	Moderate	70%
500	Roadside FMZ	81G, 72F, 47E, 8G	Very Low, Low, & Moderate	85%
501	Roadside FMZ	47E, 48F	Moderate	70%
502	Roadside FMZ	72F, 48F, 7F	Low	85%
503	Roadside FMZ	72F, 61C	Low	70%
504	Roadside FMZ	72F, 61C	Low & Moderate	70%
505	Roadside FMZ	72F, 47E, 61C	Low & Moderate	70%
506	Roadside FMZ	48F, 9G, 72F	Low	85%
507	Roadside FMZ	72F, 1B	Low	70%
508	Roadside FMZ	72F	Low	70%
509	Roadside FMZ	4, 48F	Moderate	70%
510	Roadside FMZ	72F, 61D	Moderate & Low	70%
511	Roadside FMZ	72F, 8G	Very Low & Low	85%
512	Roadside FMZ	8G	Very Low	85%

Unit	Primary Objective (Alt. 2)	Soil Map Units	Dominant Soil Water Holding Capacity	EGC Minimum Protections*
513	Roadside FMZ	81G, 80G, 48F, 61D, 72F	Very Low, Low, & Moderate	85%
514	Roadside FMZ	6F, 82G, 58F, 47E	Very Low	85%
515	Roadside FMZ	48F, 72F	Low & Moderate	70%
516	Roadside FMZ	48F, 72F	Low	70%
517	Roadside FMZ	85G, 87F, 72F, 86G	Very Low & Low	85%
652	DELSH	72F, 48F	Moderate & Low	70%

3.1.1.2 ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1—NO ACTION

Under the No-Action alternative, no proposed project activities would take place. No soils would be disturbed from vegetation or fuels management activities. Soils would continue to develop along current trajectories and under natural vegetation and climatic conditions. Disturbed soils from past activities would continue on a passive restoration trajectory. All roads currently on the landscape would remain with the same impacts to soil productivity based on use. The forest floor would remain intact, maintaining effective ground cover, though potentially at levels higher than would naturally exist with natural fire disturbance. Slope stabilities would be commensurate with natural conditions, except where instability is affected by roads, which would have the continued potential to fail if under deferred maintenance and with the right set of conditions. Inherent water holding capacities of soils would continue to influence the vigor of vegetation across the landscape, based on annual precipitation, vegetation densities due to lack of historic fire disturbance and competition for limited water.

EFFECTS COMMON TO PROPOSED ACTION & ALTERNATIVE 3

Both action alternatives involve the decommissioning and roadbed restoration of 11.1 miles of national forest system ("system") roads, the storage (convert to Maintenance Level 1) of 1.6 miles of system roads, and stream crossing improvement of 4 road crossings. Refer to Table (Chapter 2) for the list of roads and proposed activities.

These activities would result in the long term restoration of soil productivity and elimination of potential slope failures along 11.1 miles of system roads, the reduced potential for slope failures along 1.6 miles of system roads and 4 stream crossings, and temporary improved soil productivity on 1.6 miles of system roads put into storage.

Slope Stability

Road building in forest land is widely recognized as one of the primary causes of debris avalanches in managed forests (Sidle 1980). Roads change the surface and subsurface water flow patterns, which can cause concentrations of flow and soil saturation where it didn't exist before, leading to a slope failure. Roads have the potential to accelerate slumps, earthflows, and possibly creep landslides (Megahan 1986).

The added weight of fill material on steep slopes, combined at times with improperly routed water that causes saturation of the fill slope, often results in eventual failure. Also road cuts in steep, unstable terrain can trigger debris avalanches by removing downslope support. Road decommissioning, storage,

and stream crossing improvement on these identified roads provide an opportunity to minimize risk of slope failures along road prisms, by providing proper drainage, and recognizing and improving areas that are recognized to be at risk of failure. In particular, the decommissioning of FSR 2500617 would eliminate the potential for fillslope failures at multiple channel crossings as well as linear fillslope locations that are currently showing evidence of instability (fillslope cracking and slumping).

Project Design Criteria and Mitigation Measures that have been designed for the Upper Briggs project, including best management practices (BMPs) for temporary and system road activities in the National Core BMP Technical Guide (USFS 2012) and the Region 6 General Water Quality Best Management Practices (USFS 1988), have influenced the planning of road activities during project development, and would be implemented to reduce or eliminate potential future risk on system roads to be decommissioned, put into storage, and storm proofed at stream crossings.

Soil Productivity

Road decommissioning would involve taking the road off the national forest transportation system and restoring the roadbed. Roadbed restoration could include any combination of the following potential actions for road decommissioning: shallow ripping, deep subsoiling, partial to full roadfill pullback/recontouring, mulching/placing slash, pulling cross-drain and drainage culverts and associated fill, shaping stream crossings to natural channel dimensions, water-barring, seeding, planting, and blocking the entrance with a barrier (such as berm construction and/or boulder placement). No ground disturbing actions may be needed where a roadbed is already on a successful passive restoration trajectory.

Road decommissioning provides the opportunity for soils that have been committed to something other than site productivity, to begin to redevelop and support a vegetation community again. While short term effects to soils can include a temporary increased risk of erosion due to loosening the soil, through breaking up deep compaction, water infiltration and gas exchange processes can be renewed, roots are able to penetrate deeper into the soil profile, and soil microbial and nutrient cycling communities and processes can begin to get re-established, resulting in soil productivity restoration over the long term.

“Storage” could include any combination of the following potential actions for converting an open, system road to Maintenance Level 1, closed and put into storage: pulling cross drain and drainage culverts and associated fill, ripping or subsoiling a portion of the roadbed, installing rolling dips, waterbarring, seeding, mulching/placing slash, and blocking the road entrance with a barrier (such as berm or gate). Putting a system road into storage still commits the soil resource to something other than soil productivity over the long term. However, eliminating regular use of the road reduces the potential for surface erosion, as organic matter builds up on the road prism. Over time with continued closure, some shallow rooted vegetation is able to establish in the road prism and temporarily improve productivity, until the road is re-opened.

Stormproofing stream crossings would improve the hydrologic function of these systems and reduce or eliminate the potential for fill failures at the crossings during high flow events, which would reduce or eliminate the potential domino effects of downstream inner gorge slope failures or mass wasting that can occur when road crossings blow out.

EFFECTS SPECIFIC TO ALTERNATIVE 2—PROPOSED ACTION

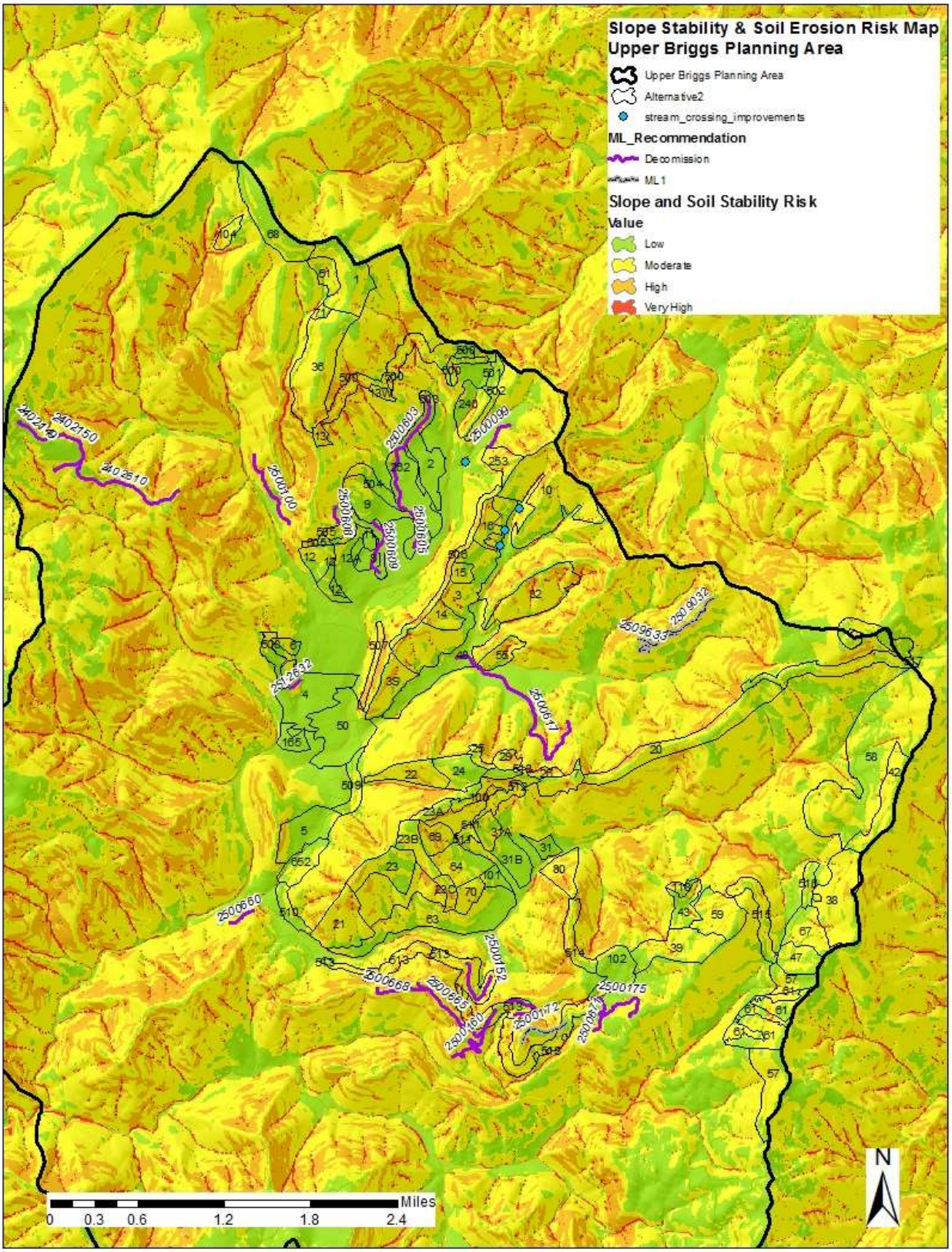
There are 4,017 acres within the proposed vegetation treatment units in Alternative 2. This includes all of the primary management objectives (develop and enhance late seral habitat (DELSH), restore pine-oak communities, restore sensitive plant habitat, restore meadow systems, restore riparian reserves,

and create and maintain strategically located fuel management zones (FMZs)). Treatments would involve multiple silvicultural prescriptions, including variable density thinning to 60 or 40% canopy cover, hardwood retention, and ¾ acre maximum patch cuts. Fuels treatments would involve pruning, piling, and burning post vegetation treatment, with underburning 1 to 5 years post treatment. Treatment methods would involve a combination of manual (hand) work, and mechanized equipment including ground-based, cable-yarding, and helicopter equipment. It is estimated that up to 3 miles of temporary roads would be needed to provide temporary access to meet project objectives

Slope Stability

Slope stability can be impacted by actions that alter soil holding strength of root systems through vegetation changes, change drainage patterns through soil movement or compaction, or undermining of slopes. Specific activities as related to the Upper Briggs Restoration project include temporary road construction and reconstruction, silviculture treatments, and fuels treatments. Figure 15. Slope Stability and Soil Erosion Risk Map, With Alternative 2 Units and Road Proposals. displays the slope stability and soil erosion risk mapping within the Alternative 2 proposed treatment units, as well as the proposed road decommissioning, storage, and stream crossing stormproofing.

Figure 15. Slope Stability and Soil Erosion Risk Map, With Alternative 2 Units and Road Proposals.



Temporary Roads

The effects of temporary roads have the potential to be similar to the effects of system roads (see the discussion of effects under Effects Common to All Action Alternatives). However temporary roads are usually constructed with no engineering specifications since they are targeted to be used for a short time (typically a single season), and then obliterated. This lack of construction design makes it particularly important to follow project design criteria for avoiding potentially unstable slopes, even with the potentially short time frame of use. That is because even temporary roads which are constructed with road cuts in steep, unstable terrain can trigger debris avalanches and slope failures by removing downslope support and interfering with surface and subsurface water flows that can weaken slopes.

Where there are opportunities to utilize existing non-system road prisms as temporary roads, this provides the benefit of obliterating the route which provides an opportunity to minimize risk of slope failures along road prisms, by providing proper drainage, and recognizing and improving areas that are recognized to be at risk of failure.

Activities proposed in Alternative 2 are expected to need approximately 3 miles of temporary roads in order to achieve management objectives. Many of these segments have the potential to re-use existing legacy templates from past management. Project Design Criteria and Mitigation Measures that have been designed for the Upper Briggs project, including best management practices (BMPs) for temporary and system road activities in the National Core BMP Technical Guide (USFS 2012) and the Region 6 General Water Quality Best Management Practices (USFS 1988), have influenced the planning of road activities during project development, and would be implemented to minimize impacts of temporary roads on slope stability.

Silviculture Treatments

Through increasing the depth of the saturated zone in the soil, and reducing root strength, the removal of trees can increase slope failures (Megahan 1986). When the majority of vegetation is removed, such as in a clear-cut, the amount of water in the soil profile is increased for a time due to a reduction in plant uptake and transpiration, as well as reduction in canopy interception. Roots increase the strength of soil by helping to bind soil particles together, and to reinforce a soil mass by anchoring it to the underlying bedrock, particularly in shallower soils (Ziemer 1981a). When trees die or are cut, the roots die and decay, resulting in a decline of reinforcement by the roots; approximately 50% of the original root reinforcement is lost within 2 years after deforestation, with 90% gone within 9 years (Ziemer 1981a). However, if only some of the vegetation is removed, such as in a thinning, the loss of root strength is greatly reduced. This is because the remaining trees' root systems are still there to anchor the soils, and they take advantage of the reduction in competition by expanding their root systems (Ziemer 1981b).

It is not expected that there would be an increased chance of slope instability due to the silvicultural treatments planned with the Upper Briggs project, under any action alternative. Silvicultural prescriptions across the treatment landscape would involve variable density thinning to 60% or 40% canopy cover, depending on wildlife habitat needs at the site scale, retention of hardwoods, and patchcuts for dispersal habitat of no greater than ¾ acre, and 20% of stand based on existing vegetation conditions. It is expected that the silvicultural treatments planned would not reduce the density of remaining live tree roots enough to cause a weakening of the soil-root reinforcement. The remaining trees' root systems would respond to the reduction in competition and expand in the soil profile before the root systems of the cut trees had seriously decayed. The promotion of oaks and other re-sprouting hardwood species increases the long-term effectiveness of vegetation adding to slope stability through their root-anchoring capabilities.

Fuels Treatments

Underburning could have similar effects as those described for silvicultural treatments, through changes to vegetation as well as the consumption of surface down wood and litter. However, fuels treatments are designed to maintain the overstory canopy the stands are being managed for, as well as to burn with a mosaic of low severity and unburned fuels. Fuels treatments, including pruning, handpiling and burning, are designed to make stands more resistant to stand replacing wildfire effects, which is the kind of disturbance that would be more likely to increase the risk of slope failures. Based on the fuels treatments proposed, it is not expected that there would be a measurable effect from fuels treatments that would result in an increase in slope failures in the project area.

Soil Productivity

Soil productivity can be impacted by management activities, through actions that reduce effective ground cover, displace soil, cause soil compaction or otherwise adversely impact soil structure, destabilize slopes, and change soil water and nutrient cycling processes through vegetation and down wood manipulation. Specific activities as related to the Upper Briggs project include system road reconstruction, temporary road construction and decommissioning, silviculture treatments, fuels treatments, and use of heavy equipment logging systems.

The Siskiyou National Forest Plan standards and guidelines for the soil resource require that no more than 15% of an activity area, including roads and landings, be left with detrimental soil conditions, as well as specific effective ground cover requirements to prevent erosion from mineral soil exposure (refer to the Regulatory Framework in this report). Project design criteria and mitigation measures have been developed specifically for the Upper Briggs Restoration Project to meet these standard and guidelines with implementation of all proposed project activities for all action alternatives.

Roads

Of any of the forest management activities being proposed with this project, the temporary and national forest system road network being used/reconstructed/constructed is expected to result in the greatest opportunity for soil erosion per unit area (Megahan 1986). However, project Design Criteria and Mitigation Measures that have been designed for the Upper Briggs Project, including best management practices (BMPs) for road activities in the National Core BMP Technical Guide (USFS 2012) and the Region 6 General Water Quality Best Management Practices (USFS 1988), have influenced the planning of road activities during project development, and would be implemented to minimize impacts of roads on soil productivity.

Existing System Roads

Existing system roads are considered a long term commitment of the soil resource to something other than soil productivity. The use of existing system roads during the implementation of this project would not result in a change to the current condition of the soils that are committed to supporting the transportation system. However, where system roads have been closed for a period of years, some level of road reconstruction and maintenance would be necessary to make them suitable for treatment access.

Road reconstruction generally requires the removal of vegetation and the reshaping of the former road prism, possibly including ditches, from a road in disrepair. The road may have achieved some degree of restoration from past use, but whatever that degree, it would be reversed. The conditions of roads needing reconstruction vary greatly, from those with near complete restoration to those with hardly any. Reconstruction of these routes, however, has far less impact to soil productivity (since it had long

since been comprised) than to native soil sites, and that is the benefit of reusing them over new construction. Nonetheless, soil is compacted and short-term erosion from newly exposed soils is likely.

Temporary Roads and Landings

Temporary roads and landings are expected to have an irretrievable reduction in soil productivity since they are bladed (soil is mixed and displaced) and compacted. Even once rehabilitated, the soil profile is modified to a degree that may take many decades to return to the productive state of the undisturbed forest soils adjacent to it. Landings also, with their likely deep compaction, and soil mixing from construction and recurrent disturbance are expected to produce irretrievable reductions in soil productivity. Nonetheless, their use is temporary, with the expectation that following use they would be returned to the highest degree of productivity reasonably achievable.

Activities proposed in Alternative 2 are expected to need up to 3 miles of temporary roads in order to achieve management objectives. Many of these segments have the potential to re-use existing legacy templates from past management. By re-using old templates, these existing prisms would be obliterated to maximize soil productivity restoration potential of the disturbed sites. No new temporary roads or landings would be permitted within riparian reserves, to avoid the creation of detrimental soil disturbance that could create adverse effects to hydrologic function and soil productivity within riparian areas. Project Design Criteria and Mitigation Measures that have been designed for the Upper Briggs project, including best management practices (BMPs) for temporary and system road activities in the National Core BMP Technical Guide (USFS 2012) and the Region 6 General Water Quality Best Management Practices (USFS 1988), have influenced the planning of road activities during project development, and would be implemented to minimize impacts of temporary roads on soil productivity.

Silvicultural Treatments

Silvicultural treatments being proposed include variable density thinning to 60 or 40% canopy cover, hardwood retention, and ¾ acre maximum patch cuts. These actions have the potential to affect soil productivity, and organic matter and large woody material through changes to vegetation. Detrimental disturbance as it relates to these silvicultural treatments will be discussed under Harvest Systems, below.

Vegetation uptakes nutrients from the soil in a mostly soluble, inorganic form, and converts them to an organic form for metabolism. Most of a tree's nutrients are distributed in the leaves, twigs, and branches; as the tree discards leaves, branches, bark, or dies, the plants organic nutrients are returned to the soil. Organic material returned to the soil is decomposed and the nutrients are mineralized (i.e., converted to an inorganic form) by soil organisms depending on the soil's physical conditions (such as moisture, temperature, aeration, etc…) (Farve and Napper 2009). All of the silvicultural treatments manipulate to various extents the vegetation component that is a part of the nutrient cycle of the soils it is directly growing on. However, since all of these treatments maintain a component of the original forest system, including some overstory vegetation and the forest floor organic litter layer (i.e., they are not harvest systems such as clear-cuts that drastically change the vegetation component), it is not expected that direct or indirect effects to soil productivity as it relates to nutrient cycling would be measurable.

In the forest, precipitation is intercepted, retained, and redistributed by the tree canopy. Water ultimately evaporates from the canopy (interception) or drips through (through-fall) or runs down the stems (stem flow) to the forest floor. Tree canopies intercept precipitation, moderating and metering its fall to the soil surface. They also redirect this intercepted moisture toward the drip line of the tree, and away from the base of the trunk. In extreme rainfall conditions in the absence of deep-crowned tree cover, such as following clear-cut or shelterwood logging, the rate of water striking the surface could exceed the rate of the soil's ability to absorb it, with localized sheet erosion a likely result. Such effects

are generally only relevant to degrees of canopy removal associated with clear-cutting or shelterwood logging, or high intensity stand replacement fire. The treatments in the Upper Briggs Project, however, are variable density thinning, or select removal to form ¾ acre gaps, where a measurable direct or indirect effect of this sort is unlikely, since there would still be various levels of an overstory component directly influencing and providing organics to the soil.

Prescribed amounts of snags and downed wood would be left on a per-acre basis consistent with historical fire regime effects and plant association (plant series) capabilities where existing amounts are below such levels. However, this mitigation is only effective where such snags are available in adequate numbers. Where they are not so available, there would be an opportunity to create more from remaining live trees. Refer to the Wildlife Report for further discussion on snags and downed wood. Snag creation would have a positive effect on long-term soil productivity since snags are a source of future down logs, which are an important component of long-term soil productivity.

Figure 14 displays the water holding capacity of soils within the Alternative 2 treatment units. Table 64 lists each of the treatment units, the primary objective of each unit, and the dominant water holding capacities of the soils within those units and amount of needed effective ground cover. With Alternative 2, 43 units require 85% effective ground cover, 39 units require 70% effective ground cover, and 3 units require 60% effective ground cover.

Harvest (Logging) Systems

Logging systems (ground-based, skyline-cable, and aerial) have the potential to adversely impact soil productivity through detrimental compaction, displacement, erosion, and loss of effective ground cover/organic matter. Ground-based systems typically have the greatest potential for effects, whereas aerial systems typically have the least potential for adverse effects.

Project Design Criteria and Mitigation Measures that have been designed for the Upper Briggs project, including applicable best management practices (BMPs) for vegetation management activities in the National Core BMP Technical Guide (USFS 2012) and the Region 6 General Water Quality Best Management Practices (USFS 1988), as well as Regional and Forest level Standards and Guidelines have influenced the planning of vegetation activities during project development, and would be implemented to minimize impacts of harvest activities on soil productivity.

Ground-based Systems (tractor, rubber-tired skidder, harvester-forwarder)

Ground-based logging systems have the greatest potential to adversely affect short and long-term soil productivity. Logging and other equipment can compact and ‘puddle’ soils over which they operate (landings, skid roads, roadways, etc.). Tractor, or ground based logging has the greatest potential to cause soil compaction, which decreases soil volume and pore space and modifies soil structure and results in a decrease in gas, water, and nutrient exchange, slows root penetration, and can aggravate soil drought, especially in Mediterranean climates such as that of SW Oregon (Atzet et al. 1989), though soil drought may be less of a concern here where there is a much stronger maritime weather influence. Puddling is the destruction of soil structure, primarily when wet, by severe compaction, to the point where ruts or imprints are made and the soil structure has been so destroyed as to prevent water from infiltrating into the soil profile.

Compaction may inhibit occupation of the soil by organisms that assist in the decomposition of wood to soil organic material that improves site productivity, and help to aerate the soil. Compaction also possibly inhibits the growth of beneficial fungi (mycorrhizae) that provide nutrients to plant roots (Keslick 1997). Ectomycorrhizal fungi form an essential interface between soil and trees. They usually colonize more than 90 percent of the feeder roots of host plants (Goodman and Trofymow 1998). Plant

development is also restricted in compacted soils due to poor aeration and impeded root growth. As a result, soil productivity is adversely affected (Floch 1988).

Soil moisture content, soil characteristics, and force affect the level of compaction that can occur from harvest systems. Fine-textured soils dominated by expandable clay minerals, and well-graded, coarser textured soils are most likely to compact when moist, whereas finer textured soils dominated by non-expandable clay minerals, and of poorly graded, coarser textured soils such as most pumice and coarse ash soils, are less affected by soil moisture (Atzet et al 1989).

Compaction from logging activities is now routinely mitigated, by designating and minimizing the number of skid trails used; by requiring logging equipment to use only those roads and skid trails created during past timber harvest where feasible; using equipment and or techniques shown effective to prevent or minimize compaction (such as low psi (pounds per square inch) or operating on slash to disperse weight); and allowing operations only during conditions when soils are unlikely to be detrimentally compacted beyond the 15% LRMP allowances (such as on dry or frozen ground; or over deep snow with a firm base). These mitigations have been proven successful and are applied to all Action Alternatives in this project.

Detrimental displacement is defined as the removal of more than 50% of the soil's 'A' horizon (topsoil) from an area greater than 100 square feet that is at least 5 feet in width. This displacement occurs by natural means, such as heavy rains that cause erosion on exposed surfaces (such as skid trails and skyline corridors), or by mechanical means such as churning tractor treads or dragging of logs across the ground. Erosion is a form of detrimental displacement. The majority of erosion occurs by sheet erosion (the even removal of thin layers of soil by water moving across extended areas of gently sloping land) and is difficult to detect, as there are no dramatic effects to alert one to its occurrence. Rills and gullies, however, are dramatic examples of erosion that are easily detected.

Detrimental displacement is routinely mitigated by designating and minimizing the number of skid roads and skyline corridors used; requiring a minimum of one-end log suspension to prevent soil gouging; and placing percent slope limitations on ground-based harvest equipment. Additionally, erosion associated with skid trails and skyline corridors can be effectively mitigated by the placement of cross drains (water bars); drainage dips; placement of down wood and slash; and erosion control seeding (or any vegetative cover on exposed soil). Mitigation measures have been specifically designed for this project. Many have been used for many decades and there has been considerable monitoring and demonstration of their effectiveness.

Large woody material, such as large logs, and standing snags (future large down logs), are important components in the development and retention of productive soils. Snags are routinely felled if they are believed to be a safety hazard to operations. Operation of logging equipment can mechanically damage/destroy downed logs in advanced stages of decay. Logging and burning has the potential to eliminate these features, particularly those in advanced degrees of decay, from the landscape if care isn't taken to retain them in adequate sizes, numbers, and distribution across the landscape. Project Design Criteria for maintenance of snags and downed wood assure that sufficient quantities are retained on the landscape.

Skyline-Cable Systems

Using cables to suspend one or both ends of logs as they are pulled from the stand to the landing largely eliminates the potential for compaction and puddling within the stand. What remains, however, is the potential for detrimental soil displacement if one or both ends of the log are dragged across the ground from the stump to the landing. Full suspension (where the log is lifted entirely off the ground during yarding to the landing) and one-end suspension (where one end of the log is allowed to drag along the ground), are effective mitigations that are now regularly employed to minimize detrimental

displacement, as well as the use of a pre-designated skid trail or skyline corridor layout. Skyline systems typically result in approximately 5% or less detrimental soil conditions.

Aerial Systems

Helicopter logging has the least impact of all logging systems on soil productivity. This is a form of full suspension, with no part of the log being drug across the ground, except for very short distances as logs are lifted off the ground from a central point between logs. Such logging eliminates any potential for equipment-generated detrimental soil displacement, compaction, or puddling and their attendant erosion effects. Helicopter logging does, however, require larger, though fewer landings, with the associated compaction and displacement effects typically around 2%.

Ground-based mechanized felling, pre-bunching, and/or forwarding on Steep Slopes

Advances in ground-based harvest equipment technology are making it more possible to safely operate mechanized felling, pre-bunching, and yarding equipment on steeper slopes (greater than 35%), such as through using self-leveling feller-bunchers or tethered harvester-forwarder systems. Industry has been encouraging these developments to increase operator safety as well as increase production and improve economic feasibility, due to the high costs of conventional cable and helicopter systems (Flint and Kellogg 2013, Visser et al. 2013, Acuna et al. 2011). A study in the Coast Range of Oregon looking at the productivity and cost of six different steep slope harvesting systems found that all steep terrain harvester-forwarder systems had the lowest overall harvesting costs, but also that utilizing a specialized steep terrain harvester which processed and pre-bunched for a cable yarding system, caused an increase in productivity of 79% and a reduction in cost of 58% for the cable yarder (Flint and Kellogg 2013). Similarly, a research trial in Australia found that utilizing a self-leveling feller-buncher to fell and pre-bunch stems for cable yarding on slopes between 36-47%, on dry, sedimentary-based soils with good traction, increased productivity of the cable logging operation (Acuna et al. 2011). While both studies resulted in positive outcomes for economics, neither study examined effects of these systems to soil.

Relatively little research has been done to date, to determine the disturbance effects to soil productivity when utilizing steep-slope harvesting systems. Some reviews of the potential slope limitations of various ground-based harvest equipment discuss the safe operating range as related to soil bearing capacity and percent slope (Visser and Stampfer 2015, Visser et al. 2013). Soil bearing capacity focuses on the maximum average contact pressure between the load (in this case, the machine), and the soil which should not produce shear failure. However, this should not be equated to the contact pressure that would result in detrimental soil productivity impacts; it is expected that other detrimental effects would likely result in the soil before reaching the point of vehicle slippage and shear failure. Based on their review, Visser and Stampfer (2015) provide guidelines for slope limits for different kinds of ground-based equipment, but these guidelines focus on safety, not impacts to soils, and they recognize that few studies have been done to quantify disturbance. In their economic study, Flint and Kellogg (2013) recognized the importance of considering the potential effects of soil disturbance, not just the economics, of steep terrain ground-based operations.

A recent study in the western Oregon coast range (Zamora-Cristales et al. 2014) evaluated the effects of two systems, a harvester-cut, cable-yarded unit and a harvester-cut, forwarder-yarded unit, on mineral soil exposure and soil strength on slopes averaging 65% and 58%, respectively. Soils were dominated by very gravelly loams. Operations occurred with soil moistures ranging from 30 to 39% (harvester-cable) and 30-36% (harvester-forwarder). The harvester-forwarder system resulted in two, downhill passes on designated skid trails; the harvester-cable system resulted in one, downhill pass on designated skid trails, with logs being cabled uphill. Steep trails represented 15% of the area in the harvester-cable unit, and 10% of the area in the harvester-forwarder unit. Spacing of trails ranged from

18 to 24 m (approx. 60 to 80 ft.) apart. On harvester-forwarder, 7% of the sample points, and 3% of the sample points in harvester-cable, had exposed mineral soil; the statistical analysis of the data generally confirmed that each harvest unit remained below 10% exposed soil. Regarding soil strength, there was no apparent relationship between changes to soil strength and the percent slope, for either system. An evaluation of the relationship between soil strength and slash showed that operating on slash mats resulted in less increase in soil strength over adjacent undisturbed soil, than operating on no slash. When considering the effects of soil strength on forest site productivity, the soil strength on the 2-pass harvester-forwarder unit trails averaged about 2,770 kPa, whereas the single-pass harvester-cable unit trails averaged about 2,096 kPa. Soil strength levels of about 2,500 kPa or higher are considered to start inhibiting vegetation growth on a variety of soils (Page-Dumroese et al. 2006, cited in Zamora-Cristales et al. 2014). These impacts were only seen within the designated trails, which did not exceed 15% of the area in both units. Dry season operations, only 1 to 2 vehicle passes on trails, and an operating system that added slash to the trails and generally limited ground disturbance, as well as skilled operators, are considered factors that contributed to the results of this study.

On the Fremont-Winema National Forest in south-central Oregon, soil disturbance monitoring was completed on a timber sale unit which was thinned in the summer of 2016 utilizing a tethered harvester and forwarder on wheel tracks (Rone 2017). Average slopes in the unit were approximately 20 to 60%, with soils consisting of coarse pumice which were operated on in dry soil moisture conditions. Shortly after harvest completion, soil disturbance monitoring transects identified 9% and 6% in disturbance class 2 and 3, respectively, which in these soil types the soil scientist considers detrimental soil disturbance (G. Rone, pers. comm.). Initial direct soil disturbance was dominated by soil displacement over compaction, which is related to the coarse, non-cohesive properties of the pumice soil in the unit. Some other operational concerns that were observed were machine side tracking and turning impacts, the disintegration of slash mats, and converging and side-by-side skid trails. Monitoring identified multiple recommendations to help shape project design criteria and mitigations for future steep slope operations, as well as the need to monitor again after a wet season.

The Upper Briggs project is focusing on allowing pre-bunching on slopes greater than 35% but no more than 45%, to assist cable or helicopter yarding, if appropriate equipment and methods are available at the time of implementation. Specifically designed project design criteria and mitigations have been developed to guide the use of this method and assure activities meet soil resource standards and guidelines (refer to Best Management Practices/Mitigation Measures/Project Design Criteria section in this report).

Fuels Treatments (Activity Fuels and Fuel Management Treatments)

Activity fuels treatment refers to the slash and accumulated fuel resulting from the proposed density management treatments. Activity fuels treatments can include whole tree yarding or leave tops attached and landing pile burning. Fuel management treatments include pruning, piling and burning, and underburning 1 to 5 years post vegetation treatment.

Leave Tops Attached / Whole Tree Yarding

This treatment requires that the top of the tree be yarded to the landing along with the last log (or whole tree if small enough). In some small tree cases, this practice may mitigate the potential for detrimental soil displacement from the dragging log end as the limbs of the top cushion and elevate that end and prevent soil gouging and displacement.

With the increased interest in harvesting biomass, there has been an increased need to understand how removing the branches and needles from the site might be affecting short and long-term soil productivity. Most studies have been based on models and/or nutrient budgets which forecast likely

effects; however long-term field studies have also been started. In a review of literature regarding the effects of whole tree harvesting on soil productivity, Farve and Napper (2009) refer to a summary of effects by Waring and Running (2007: 214) that found that "a whole-tree harvest can remove as much as three times the nutrients as compared to a conventional bole-only harvest….however, since the soil nutrient (belowground) pool contains most of the nutrient capital of a forest ecosystem (by several orders of magnitude), in general, removal of the whole tree during timber harvesting should result in only a small percentage of nutrient loss from the forest ecosystem." With implementation of the Upper Briggs Project, where only a portion of trees within a stand are being removed instead of all the trees, the impacts of leaving tops attached is expected to be even less, and likely immeasurable.

Handpile Burning / Underburning

Heat produced during the combustion of aboveground fuels (i.e., dead and live vegetation, litter, duff) is transferred to the soil surface and downward through the soil by several heat transfer processes (radiation, convection, conduction, vaporization, and condensation). As heat is transferred downward into and through the soil, it raises the temperature of the soil. The greatest increase in temperature occurs at, or near, the soil surface. Within short distances downward in the soil, however, temperatures can rapidly diminish so that within 2.0 to 3.9 inches (5 to 10 cm) of the soil surface the temperatures are scarcely above ambient temperature (Neary et al. 2005).

Typical physical effects to soil that can occur from fire include changes to soil structure (particularly as a result of loss of organic matter), changes in porosity and bulk density, loss of cover (i.e., canopy, litter, duff), water repellency, and runoff and erosion vulnerability.

Organic matter plays a key role in soil structure in the upper part of the mineral soil at the duff-upper A-horizon interface, in that it acts as a glue that helps hold mineral soil particles together to form aggregates. Fire can impact the organic matter content in soil by killing the living organisms at temperatures as low as 122 to 140ºF, and by destructively distilling to completely consuming nonliving organic matter at temperatures of 224ºF and 752ºF, respectively (Neary et al. 2005).

Loss of the organic matter component in the soil breaks down the soil structure, which in turn results in a reduction in the amount and size of soil pore space. When the soil structure collapses, it particularly reduces the amount of macropore spaces, and increases the bulk density of the soil, resulting in a loss to soil productivity.

When fire results in the loss of canopy, litter, and duff cover, it exposes the mineral soil to erosion processes. The litter and duff layers also act as an insulator that protects the underlying soil layers from heating, and if they are consumed, it exposes the mineral soil to greater soil heating impacts. Fire-induced water repellency may occur when combustion of organic matter vaporizes hydrophobic organic substances that then move downward in the mineral soil and condenses into a water repellent layer. This in turn increases risk of soil erosion. Water repellent layers have the greatest impact within the first year after fire, as they tend to break down fairly quickly.

Typical chemical effects to soil that can occur from fire include nutrient losses, cation exchange capacity loss, and changes to pH. Nitrogen is the most limiting nutrient in wildland ecosystems, and as such requires special consideration when managing fire. Nitrogen loss increases with increasing temperatures through volatilization, with no loss of N at temperatures below 392ºF all the way up to complete loss of N at temperatures above 932ºF (Neary et al. 2005). The amount of N lost is generally proportional to the amount of organic matter combusted, and burning during moist litter and soil conditions have shown a decrease in the amount of total N lost compared to dry conditions (DeBano et al. 1979; cited in Neary et al. 2005).

Nitrogen that is not volatized either remains as part of the unburned fuels or it is converted to highly available NH_4-N that remains in the soil (DeBano et al. 1979; Covington and Sackett 1986; Kutiel and Naveh 1987; DeBano 1991; cited in Neary et al. 2005). This temporary increase in fertility from available N is usually short-lived and is quickly utilized by vegetation within the first few years after burning (Neary et al. 2005).

The cation exchange capacity of soil can be impacted by fire through the destruction of organic matter. The negatively charged particles of organic matter adsorbs otherwise highly soluble positively charged cations, which prevents them from being leached out of the soil. As the amount of organic matter is destroyed from fire, so too is the soils cation exchange capacity.

Cation nutrients (i.e., Ca, Mg, Na, K, NH_4) become concentrated in the ash following fire, and can be lost in several ways such as volatization (but this takes very high temperatures), particulate loss in smoke, runoff and erosion, and there can be a long term loss of cations to leaching due to the soils reduction in cation exchange capacity. Cation exchange capacity rebuilds over time with new accumulation of organic matter. The release of soluble cations from the organic matter during combustion can temporarily increase soil pH, but this is dependent in part upon the amount and chemical composition of the ash. Thick layers of ash (termed the ash-bed effect) found from severe burning conditions tends to have the greatest impact on raising soil pH.

Typical biological effects to soil that can occur from fire include loss of microorganisms, loss of meso- and macrofauna, and loss of roots and reproductive structures such as seed banks. Impacts from fire to microorganisms as well as their recovery can be very complex because so many variables are involved. In general it can be stated that “intense wildfire can have severe and sometimes long-lasting effects on microbial population size, diversity, and function”, whereas at the other end of the spectrum, “low-severity underburning generally has an inconsequential effect on microorganisms.” (Neary et al. 2005). This range of effects is in part related to the amount of organic matter impacted by fire, and the temperature and depth of soil heating. If both of these can be minimized, so will impacts to the microbial population in the soil. Effects of fire to meso- and macrofauna, such as mites, insects, and earthworms, is also highly variable, depending in part on species, habitat and adaptations.

Whether or not plant roots and seed banks are destroyed by fire depends on how deep in the soil they reside, the fire severity and amount of soil heating, and the moisture content of the plant tissues and the soil. Higher moisture content tends to lower the temperature at which living biomass can be killed. Plant tissue can be killed at as low as 104°F, and seeds can be killed at as low as 122°F.

Moist soil is a better conductor of heat into the soil so lethal temperatures may extend deeper into the soil surface. However, high moisture content in the litter and duff aids in facilitating a low severity underburn, which results in very little impact to roots and seeds except at the very surface of the litter layer.

Pile/concentrated slash burning increases the residence time of the fire due to concentrated fuels, which can lead to more consumption of organic matter, higher soil heating temperatures, heating deeper into the soil profile, and thus resulting in isolated patches of severely burned soils directly under the slash pile. Mitigations minimizing to the extent possible the size of the piles and burning during moist soil moisture conditions can reduce these impacts by keeping burn temperatures and soil heating as low as possible. Smaller burn scars tend to recover quicker as well due to the high amount of un-impacted soil around them that contribute to recolonization of soil microorganisms and other soil biota.

The *1998 Regional Supplement to the Forest Service Manual (FSM 2520 R-6 Supplement 2500-98-1, Effective August 24, 1998)* defines detrimentally burned soil as:

> "The condition where the mineral soil surface has been significantly changed in color, oxidized to a reddish color, and the next one-half inch blackened from organic matter charring by heat conducted through the top layer. The detrimentally burned soil standard applies to a contiguous area greater than 100 square feet, which is at least 5 feet in width."

Burning of hand slash piles should not exceed the detrimentally burned soil standard since individual burn piles are designed to be discontinuous and not greater than 10 feet in diameter. Even if these burn scars are taken into account, it is expected that less than 2 percent of the area would be left in a severely burned condition.

Detrimental burning occurs when high intensity fire consumes organic matter above and within the soil, heating the soil to the point where the mineral soil surface changes color and the next one-half-inch deeper of soil organic matter is charred. This can happen under natural high-intensity wildfire conditions or by management actions beneath burn piles or 'prescribed burns' when the prescriptions are applied incorrectly or "escape" the parameters of their prescription and become overly intense.

Detrimental burning is most likely under extreme fire weather and dry fuel moisture conditions where fuel accumulations are greatest. Reduction of this fuel through management action decreases the potential of high intensity fire and detrimental burning of the soil. In areas where fuels have been treated (reduced), it is common to have only approximately 20% of the soils in a wildfire-burned area to be in a detrimentally burned condition; this is half of what has been observed in areas where fuels had not been treated.

Large woody material, such as large logs, and standing snags (future large down logs), are important components in the development and retention of productive soils. Burning has the potential to eliminate these features, particularly those in advanced degrees of decay, from the landscape if care isn't taken to retain them in adequate sizes, numbers, and distribution across the landscape.

The purpose of fuel management activities in the Upper Briggs project is to reintroduce fire into a historically fire-adapted landscape, and to make the ecosystems within the area more resilient to impacts from fire over time. Effects to soils from these activities are expected to therefore be within the natural range of variability expected in these fire-adapted ecosystems.

EFFECTS SPECIFIC TO ALTERNATIVE 3

There are 2,628 acres within the proposed vegetation treatment units in Alternative 3. This includes all of the primary management objectives (develop and enhance late seral habitat (DELSH), restore pine-oak communities, restore sensitive plant habitat, restore meadow systems, restore riparian reserves, and create and maintain strategically located fuel management zones (FMZs)). Treatments would involve multiple silvicultural prescriptions, including variable density thinning to 60 or 40% canopy cover, thinning from below to maintain 60% canopy cover, hardwood retention, and ¾ acre maximum patch cuts. Fuels treatments would involve pruning, piling, and burning post vegetation treatment, with underburning 1 to 5 years post treatment. Treatment methods would involve a combination of manual (hand) work, and mechanized equipment including ground-based, cable-yarding, and helicopter equipment. It is estimated that approximately 0.61 miles of temporary roads would be needed to provide temporary access to meet project objectives.

Slope Stability

Temporary Roads

Activities proposed in Alternative 3 are expected to need approximately 0.61 miles of temporary roads in order to achieve management objectives. Many of these segments have the potential to re-use existing legacy templates from past management. Project Design Criteria and Mitigation Measures that have been designed for the Upper Briggs project, including best management practices (BMPs) for temporary and system road activities in the National Core BMP Technical Guide (USFS 2012) and the Region 6 General Water Quality Best Management Practices (USFS 1988), have influenced the planning of road activities during project development, and would be implemented to minimize impacts of temporary roads on slope stability.

Silvicultural Treatments

Silvicultural treatments proposed in Alternative 3 would have the same effects on slope stability as described in Alternative 2, only over less acres. Based on the silvicultural treatments proposed, it is not expected that there would be a measurable effect that would result in an increase in slope failures in the project area.

Fuels Treatments

Fuels treatments proposed in Alternative 3 would have the same effects on slope stability as described in Alternative 2, only over less acres. Based on the fuels treatments proposed, it is not expected that there would be a measurable effect from fuels treatments that would result in an increase in slope failures in the project area.

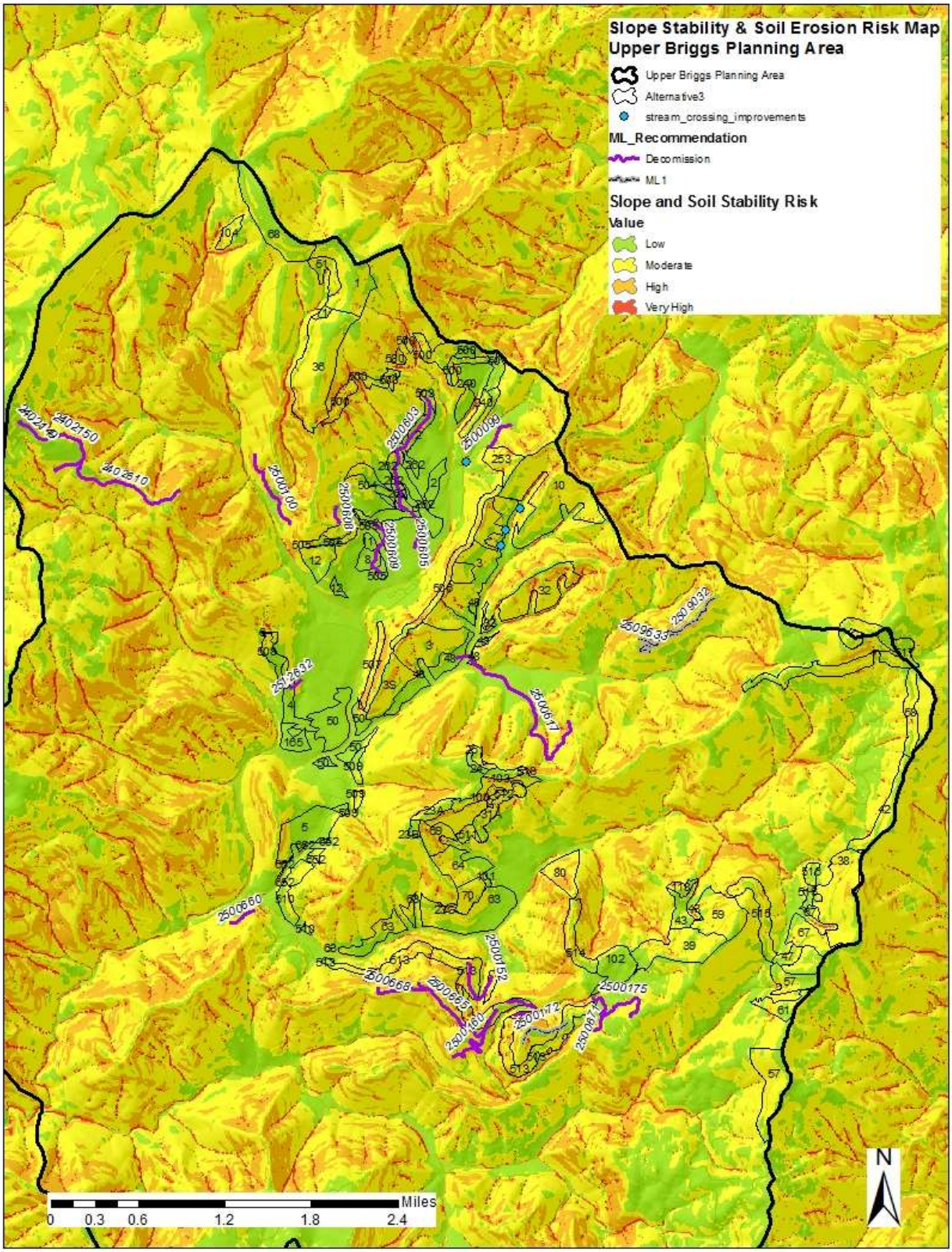


Figure 16. Slope Stability and Soil Erosion Risk Map, With Alternative 3 Units and Road Proposals.

Soil Productivity

Soil productivity can be impacted by management activities, through actions that reduce effective ground cover, displace soil, cause soil compaction or otherwise adversely impact soil structure, destabilize slopes, and change soil water and nutrient cycling processes through vegetation and down wood manipulation. Specific activities as related to the Upper Briggs project include national forest system road reconstruction, temporary road construction and decommissioning, silviculture treatments, fuels treatments, and use of heavy equipment logging systems.

The Siskiyou National Forest Plan standards and guidelines for the soil resource require that no more than 15% of an activity area, including roads and landings, be left with detrimental soil conditions, as well as specific effective ground cover requirements to prevent erosion from mineral soil exposure (refer to the Regulatory Framework in this report). Project design criteria and mitigation measures have been developed specifically for the Upper Briggs Restoration Project to meet these standard and guidelines with implementation of all proposed project activities for all action alternatives.

Roads

Effects of existing system roads and temporary roads and landings on soil productivity would be the same as those described under Alternative 2, only with the expectation that overall there would be less effects since less acres are included for treatments in Alternative 3. There would be fewer landings and temporary road miles needed to implement Alternative 3.

Silvicultural Treatments

Effects of silvicultural treatments would be the same as those described under Alternative 2, only there would be less effects since less acres are included for treatments in Alternative 3.

Figure 7 in the soils report displays the water holding capacity of soils with the Alternative 3 treatment units. Table 9 in the soils report lists each of the treatment units, the primary objective of each unit, and the dominant water holding capacities of the soils within those units and amount of needed effective ground cover.

With Alternative 3, 33 units require 85% effective ground cover, 34 units require 70% effective ground cover, and 2 units require 60% effective ground cover.

Harvest (Logging) Systems

Effects of harvest systems, including ground-based, skyline-cable, aerial, and ground-based on steeper slopes, would be the same as those described under Alternative 2, only there would be less effects since less acres are included for treatments in Alternative 3.

Fuels Treatments (Activity Fuels and Fuel Management Treatments)

The effects of all of the fuels treatments would be the same as those described under Alternative 2, only there would be less effects since less acres are included for treatments in Alternative 3.

CUMULATIVE EFFECTS —ALTERNATIVE 2 & ALTERNATIVE 3

The cumulative effects analysis area for the soil resource are the proposed vegetation treatment units and proposed road treatments (decommissioning, storage, stream crossing improvement) in the project area, and areas downslope of these areas that could be impacted by soil movement/slope instability. This cumulative effects analysis area is considered sufficient because effects to a particular soil is localized to the defined area where direct and indirect effects can be measured.

Past events in these areas which still have the potential for residual effects to soils include timber management and wildfires. Timber management has occurred within 14 of the proposed units; these units and their current condition are shown in Table 5 on page 62, and are included in proposed treatments for Alternative 2 and Alternative 3. Wildfires which overlap proposed treatments and that are recent enough to still have the potential for residual effects to soils include the 2014 Onion Mountain Fire and the 2010 Oak Flat Fire. Detrimental effects from both of these fires would be primarily the loss or reduction of surface organic matter that provides nutrients, water retention, and effective ground cover from erosion on high severity and moderate severity sites. A review of burn severity within overlapping proposed treatments is summarized below in Table 5.

Table 15. Proposed Treatments That Overlap Wildfire Perimeters and Their Burn Severities.

Road Decommissioning – Alternative 2 and Alternative 3	
FSR 2402610	Located on the northern edge of the Oak Flat fire in predominantly moderate severity.
FSR 2402150	Located on the northern edge of the Oak Flat fire in predominantly moderate severity.
FSR 2500660	In the Oak Flat fire perimeter, within moderate severity.
Vegetation Treatments	
Unit 508	Is along the eastern edge of the Oak Flat fire, but was mostly unburned and low severity, with a small patch of moderate and no high severity. Roadside FMZ is the primary objective in both action alternatives.
Unit 10	The edge of unit 10 along FSR 2509020 is within the Onion Mountain fire and was mostly unburned or low severity but on the edge of a patch of high severity. Pine-Oak management is the primary objective in both action alternatives.
Unit 517	Part of this roadside FMZ was burned, and is dominated by moderate severity burn from the Onion Mountain fire. Roadside FMZ is the primary objective in both action alternatives.
Unit 20	Part of this unit burned in the Onion Mountain fire, and experienced two patches of moderate and high severity surrounded by low and unburned. The primary objective is FMZ in Alternative 2, and is dropped from Alternative 3.

The LRMP establishes that the total area of detrimental soil conditions should not exceed 15 percent of the total acreage within the activity area, including roads and landings. Where a unit is already estimated to be over 15 percent detrimentally disturbed (Siskiyou NF Plan, vs. 20 percent in the R6 Manual) from past impacts, the Region 6 Manual requires that “the cumulative detrimental effects of project implementation and restoration must, at a minimum, not exceed the conditions prior to the planned activity and should move toward a net improvement in soil quality” (USFS 1998). During preparation for implementation, treatment methods are designed to assure that soil detrimental disturbance will not exceed this Standard and Guideline. In areas where there are residual past effects, then the re-use of old disturbance areas to the maximum extent possible helps to prevent an increase in the acres. In addition, required mitigation measures to improve effective ground cover and water infiltration, such as through slash placement and subsoiling, improve the disturbed areas and set the soil resource on a trajectory of restored soil productivity.

3.1.2 Fire & Fuels

Information for fire, fuels is incorporated entirely in this EA and assesses potential effects to resources within the project area, and it provides a full explanation of measurements and metric used in evaluating the information for the no action and action alternatives.

3.1.2.1 REGULATORY FRAMEWORK

Guidance for fire and fuels in the planning area is found in the following documents:

- The National Fire Plan, Managing the Impacts of Wildfires on Communities and the Environment, September 8, 2000;
- State of Oregon Smoke Management Plan
- Wildland and Prescribed Fire Management Policy, January 2001;
- Siskiyou National Forest Land and Resource Management Plan, 1990.

Based on the Land and Resource Management Plan for the Siskiyou National Forests (USFS 1989); the management objective for this allocation is to preserve the values of the area in a substantially natural condition. Emphasis is placed on retaining the large trees and the natural-appearing character of stands in the area over the long term. Pertinent recommendations from the Briggs Creek Watershed Analysis include "[O]verall management activities should mimic the effects of natural, low intensity fires to promote forest health. Prescribed fire, thinning and timber harvest are appropriate management tools to consider in order to create stand conditions within the natural range of variation."

This analysis is focused on the area bound by the Upper Briggs planning area.

Only fire and fuels activities that occurred within the project area during the preceding 15 years were considered in the analysis of cumulative effects; these actions or events are described below in Table 76. District experience and field reviews have shown that vegetation management activities such as thinning followed by prescribed fire have the beneficial effect of reducing fire intensity and fire behavior for an average of 15 years, perhaps longer depending on location and treatment intensity.

Table 76. Fire-Specific Actions or Events That Occurred Within the Project Area.

Action	Decade	Acres/Miles/Permits	Description/Extent of Activity
Burning of Piled materials	2000-2008 2009-2015 **total**	29 acres 799 acres **828 acres**	A method used to reduce logging debris post-harvest that involves either machine or hand-piling material and burning the piles. 17 different areas were treated.
Hazardous fuels thinning	2010s	1520 acres	Thinning dense stands, removing underbrush mechanically or manually.
Piling/chipping of fuels and rearrangement of fuels	2010-2015 Unknown **total**	721 acres 28 acres **157 acres**	Hand-piling and machine-piling of woody debris for fuel load reduction. Rearrangement and redistribution of Debris resulting from natural or human activities. 20 separate units were treated.

3.1.2.2 EXISTING CONDITIONS

The vegetation in the project planning area is characterized primarily by Douglas-fir, Ponderosa pine, white fir, cedar, White Oak and California Black Oak. Important changes have occurred in these forests since the late 1800's. The occurrence of low-intensity fires has decreased while the occurrence of stand replacing fires has increased. This began in the late 1800s as a result of relocation of Native Americans and the disruption of their traditional burning practices. Then, in the early 1900's "fire exclusion" was adopted as a management policy. As a result of these changes in the fire regime, dense conifer understories have developed, commonly adding 200 to 2,000 small trees per acre beneath old growth stands and thickets where the overstory was removed (Brown et Al 2000).

A combination of heavy forest floor fuels and dense understory acting as ladder fuels, coupled with the normally dry climate and frequent lightning- and human-caused ignitions, has resulted in an increase of severe stand replacement wildfires (Brown et Al 2000).

FIRE REGIME

A fire regime is a generalized description of the role fire plays in an ecosystem (Agee 1993). It refers to the pattern and variability of fire occurrence and its effect on vegetation. Fire regime typically is a description of fire frequency, predictability, intensity, seasonality, and size characteristics of fire in a particular ecosystem

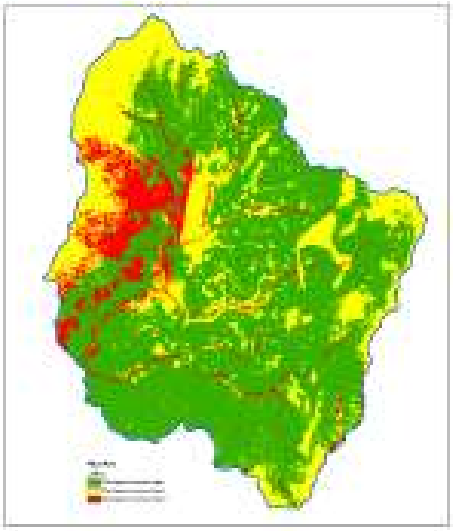
- **Fire Regime 1:** 0- to 35-year frequency; low severity to mixed severity. Frequent low intensity surface fires are the norm. Typical climax plant communities include ponderosa pine, dry-site Douglas-fir, mixed conifer, and oak woodlands.
- **Fire Regime 2:** 0- to 35-year frequency; moderate to high severity. Typical plant communities include true grasslands and savannahs, ceanothus, and Oregon chaparral.
- **Fire Regime 3:** 35- to 200-year frequency; low to mixed severity. This regime usually results in a mixed landscape. Lower severity fire tends to predominate in many events. Typical plant community is mixed conifer.

Table 87. Fire Regime Within Planning Area.

Fire Regime	Acres	Fire Frequency	Fire Severity	Vegetation Class
I	15,773	0-35 years	Low and Mixed	Mixed Conifer
II	6,654	0-35 years	Stand Replacement	Grass
III	2,218	≤50 years	Low and Mixed	Riparian Woodland

Upper Briggs Project Area

FRCC	DESCRIPTION	Percent FRCC
Fire Regime Condition Class I	Low Vegetation Departure	0.64
Fire Regime Condition Class II	Moderate Vegetation Departure	0.27
Fire Regime Condition Class III	High Vegetation Departure	0.09



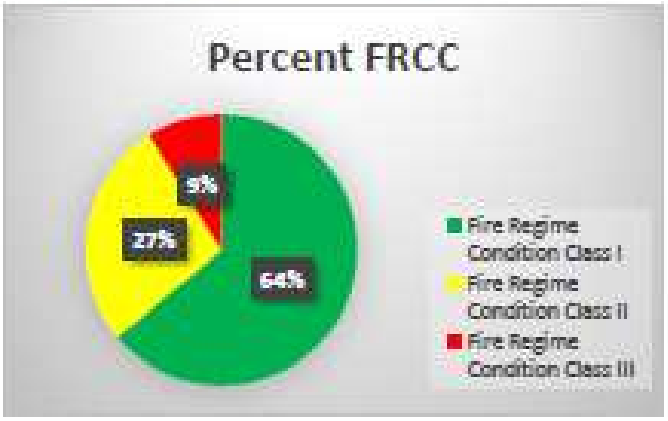


Figure 17. Fire Regime Within the Planning Area

Historically, frequent low intensity fires would have consumed down fuels, killed small trees, reduced the presence of brush and hardwood tree vegetation, killed the lower branches on trees, stimulated or maintained grass/forbs in meadows and the forest understory, and generally reduced forest stand densities by killing individual or clumps of trees. These fires likely tended to maintain forest stands that consisted of large diameter but relatively wide spaced trees (20- 50 trees per acre) with a relatively open understory with little ladder fuel. Large down logs were probably limited in number because of the frequent fire regime. Meadows would have tended to be larger and dominated by grass with less shrubs and trees. Such meadows provided unique habitat for certain dependent plant and animal species.

FIRE HAZARD

Stands throughout the project area have accumulated surface and ladder fuels that under typical summer conditions create high severity fire effects. The shift in species composition from pine and hardwood to Douglas-fir and brush increases the risk of stand replacing fire. Historically, periodic wildfires limited the species composition of dry sites to mainly pine and hardwood species that have developed with frequent fire. Douglas-fir is more susceptible to fire-caused mortality than pine due to its branch characteristics and bark qualities. Fire-resilient pines are now at risk of loss from fire that could be carried into the tree crowns from the understory vegetation. It is likely that the exclusion of fire has encouraged the development of understory vegetation and has formed live fuel ladders that extend into the forest canopy. In the absence of management activities, the trend is for both surface and ladder fuels to increase within most vegetation types.

Fuels

Predicting the potential behavior and effects of wildland fire is an essential task in fire management. Mathematical surface fire behavior and fire effects models and prediction systems are driven in part by fuel-bed inputs such as load, bulk density, fuel particle size, heat content, and moisture of extinction. To facilitate use in models and systems, fuel-bed inputs have been formulated into fuel models (Scott and Burgen 2005). Table 98 displays lists of fuel models that are or can be expected to be in the planning area over the next 50 years.

Table 98. Fuel Models That Are or Can Be Expected to Be in the Planning Area Over the Next 50 Years

Fuel Model	Description	Flame Length (Feet)	Rate of Spread (Chains/Hour)	Probability to Escape Initial Attack Efforts
GS3	Grass and Shrub – Moderate Load	5-10	50-100	High
SH8	Shrub - High Load	7-15	2-75	High
SH9	Shrub – Very High Load	10-25	25-100	Very High
TU1	Timer Grass Shrub - Low Load	1-2.5	1-7	Very Low
TU2	Timber Shrub - Moderate Load	3-8	5-50	Moderate
TU5	Timber Shrub - High Load	6-14	5-30	High
TL1	Conifer Litter - Low Load	1-1.5	1-1.5	Very Low
TL4	Small Down Log	1-3	2-10	Low
TL5	Conifer Litter - High Load	2-5	2-18	Low
TL8	Timber Litter	3-7	5-22	Moderate
TL9	Broadleaf Litter - Very High Load	4-9	5-35	Moderate

Notes: *A Fine Dead Fuel Moisture of 3, 4, & 5 was used to calculate values. Additionally a 2-10 mph mid-flame windspeed, upslope was used with a 40% slope.*

Fuel models (FM), are used to help describe and quantify surface fuel situations and estimate fire behavior. Criteria for choosing a fuel model involve assessing the fuel strata that will support the fire as it spreads and generates heat intensity. Where fuel beds are fairly continuous with similar fuel characteristics, one model can provide a realistic representation of expected fire behavior. Fuel conditions defined by quantity and arrangement have been categorized into 40 standard descriptive fuel models (Scott and Burgan, 2005).

Fuel models were selected by onsite photo series interpretation as well as remote sensing and common stand exams. A brief description of the FM characteristics that are located in the project area and their representation follows:

- Most stands have moderate to high surface fuel loads that exceed desired conditions in the Forest's Land Resource Management Plan.
- Fuel models TL5 and TU5 are the most suitable to model fire behavior in these areas depending on whether grass, needle cast or woody debris is the carrier of fire. The moderate to high concentrations of surface fuels found in some stands are from insect induced mortality, wind throw, stem exclusion, and past management. Fuel loads in these stands exceed 9 tons per acre. For areas with heavy fuel loads the most accurate fire behavior predictions use fuel model TU5. Fuel model TU5 represents plantations from regeneration shelter wood harvests, old fire scars with tall brush, or timber reproduction.

- Duff levels over much of the project area range from .25” to 3” in depth. The exception is directly under the larger pine trees. Bark from pine flakes off and accumulates within the first few feet of the bole of the tree and combines with annual needle cast. With the exclusion of fire over the past century, these bark flakes have reached depths of up to 12” under much of the larger pine. When these duff mounds burn completely under low moisture conditions, high stress can be placed on the tree.

Wildland-Urban Interface

Wildland-Urban Interface borders the southern tip of the planning area along sections of forest roads 25 and 2524 as shown in Figure 18.

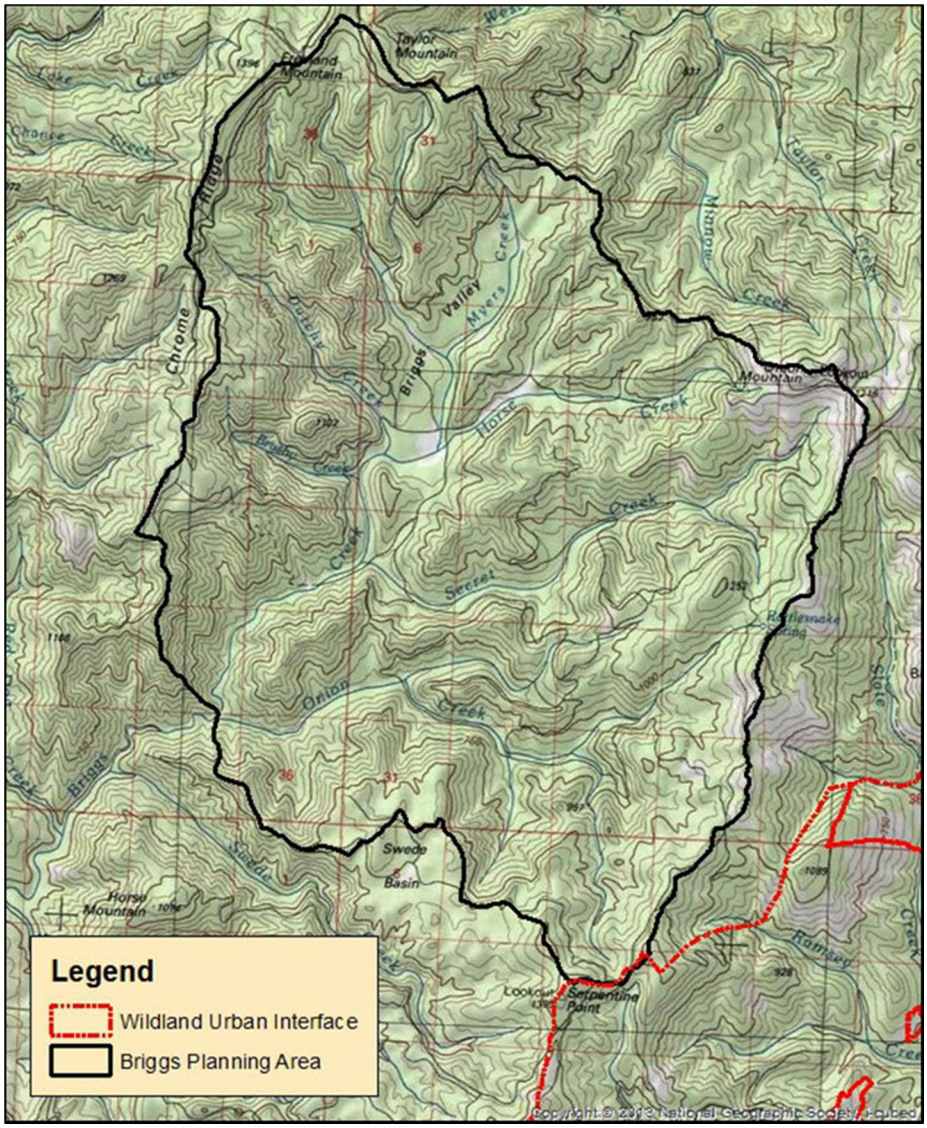


Figure 18. Wildland-Urban Interface.

3.1.2.3 ENVIRONMENTAL CONSEQUENCES

The alternatives are analyzed from the existing condition out 50 years. This time frame allows the comparison of alternatives beyond the fire return intervals for the project area.

ALTERNATIVE 1—NO ACTION

The no action alternative considers that the proposed activities would not be implemented. The area would be left unmanaged and would not meet standards and guides or the desired condition.

Direct & Indirect Effects

Effect on Fire Behavior

Due to current fuel loadings and Fire Regime Condition Classes throughout the project area, much of the landscape is classified as moderate to high risk of experiencing an uncharacteristically severe Fire.

No commercial harvest or fuels reduction activities would take place, custodial activities would continue, such as routine maintenance and response to emergencies – such as wildfire suppression. In this alternative, geographic features and fuels continuity would facilitate transition to an active crown fire over much of the project area. This alternative would maintain a high potential for an uncharacteristically severe fire on the landscape, presenting a high risk to suppression personnel, loss of habitat, and an elevated threat to the communities adjacent to the Forest boundary in Josephine County. Over time, wildfire behavior is expected to become more severe as forest fuels continue to build up. Moderate to high-intensity wildfires are also expected to occur, depending on the weather conditions. The time of year, weather, and location would dictate the size and severity of a wildfire and its subsequent effects.

Over time, stand types would shift toward fuel model TU5 as described above in Table 9. Trees would age, die, and fall becoming down woody material would exceed 10 tons per acre. Surface fuels would increase. Litter, duff, twigs, and small branches would continue to accumulate. In addition, large surface fuels (greater than 3 inches in diameter) would increase. The canopy bulk density in the forest would remain about the same. Dead and fallen trees would reduce the mass of canopy, but this would be offset by the regeneration of young trees. Canopy cover is expected to remain about the same; although fallen trees would create openings in the overstory, younger trees would replace them. Canopy base heights would not change from the existing condition because the main changes in the stands would be that trees would die and fall over. In this alternative crown fire would remain well above the historical levels for the Fire Regime.

Effect on Fire Suppression

Implementation of the No Action Alternative would limit fire suppression capability in this area. If left untreated, the current fuels strata would generate fire behavior in excess of firefighter capabilities. The high intensities that would be generated would make travel difficult until the fire behavior subsides.

As the fuel loadings remain high, the risk to fire suppression forces also increases primarily due to the increased fire behavior. Without direct attack tactics, suppression forces would use indirect tactics. Indirect suppression tactics require moving away from the fire's edge far enough to allow sufficient time for fire lines to be constructed while providing for firefighter safety. This would result in increased fire size and additional impacts to resources. The location of the project area is adjacent to

the communities of Grants Pass, Merlin, Galice, and multiple high-use campgrounds, therefore backing away and going indirect is not a preferred strategy.

Table 109. Average Predicted Flame Lengths and Fireline Intensities and Firefighter Interpretation under Alternative 1 – No Action.

No Action	Flame Length (ft)	Rate of Spread (Chains/Hour)	Fireline Interpretation
Existing Condition	6-10	12-30	Fires may be too intense for direct attack on the head by persons using hand tools. Hand line may not be relied on to hold the fire. Equipment such as dozers, engines, and retardant aircraft may be effective.
Year 5-10	10-14	30-58	Fires may present serious control problems torching out, crowning, and spotting. Control efforts at the fire head could be ineffective.
Year 10 and beyond	≥15	≥58	Crowning, spotting, and major fire runs are expected. Control efforts at head of fire are ineffective.

Evolving Circumstances

Fire history in the Wild Rivers Ranger District shows that areas that were affected by past wildfires and left unmanaged, developed fuels profiles that readily support fire. Fires burning in these conditions delay the development of tree stands (Brown and Smith, 2000). Fires typically burn through these fuels conditions affecting adjacent unburned forest and increasing the loss of forest structure. With fire return intervals between 8 and 16.5 years on the west side of the Klamath Mountains, (Taylor and Skinner 2006), it can be expected that fire will continue to shape this landscape. Unmanaged areas will continue to burn with intensities that perpetuate early seral stage development and hinder the development of forested ecosystems.

ALTERNATIVE 2—PROPOSED ACTION

The proposed action, described in detail in Chapter 2 of this Environmental Assessment, would treat approximately 4,017 acres through a combination of methods. To sustain large Ponderosa Pine and hardwood (Oak/madrone), increase stand vigor, and promote pine regeneration a combination of the following treatments would be implemented: natural fuels treatment and activity fuels treatment.

Natural Fuels Treatment—Although treatment of natural accumulations of fuel to reduce fuel loading and improve the Fire Regime Condition Class (FRCC) is usually accomplished by prescribed fire, there are many other methods that maybe considered for fuels reduction to change the condition class. These methods include: underburning, handpiling and burning piles, pruning ladder fuels, lop and scatter, thinning, chipping, brushing, whole tree yarding, and yard with tops attached. Fuels reduction treatments typically take more than one treatment to reach the goal of reducing the FRCC.

Activity Fuels Treatment—Activity fuels are the slash and accumulated fuels loading resulting from commercial harvest action, and in some cases resulting from pre-commercial thinning. While there may be slash from previous harvesting or from natural conditions, the majority of material would be generated through harvesting. When resulting levels of activity fuels are predicted to be greater than that which equates to an acceptable fuels risk and fire hazard, there are several techniques available to reduce these fuels. All of these techniques are considered viable until Pre and Post-Harvest reviews are conducted; at that time fuels treatments will be assigned.

The proposed action would meet the stated Purpose and Needs for the Briggs project by reducing the understory and fuels treatments on activity and natural fuels. Implementation of the Proposed Action in accordance with LRMP direction would meet the Purpose and Need while moving the project area toward the Desired Condition.

Direct Effects

Effect on Fire Behavior

Fuels reduction would occur through harvest and treatment of non-merchantable material encompassing approximately 4,017 acres. Handpiling, pruning, and burning of piles, underburning or jackpot burning is prescribed to reduce activity and natural fuels which will lower fire behavior.

Harvest would reduce the volume of larger diameter merchantable material from the site, thereby reducing future high fuel loadings and ladder fuels which will lower fire intensities and flame lengths. Underburning, jackpot burning and/or pile burning would treat the high density of the un-merchantable material.

Hand piling and burning and/or jackpot burning would treat the smaller diameter material and prepare the fuels treatments needed to maintain all treatment types within this alternative. After treatments the fuel loading is estimated to be between 5 to 8 tons an acre these areas can be directly attacked with suppression resources increasing the chance of suppressing these fires in the initial attack phase while maintaining resource needs (Brown et al. 2003). During the felling and removal process it is anticipated that there would be normal breakage typically associated with timber felling. Fuel loading that is below the handpile specifications would be left on site to meet resource needs. This material would reduce soil movement and provide multiple resource benefits while the reduced fuel loading would decrease fire behavior.

Fuel treatments in these stands which include harvest would result in fuel characteristics reflective of Condition Class 1. Prescribed fire would be used to maintain Condition Class 1 to reduce the likelihood of damage to adjacent stands.

Indirect Effects

Effects on Fire Behavior

Upon completion of project activities and with annual maintenance, fuel loadings would be reduced thereby lessening fire behavior and fire effects within the treated units. The fuel model in treated units would be represented by TU1 or TL1 low load grass and/or shrub with litter. The area outside treated units would burn the same as the no action alternative. Placement of the treated units would reduce overall fire size within the project area by reducing fire behavior and provide opportunity for suppression forces to take appropriate actions (Finney 2001). Altering the movement and effects of fire through the project area would result in more natural and mosaic burn patterns.

Fuels on the forest floor would consist of small diameter material and scattered larger logs. Snags and large logs may be present in the units to meet resource needs and LRMP direction. These guidelines were developed with consideration for fire and its role in developing and sustaining these ecosystems

As these stands mature, fuel loadings would increase. Continued stand maintenance designed to achieve the desired condition would maintain fuels profiles that allow fire to resume its ecological role and meet LRMP direction.

Table 20. Fire Regime Within Project Area for Alternative 2—Proposed Action.

Fire Regime	Acres	Fire Frequency	Fire Severity	Vegetation class
I	2,372	0-35 years	Low and Mixed	Mixed Conifer
II	1,527	0-35 years	Stand Replacement	Grass
III	121	≤50 years	Low and Mixed	Riparian Woodland

Alternative 2 Upper Briggs

FRCC	DESCRIPTION	Percent FRCC
Fire Regime Condition Class I	Low Vegetation Departure	0.59
Fire Regime Condition Class II	Moderate Vegetation Departure	0.38
Fire Regime Condition Class III	High Vegetation Departure	0.03

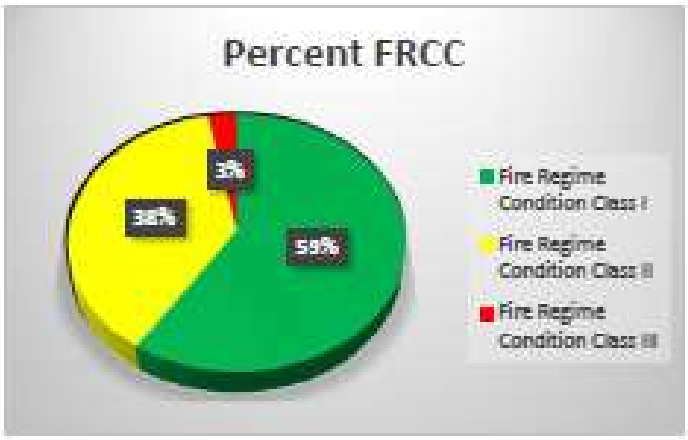


Figure 19.Fire Regime Condition Class for Alternative 2--Proposed Action

Effects on Fire Suppression

Rates of spread and flame lengths along system roads would be lower as the majority of the fuels would be removed. Foot travel in the units would be unimpeded except for the occasional large log. Suppression actions would not be restricted by fire behavior; thus direct suppression actions would be possible within treated stands. The effect on fire suppression forces beyond year 10 would depend on the continued maintenance of the stands. Stands that are maintained and managed to achieve the desired condition would not adversely impact future suppression. Table 11 below displays the projected fire behavior and production rates for Alternative 1 within treatment units.

Table 111. Predicted Average Flame Lengths, Fireline Intensity, and Firefighter Production Rates Within Treatment Units. Alternative 2—Proposed Action.

Proposed Action	Flame Length (feet)	Chains per Hour (chains)	Suppression Interpretation
Existing Condition	6-10	12-30	Fires may be too intense for direct attack on the head by persons using hand tools. Hand line may not be relied on to hold the fire. Equipment such as dozers, engines, and retardant aircraft may be effective.
Post-Activity	≤2	≤10	Fires can generally be attacked at the head or flanks by persons using hand tools. Hand line should hold the fire.
Year 3-5	≤3	≤15	
Year 6-10	≤4	≤20	

Cumulative Effects

Access to the area would be safer and reduced fire behavior would allow suppression forces to take appropriate action. Improved conditions would reduce the likelihood of fire spreading between the public and private lands interface.

Fuels treatments would improve the safety for all users. The treatment areas can be used with previous treatment units outside the project area to aid in containing future fires which will increase fire suppression safety, reduce potential resource damage, and potentially lower suppression costs.

Roads and ridgelines are commonly used as a control points for containing wildfire and are often used as the fireline. With the implementation of this alternative fire behavior within the treated units would be substantially reduced. Suppression forces could enter these areas and take appropriate actions as needed to manage fires to achieve the desired condition.

As managers continue to move the forest toward the desired condition fire would be able to resume its natural role in developing and sustaining these ecosystems. Continued management practices can and will alter the effects of wildland fire (Agee and Skinner 2005).

ALTERNATIVE 3

In Alternative 3, proposed forest management activities are dry forest restoration thinning reducing canopy cover 40% and 60%. The Proposed Action 3, described in detail in the Briggs Environmental Assessment, would treat approximately 2,630 acres through a combination of treatment methods. Proposed fuels treatments under this alternative include lop and scatter, hand pile and burn, underburn, and/or biomass removal.

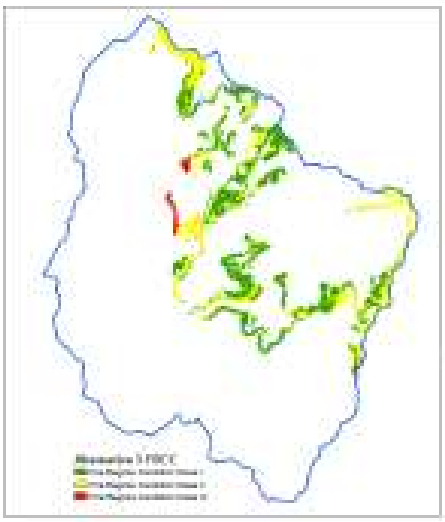
Direct & Indirect Effects

Dry forest restoration thinning treatments are intended to create multi-aged and multi-layered stands. Untreated stands would be left in a condition less resilient to environmental stressors such as fire, drought, and insects. Canopy cover would range from 40% to 60% following treatment. The largest and most resilient trees would remain. In addition, non-commercial and commercial trees under 80 years of age would be thinned to reduce tree density. Large untreated gaps would exhibit extreme fire behavior, larger group torching of trees during a wildland fire, however, the reduced canopy bulk density of the stand and openings would limit large scale crown fire potential. These untreated areas would increase safety risks to firefighter and the public during the initial attack of wildland fires. Overall, stands would exhibit a slight increase in potential fire behavior and a decrease in suppression capability when compared to Alternative 2.

Table 122. Fire Regime Protection Class for Alternative 3

Fire Regime	Acres	Fire Frequency	Fire Severity	Vegetation class
I	1,499	0-35 years	Low and Mixed	Mixed Conifer
II	1,052	0-35 years	Stand Replacement	Grass
III	79	≤50 years	Low and Mixed	Riparian Woodland

Alternative 3 Upper Briggs		
FRCC	DESCRIPTION	Percent FRCC
Fire Regime Condition Class I	Low Vegetation Departure	0.57
Fire Regime Condition Class II	Moderate Vegetation Departure	0.40
Fire Regime Condition Class III	High Vegetation Departure	0.03



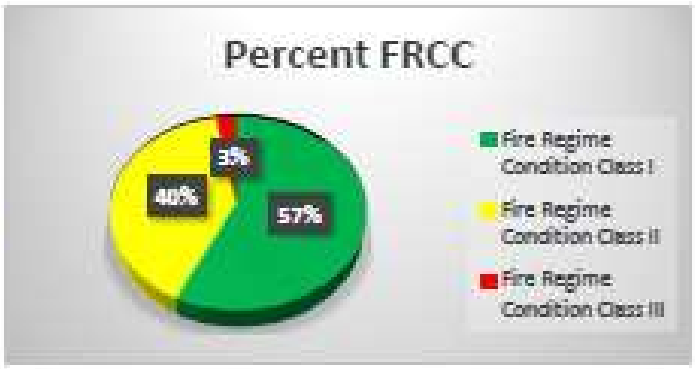


Figure 20. Fire Regime Condition Class for Alternative 3

Effect on Fire Suppression

With continued high recreational use and the close proximity to Merlin, numerous campgrounds and the community of Grants Pass, human-caused fires will continue to be a threat. As the fuel loadings

remain high, the risk to fire suppression resources also increases primarily due to the continued high fire behavior. Actions in Alternative 3 would reduce fuel loading and fire behavior in some areas, however, untreated portions between project areas would retain high fire behavior characteristics. Untreated areas would pose high risk for firefighters and limit opportunities for successful direct attack. Without direct attack tactics suppression forces would have to use indirect tactics. Indirect suppression tactics require moving away from the fire's edge far enough to allow sufficient time for fire lines to be constructed while providing for firefighter safety. This would result in increased fire size and additional impacts to resources. The location of the project area is adjacent to the community of Grants Pass, campgrounds, and Merlin, indirect strategies are not preferred.

Table 13. Average Predicted Flame Lengths, Fireline Intensities, & Firefighter Interpretation under Alternative 3.

	Flame Length (ft)	Rate of Spread (Chains/Hour)	Fireline Interpretation
Existing Condition	6-10	12-30	Fires may be too intense for direct attack on the head by persons using hand tools. Hand line may not be relied on to hold the fire. Equipment such as dozers, engines, and retardant aircraft may be effective.
Post Treatment	≤3	12-30	Fires can generally be attacked at the head or flanks by persons using hand tools. Hand line should hold the fire. Untreated areas are likely to cause concern due to existing conditions, higher flame lengths and greater rates of spread.
Year 3-5	≤4	50-100	Fires are too intense for direct attack on the head by persons using hand tools. Hand line cannot be relied on to hold the fire. Equipment such as dozers, engines, and retardant aircraft can be effective.
Year 6-10	10	> 100	Fires may present serious control problems torching out, crowning, and spotting. Control efforts at the fire head would probably be ineffective.

Cumulative Effects

The cumulative effect of Alternative 3 of the proposed action and ongoing hazardous fuels reduction work on FRCCs within the project area would begin to move towards the historic fire regime and condition class on a stand level. However, due to prominence of large untreated areas within the project acres will not create a well-defined fuel break. This would be a departure from the historical fire regime and would continue to trend toward condition classes 2 and 3 on unmanaged land.

Fire hazard and risk within the watershed would also be reduced in areas that are treated. Past, current, and future fuels reduction on federally-managed lands would result in beneficial effect of increasing the landscape scale effectiveness of fuels reduction treatments.

3.1.3 Air Quality

Information for air quality is incorporated entirely in this EA and assesses potential effects to resources within the project area and provides a full explanation of measurements and metric used in evaluating the information for the no action and action alternatives. The air quality section describes the current condition of air resources in the project area and the effects of thinning and associated project activities (such as fuels treatments) on those resources. This discussion includes greenhouse gases, such as carbon monoxide and carbon dioxide.

3.1.3.1 BACKGROUND

REGULATORY FRAMEWORK

The Clean Air Act (as amended in 1990) establishes minimum requirements for air quality nationally. States can require more strict criteria. Users of prescribed fire must comply with all applicable federal, state and local air quality regulations. The Clean Air Act establishes air quality goals and provides measures to attain those goals by addressing existing and potential air pollution problems. The air quality goals include attaining National Ambient Air Quality Standards (NAAQS) and preventing significant deterioration of air quality in areas cleaner than the NAAQS.

Regional Haze Rule: (1990 Clean Air Act Amendments) 40 CFR Part 51: In 1999, EPA promulgated the Regional Haze Rule (40 CFR 51.308-309) which calls for states to establish goals for improving visibility in mandatory Class I areas and to develop long-term strategies for reducing the emissions of air pollutants that cause visibility impairment. Class I areas include wilderness or national parks greater than 5,000 acres which existed on August 7, 1977. The Regional Haze Rule requires states to demonstrate ―reasonable progress toward improving visibility in each Class I area over a 60-year period (to 2064), during which visibility should be returned to natural conditions.

The Regional Haze Rule also requires states to address visibility impairment in mandatory Class I areas due to emissions from fire activities. The preamble to the rule emphasizes the implementation of smoke management programs to minimize effects of all fire activities on visibility. The rule requires states to address visibility effects from all fire sources contributing to visibility impairment in mandatory Class I areas.

State Regulations: Prescribed burning in Oregon‘s forests is managed by the State Department of Forestry (ODF) under the Oregon Smoke Management Plan (OSMP). The OSMP is intended to minimize smoke impacts by conducting forest burning under weather conditions that disperse smoke and vent it away from populated areas. Burning on National Forest System Lands requires prior approval granted by the ODF. The Rogue River-Siskiyou National Forest currently voluntarily complies with the Regional Haze Rules set forth for Central Oregon and Class I Air sheds. Refer to Smoke Management Plan OAR 629-48-001 for regional haze requirements. Currently Grants Pass and Medford are listed smoke sensitive receptor areas but at this time no restrictions are in place concerning air pollutants as listed above. Additionally, there are multiple wilderness areas which are regulated under this plan.

Standards for ambient air quality are set by the Environmental Protection Agency (EPA) and are designed to protect human health and welfare. Air quality can be impacted by the presence of particulate matter and other pollutants produced by both prescribed burning and wildfire. Three primary pollutants produced by fire are particulate matter, carbon monoxide (CO) and carbon dioxide (CO2).

The major pollutant of concern from smoke is fine particulate matter (Sandberg et al. 2002), which can travel great distances, reduce visibility, and absorb and transmit harmful gases. EPA standards have been established for two classes of airborne particulate matter – PM 10 and PM 2.5. PM 10 is particulate matter less than 10 microns in diameter while PM 2.5 is a subset that is less than 2.5 microns in diameter. Studies indicate that 90 percent of all smoke particles emitted during wildland burning (both prescribed and wildfire) are PM 10; of these, the majority are PM 2.5 (Hardy and others 1991). PM 2.5 causes the majority of air quality impacts. Human health studies on the effects of particulate matter indicate that fine particles are largely responsible for health effects (O'Neill and others 1997).

Burning techniques that minimize consumption during the smoldering phase of burning directly reduce emissions production. When compared to a summer wildfire, early season (spring, early summer) or late fall burning lessens emissions output by reducing 0-3 inch fuel consumption and leaving the majority of the moist duff, litter layer and larger woody material intact. The duff layer and large coarse woody debris generate the most emissions during the smoldering phase of combustion. Fall burns exceed spring burns in duff consumption and emission levels. Prior to burning, emissions are predicted given certain weather, burn prescription and site parameters, in order to meet State standards (Sandberg and others 2002).

SCOPE OF ANALYSIS

The scope of the air quality analysis for this project is focused on the area bound by the Upper Briggs planning area. Only fire and fuels reduction activities that occurred within the planning area during the preceding 15 years were considered in the analysis of cumulative effects. Fire-specific actions or events that occurred within the project area are listed in Table 144. Fire-Specific Actions or Events in the Planning Area in the Past 15 Years.

Table 144. Fire-Specific Actions or Events in the Planning Area in the Past 15 Years.

Action	Decade	Acres/Miles/Permits	Description/Extent of Activity
Wildfire	2002	Biscuit fire, 287/ 499,945 acres	Some fires were started by lightening or were arson starts. The overall size of the fires may have extended outside the planning area; fire acres are reported as acres within planning area/ total fire acres.
	2010	Oak Flats Fire, 6,415/ 7,494 acres	
	2014	Onion Mountain Fire, 1,338/ 4,106 acres	

3.1.3.2 EXISTING CONDITIONS

The Upper Briggs project area is approximately eleven miles west of Grants Pass, Oregon. Based on the location of the project area, relatively limited industrial development in the area, and the generalized prevailing wind direction and speed, smoke from prescribed burning should dissipate quickly.

The closest averaged wind data is collected at Sexton Summit, to the north of Grants Pass. In general, Sexton summit is characterized with constantly moving wind (8 mph or higher) for the majority of the

year. Wind typically blow southward from October to April and north-northwest-ward the rest of the time.[5]

CLASS I AIRSHEDS, NONATTAINMENT &SMOKE SENSITIVE RECEPTOR AREAS

The closest Class I airshed is the Kalmiopsis Wilderness, approximately 5 miles west of the project area. There are two previous air quality non-attainment areas within 50 miles of the project area, Grants Pass and Medford, Oregon. Based on consistent meeting of the National Ambient Air Quality standards, both non-attainment areas have been reassigned to maintenance air quality areas. There are two Smoke Sensitive Receptor Areas (SSRA) listed in the Oregon Smoke Management Plan that are within ~50 miles of the project area and the proposed potential emissions from the project, they include the city of Grants Pass (11 miles to east) and Medford (40 miles to southeast). Under the current Oregon Smoke Management Plan there are no nonattainment areas identified within 50 air miles of the Upper Briggs project area.

3.1.3.3 ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1—NO ACTION

Direct, Indirect, & Cumulative Effects

There would be no direct, indirect or cumulative effect on air quality or the Class I Federal areas with Alternative 1, because no activities would occur that could impact air quality.

ALTERNATIVE 2—PROPOSED ACTION & ALTERNATIVE 3

Direct & Indirect Effects

Emissions impacts associated with the Upper Briggs project would be mitigated through utilizing windows of good ventilation to limit adverse impacts. Cured herbaceous fuel typically consumes quickly and efficiently. Additionally, because not all units would be burned the same day and not all piles would be burned at the same time, the amount of emissions produced is not likely to affect population centers. This is because the emissions would last only a short time (the day of the burning) and would disperse rapidly, minimizing any direct effects to humans.

The effects of the emissions would cause temporary and short-term visibility impacts in the immediate project areas during ignition of prescribed fires, and the duration and extent of the effects would be affected by wind speed and direction. Weather systems can cause inversions that would affect dispersal of smoke down wind. The localized effects of burning in the project area would be short-term degradation of air quality from prescribed burning, primarily during the actual burning stage and during inversions. Smoke from prescribed burning may be visible to people driving through the area. In most cases, the impacts to recreationist would likely be limited to the day of the burn. Burning piles in the fall would have minimal impacts to hunters or dispersed recreation users; this is due primarily to the favorable dispersal of smoke in the fall. Hunters in the area may be affected for a short period of

[5] https://wrcc.dri.edu/summary/lcd.html, retrieved 21 July 2017.

time (the day of the burn), but would not experience adverse long-term impacts. Since smoke dissipates rapidly, there are no past or future projects, that when combined with any of the action alternatives that would contribute to any cumulative effect on air quality.

The greatest difference in effects on air quality between implementing Alternative 2 versus Alternative 3 would be one of quantity of pollutants and timing of entry; prescriptions and mitigation measures and objectives would be the same. Under Alternative 2, approximately 268 acres of broadcast under burning and 1132 acres of FMZ fuel treatments have been proposed (these activities could overlap if efficiencies are identified). The fuels objective for FMZ areas is to mitigate activity generated fuels potentially through various means designed to attain the desired condition. To best meet the Oregon Smoke Management "Best Burn Practices" to minimize potential impacts forest service personnel will determine the most efficient fire and fuels treatment to meet the project objectives, these treatments can include utilizing piling and pile burning, jackpot or prescribed underburning. Additionally the overall project unit footprint of 268 acres is also available for a prescribed fire entry (underburning). Under Alt. 3, approximately 10 acres of FMZ fuel treatments have been proposed with the overall proposed unit foot print of 75 acres would be available for fire and fuels treatments. Depending on the identified logging system landing piles would also be burned under both alternatives.

Short-term and localized impacts could occur during actual burning operations. Burning would occur along several main Forest Service gravel roads which are regularly used by the public. Smoke would be visible and could locally impact people who are driving or recreating nearby. Those impacts would likely be limited to the day of and day after burning, and would not generate long-term adverse effects. To minimize effects, notification of people in the area would occur to the extent warranted.

Activities would meet or exceed applicable Federal and State standards and regulations (36 CFR 219.27(a)(12) and follow Siskiyou LRMP Standards and Guideline 8-1. Under that guideline, smoke from project activities would be managed through a combination of reduction, dilution and avoidance.

Class I Airshed (Kalmiopsis Wilderness) and Non-Attainment Areas (Grants Pass)

For the protection of Class I Area visibility values, as well as preventing any air quality degradation in the Grants Pass or Medford area, avoidance is the key to preventing any impacts due to man-made pollutants, such as smoke created by slash disposal. Any burning planned to occur would require development of a burn plan, to include avoidance measures.

Among various factors taken into account; detailing prevailing wind direction, timing, and coordination with regulatory agencies would ensure that any burning would occur during conditions where any smoke would not degrade air quality within the identified SSRA's and/or visibility within the Kalmiopsis Wilderness areas (Class I Area). Further, burning will not take place during the visibility protection period of July 1 to September 15. Using the direction and tools described above, slash disposal managers will consult with smoke management agencies to determine what proper atmospheric conditions are best to assure that impacts to either are avoided.

Under Alternatives 2 and 3, burning under favorable transport conditions proposed to be done could be pile burning, jackpot burning and or broadcast underburning. Of these, pile burning normally has the most broad "burning window" and respectively smaller environmental windows for the remaining two treatment options. There is little risk of not being able to meet the project objectives and slash disposal needs as a result of this constraint.

Particulates

Total Suspended Particulates (TSP) for the pile burning portion is predicted to be less than one ton an acre (Assumptions: average of 50 piles per acre at 6 ft high, half sphere, equaling potential emissions of particulate matter (PM) of 0.2602 tons per acre with PM 10 = 0.1842 tons per acre and PM2.5 = 0.1604 tons per acre). For pile burning Alternative 2 total emissions could be as much as 30 tons, of which 9 tons would be PM-10 (particulate matter) particulates and ~8 tons of PM 2.5 the remaining PM is larger than 10 microns. Alternative 3 would produce approximately 3 tons of TSP with 0.9 tons of PM 10 and .8 tons of PM 2.5 with the remaining balance from particulates greater than 10 micron in size.

Cumulative Effects

Future prescribed burning on Federal lands in the analysis area would be conducted under the same air quality restrictions as described above. Prescribed fire on private lands must also follow smoke management guidelines, although they differ from those implemented on Forest Service lands. Burning activities on private lands would not measurably contribute to effects for two reasons. One, there is very little private land along the roads where fuels treatments are proposed in this project; and, two, burn activities would need to coincide precisely with ours to add to effects on air quality. Both the spatial and temporal components would need to align to add to effects, and that is an improbable scenario.

Because of the short duration of impacts and the effectiveness of available mitigation measures to disperse and dilute smoke, cumulative effects on air quality would be minimal and short-term.

3.1.4 Hydrology

The Upper Briggs Restoration Project hydrology resource report (Curtis-Tollestrup 2017) evaluates hydrologic conditions and provides a full explanation of measurements and metric used in evaluating the information for the no action and action alternatives. The information provided in this EA is summarized from the hydrology report and is available here:
http://www.fs.fed.us/nepa/nepa_project_exp.php?project=45593

3.1.4.1 EXISTING CONDITIONS

The Upper Briggs Project is located approximately eleven miles west of Grants Pass, Oregon in the Illinois River Sub-basin. The project area is the entire Upper Briggs Creek 6th field watershed (171003110701), entirely within the Briggs Creek 5th field watershed (1710031107) as shown in Figure 3. Briggs Creek is a major tributary and contributor to the water quality of the Wild and Scenic portion of the Illinois River. At the confluence of the Illinois River, Briggs Creek contributes approximately 10 to 20 percent of the total Illinois River flow. The main tributaries in the project boundary are Meyers, Brushy, Dutchy, Horse, Secret, and Onion Creeks (Figure 21. Upper Briggs Creek Project Area). Table lists the proposed treatment acres by subwatershed.

5. Table 25. Acres by Subwatershed (Alternative 2).

6th field Project Area Watershed	**Acres**	**Acres proposed treatments**	**% in Watershed**
Upper Briggs Creek (171003110701)	24,645	4,017	16 %
Subwatershed	**Acres**	**Acres of proposed treatments**	**% in subwatershed**
Dutchy Creek	1,360	25	1.8 %
Brushy Creek	804	0	0
Horse Creek	2,643	728	27.5 %
Upper Briggs Creek	3,020	304	10.0 %
Lower Briggs Creek	3,234	340	10.5 %
Meyers Creek	1,719	610	35.4 %
Onion Creek	7,547	317	4.2 %
Secret Creek	4,323	1,693	39.2 %

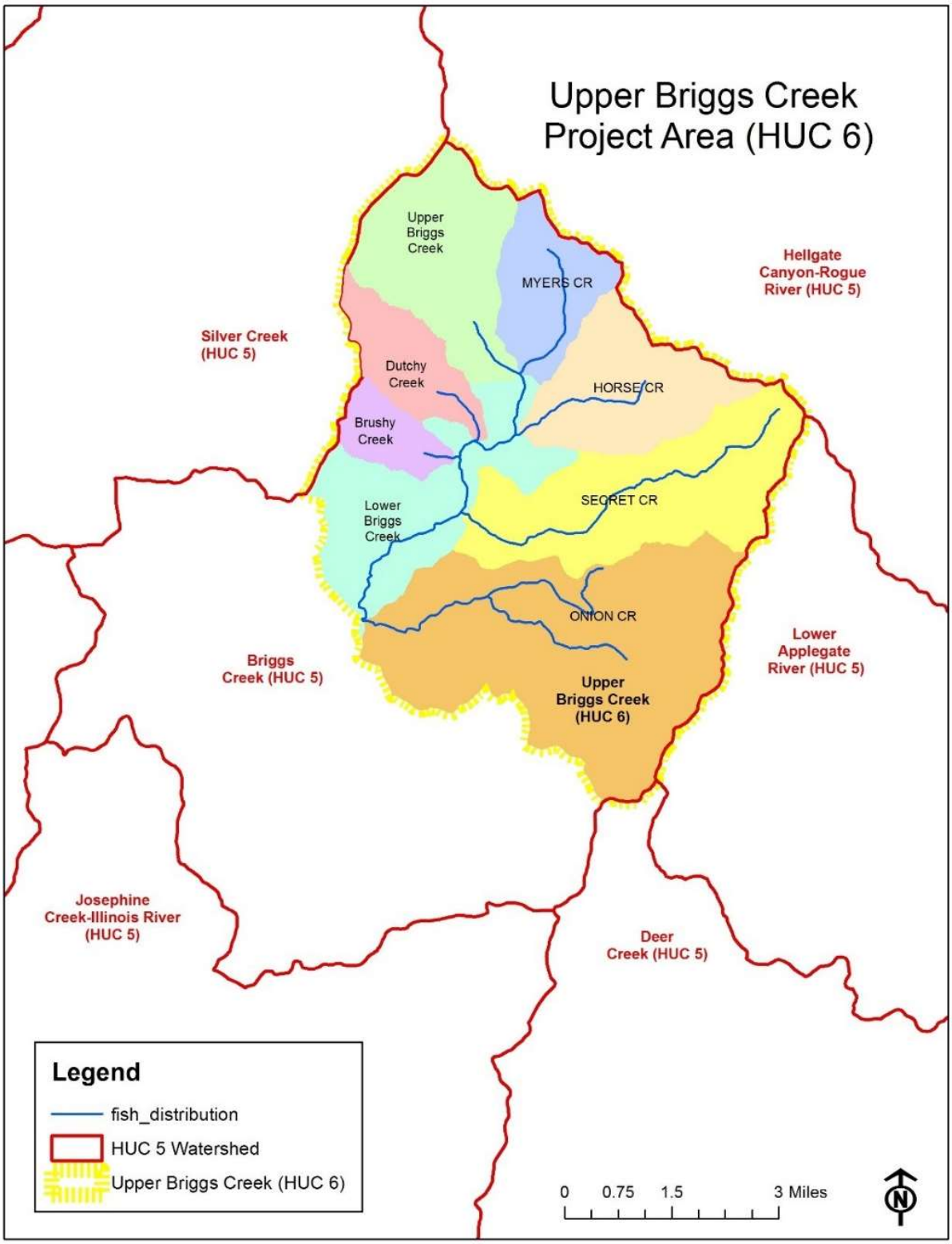


Figure 21. Upper Briggs Creek Project Area

CLIMATE

The climate is characterized by moist and cool winter with warm and dry summers. Normal rainfall for the Upper Briggs Creek Watershed is 50 – 90 inches per year for precipitation (Taylor, 1994). Most of the precipitation is predominately rain- dominated (between November and March) but can be subject to rain-on-snow events in elevations greater than 2500 feet. Shallow soils are common which can lead to rapid runoff and high flows during winter storms and low flows during the summer dry period.

BRIGGS VALLEY

Briggs Valley is a unique hydrologic feature for this watershed. It is the largest (approximately 1100 acres) moderately high (2200 feet above sea level in elevation) alluvial valley on the district. Briggs Valley soils are deep loams with shallow silty sands and slate-like shale that are underlain by amphibole gneiss faulted against Galice formation. Secret Valley (in Secret Creek sub-watershed) and Horse Meadows (in Horse Creek sub-watershed) share similar alluvial characteristics. Several sub-watersheds come together in the valley (Horse, Dutchy, Brushy, and Meyers). They contribute cooler summer water temperatures ranging in the low 60's (degree F).

Prehistorically, Briggs Valley was likely an intermittent wetland with a series of beaver dams, narrow and sinuous side channels with oxbow lakes, feeding a braided, slightly entrenched main channel that occasionally changed course with flooding events. Large wood was likely very common and scattered on the flood plains of this marshy valley. Scattered remains of dry braided channels and wetland vegetation were commonly found in the currently dry grassy meadows of the valley prior to 1987. The meadows were used as massive staging areas for the Silver Fire (1987) and were deep ripped and planted with grass seed in an effort to reclaim the site after fire crews and equipment left the area somewhat compacted. It is expected that the earlier homesteads, placer mining, and Ferrin Guard Station were primarily responsible for the current general conditions. These efforts included confining of channels, draining of fertile lands for planting of fruit trees and gardens, and for building sites, diversions of water, displacement of high bank and instream materials for gold recovery, and trapping of keystone wetland species (beaver). Timber harvest in the valley (approximately 600 acres with another 200 acres in the adjacent Secret Valley), and campground development and maintenance have added to the reduced rate of riparian productivity in the valley. The current condition, although very different from historic conditions, is a more stable condition with regards to channel morphology. It is unknown how this more stable and confined channel has affected the productivity of riparian area in the valley.

BRIGGS CREEK

Briggs Creek is low gradient, cobble and gravel dominated stream that flows through narrow colluvial canyons, bedrock gorges, flat-floored alluviated canyons, and wide alluvial valleys. The riparian forests were varied in seral stage, species composition, and density but generally were found to be dominated by a Douglas-fir and Port Orford cedar overstory and a bigleaf maple, alder, vine maple understory. Other notable species include ponderosa pine, madrone, canyon live oak, tanoak, willow, and growing abundantly within the wetted channel in many areas coltsfoot. The Biscuit Fire of 2002 did not adversely affect the riparian forests of Briggs Creek.

Briggs Creek is predominately a pool dominated stream (SRG, 2003). The stream velocity of Briggs Creek is moderately high. This can be attributed to a fairly large drainage area of 24,645 (HUC 6), 50-90 inches of rainfall and moderate relief. Winter stream flows within the semi-entrenched channel and

valley bottoms are sufficient for moving bedload sediment throughout the system and maintaining an equilibrium between current sediment supply and transport. Streamflow recedes rapidly following storms in Briggs Creek. When there is no or little rainfall over a 100 day period, the flow can drop more than 90% (Hansen, 1976). Low summer flows, especially during drought years, can be a limiting factor for riparian productivity (USDA Forest Service, 1997).

MEYERS CREEK

Meyers Creek contributes approximately 15% flow to Briggs Creek (SRG, 2003). Meyers Creek's confluence is located 12 miles above the mouth of Briggs Creek. It flows south-westerly in orientation and has a 1719 acre drainage area with 672 acres in riparian reserve. The percent of perennial reserves affected by management (82%) and miles of road per square mile is also the highest in the sub-watershed. Seral stage distribution indicates that Meyers Creek riparian reserves would benefit from pre-commercial thinning and road obliteration.

Meyers Creek has a moderately entrenched channel and the lower mainstem flows through an alluvial valley with a 1% average gradient in the lower 1½ miles. Beaver were documented as late as 1973 in this area and had considerable effects on the channel and water quality. Above this point the valley narrows and the stream becomes a more confined colluvial canyon as the gradient steepens and the stream becomes more entrenched. Riparian vegetation has been affected by campground maintenance and trail construction although the effects are not meaningful to riparian function. Hydrologic stream function has been altered markedly but only locally and due to the blasting of bedrock to create pools and the cabling of instream log structures. These structures tend to create a more confined and entrenched channel.

The confluence of Meyers and Briggs Creek is on private land (patented placer mining claim). There is a lack of hydrologic data in this area.

SECRET CREEK

Secret Creek contributes approximately 30% flow to Briggs Creek (SRG, 2003). Secret Creek's confluence is located 9.5 miles above the mouth of Briggs Creek. It flows southwest in orientation and has 4327 acres of drainage area. Approximately 1086 acres are located in riparian reserve.

There has been a history of previous harvest and road building in Secret Creek. The channel's moderately entrenched main stem meanders through the center of the valley; side slopes average 30%. The upper main stem above the valley is moderately to deeply entrenched in a colluvial and bedrock canyon. Average stream gradient is 1.5 to 4% in the lower reaches and 7 to 15% in the upper reaches. Stream surveys classify these channels as Rosgen B3, alluvially-formed channels with moderate entrenchment and bed sediments composed of gravel and cobble. Surveyors also found that banks are relatively stable. The width to depth ratio is 25 suggesting it is slightly wider and shallower than what would be expected for this type of channel. The channel is in a state of recovery from an aggraded condition related to past timber harvest and road construction. Riparian productivity is lower than historic conditions and the potential for recovery is very good. GIS data indicates that recovery, from management in localized riparian reserves are unbalanced with greater than average perennial riparian area in early seral stage. This suggests that there are pre-commercial thinning and road obliteration opportunities in these reserves that would encourage mid-late seral vegetation development.

HORSE CREEK

Horse Creek is a small tributary contributing approximately 5% flow to Briggs Creek (SRG, 2003). The lower portions have a very low gradient and meander through Horse Creek Meadow. This meadow is currently the largest meadow in the watershed that has been routinely treated for brush encroachment through brush-cutting and prescribed fire. The south-facing slope on the northwest side of the meadow has a large component of California black oak that is now encroached with small Douglas-fir due to decades of fire exclusion. Additional meadow areas around Sam Brown Campground are in need of encroachment treatments. Historic air photos from 1940 show more extensive meadows than what currently exist in the watershed. (At one time an old homestead existed in Horse Creek Meadows) Approximately 190 acres of the proposed treatment units include these historic meadow areas.

Horse Creek's confluence is located 11.3 miles above the mouth of Briggs Creek with a drainage area of 2648 acres and approximately 770 acres in riparian reserves. Lower Horse Creek is in an alluvial valley with a moderately entrenched channel (1.5% gradient). Historically, beaver had major effects on the morphology of Horse Creek. Side channels and ponding in the valley would have occurred, localized deposits of large wood and sediments would have accumulated. More plentiful summer flows with slightly warmer summer water temperatures would have been associated with those conditions. This stream is still experiencing some cutting as it has been generally confined to its present location (removal of beavers, draining of wet lands and re-routing of stream for homestead, agriculture, and road construction). The lower channel could revert back to its historic more complex condition if beaver are reintroduced. Two miles upstream the valley width begins to narrow, the gradient increases (3-6%) and changes to a more incised and entrenched channel in a colluvial canyon. Banks are more stable, and canopy cover averages 60%.

GIS data indicates that recovery is unbalanced with greater than 60% of the perennial riparian area in early seral stage indicating pre-commercial thinning and road obliteration opportunities in these reserves would encourage mid-late seral vegetation development.

DUTCHY CREEK

Dutchy Creek contributes approximately 45% flow to Briggs Creek (SRG, 2003).The Dutchy Creek watershed is 1360 acres in size. Approximately 364 acres are in riparian reserve.

BRUSHY CREEK

Brushy Creek contributes approximately 10% flow to Briggs Creek (SRG, 2003).The Brushy Creek watershed is 804 acres in size with approximately 192 acres in riparian reserve.

ONION CREEK

Onion Creek contributes approximately 30% flow to Briggs Creek (SRG, 2003).The Onion Creek watershed is 7,547 acres in size with approximately 1926 acres in riparian reserves. Braided channels are common on Onion Creek. Stream banks are generally stable and well armored by riparian vegetation. The channel substrate ranges in combination of bedrock, boulder, cobbles and some areas of sand. In areas the channel lacks structure from large wood. Overall past timber harvest has reduced large wood recruitment by 17%. The width to depth ratio is 27, suggesting it is wider and shallower than what would be expected for this type of channel.

There has been a history of previous harvest and road building in Onion Creek. The stream is in a state of recovery with no new sediment sources evident.

CHANNEL MORPHOLOGY

The Upper Briggs Creek watershed is characterized by moderately entrenched streams in narrow to broad canyon valleys with moderate to steep slopes in association with terraces. Stream width and channel alignment in the mainstem, are limited by inner alluvial canyons with occasional very wide alluvial valley bottoms. Briggs Valley is the largest (approximately 1100 acres) alluvial valley on the district and is a unique feature to the watershed. There are approximately 141 miles of perennial streams in the watershed. Approximately 27% of the watershed is in riparian reserves. Of this, management has affected nearly of the riparian reserve acres.

Timber harvest, mining, and roads can increase sediment production, and reduce instream large wood, which can cause changes in channel morphology. Sediment from harvest units is delivered to a stream by either slope failure or surface erosion (see section on sediment). Roads deliver sediment when water is forced on or across a road by a failed drainage system. Culverts plugging is the single largest source of sediment delivered to streams (USDA 1998). Large wood plays an important role in pool formation in the upper main stem and tributaries.

ROADS

Watershed slope influences the potential for groundwater interception and redistribution of flows. Watershed relief is determined by calculating the difference in elevation between the highest and lowest points of the basin divided by the length of the basin in a line approximately parallel to the major drainage. There are approximately 120 miles of FS system roads with a minimum of 29 miles of system roads located within perennial riparian reserves. Road density for the entire Upper Briggs Creek Watershed is 3.13 miles/sq. mile (Table 156; Figure 22).

Watershed risk can be evaluated by assessing road density relative to overall watershed relief. Road density less than 3.0 miles per square mile is considered low risk for channel network expansion sufficient to increase peak flows; 3.0 to 5.0 miles per square mile is considered moderate risk; over 5.0 miles per square mile is considered high risk for contribution to increased peak flow (USDA 1993). The project area is mostly in the low watershed risk category.

Table 156. Forest Service System Roads in the Upper Briggs Project.

Subwatershed Name	Square Miles	Road Miles	Density (mi/sq. mi.)	Risk
Brushy Creek	1.26	3.3	2.62	low
Dutchy Creek	2.14	3.7	1.73	low
Horse Creek	4.13	10.8	2.62	low
Lower Briggs Creek	5.06	14.5	2.87	low
Myers Creek	2.7	12.3	4.56	moderate
Upper Briggs Creek	4.71	11.2	2.38	low
Onion Creek	11.8	40.11	3.40	moderate
Secret Creek	6.8	24.8	3.65	moderate
Total (Project Area)	**38.6**	**120.71**	**3.13**	**~ Low**

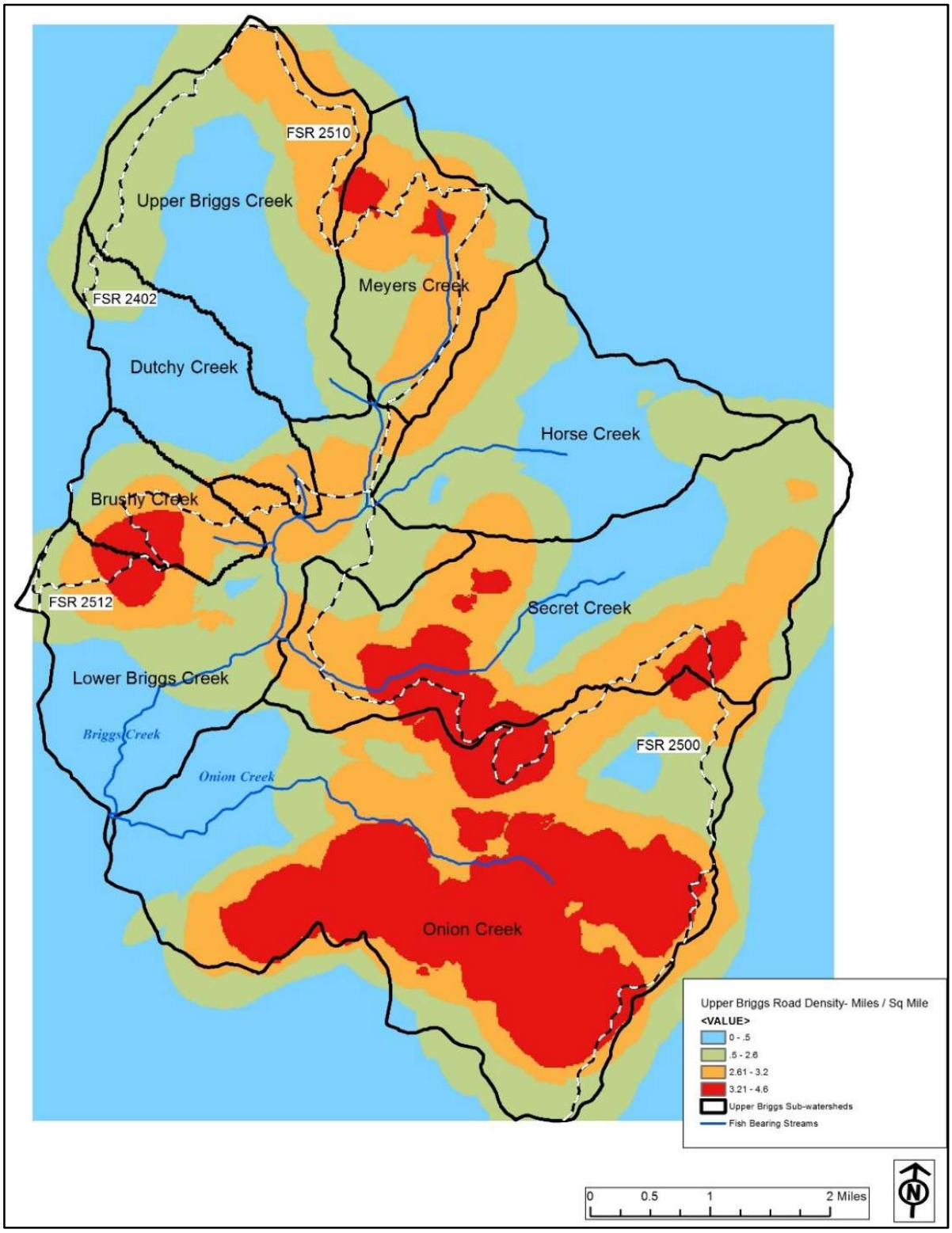


Figure 22. Upper Briggs Creek Road Density.

STREAM TEMPERATURE

Stream flow and vegetative and topographic shade primarily influence localized summer stream water temperatures. The slightly higher temperatures in Briggs Creek seen today can be attributed to alteration of riparian vegetation due to management and natural catastrophe, primarily storm event flooding, in this watershed. Recorded temperature increases can also be attributed to lower flows and hotter drier summers during the last drought from which most of the current data have been collected. Drought low flows during 1992 were less than half the amount recorded at same locations in 1993 (average rain year) in this watershed. Increases in stream temperatures during 1992 were associated with the drought low flows. At the mouth of Briggs Creek, the current condition for the range of summer 7 day average high stream temperature is 65-69 degrees F. Horse, Dutchy, Brushy, and Meyers Creek come together in the project area of Briggs Valley and contribute markedly cooler waters ranging in the low 60's (degree F).

Roads built parallel to the stream channels within the riparian zones, timber harvesting adjacent to perennial streams, and past placer mining and homesteading are the main management related activities contributing to inadequate shading throughout this watershed. There may be a higher than normal abundance of fuels especially in the headwater areas of this watershed. A catastrophic fire, disease, or insect epidemic, in a sub-watershed could reduce riparian shade and indirectly cause temporary summer water temperature increases. Management activities, which could lower summer stream temperatures would include riparian silviculture, the promotion of a diverse vegetation with large diameter trees, and reduction of potentially catastrophic fuel levels, with the goal of providing denser long term riparian shade.

WATER QUALITY

The lower 16 miles of the main stem of Briggs Creek was considered water quality limited by the Oregon Department of Environmental Quality (ODEQ) and placed on the 303(d) list in 1998 for summer stream temperature. In 2003, a Total Maximum Daily Load (TMDL) and associated Water Quality Management Plan (WQMP) was developed. The WQMP includes a strategy for implementing and achieving the TMDL and identifies the “designated management agencies” (DMAs). The Forest Service is one of the DMAs and is responsible for land uses on Forest Service-managed land addressed in the NWFP, associated Aquatic Conservation Strategy, and WQMP for the Illinois Basin. In 2008, the TMDL and WQMP were approved by EPA and the streams were de-listed in 2010.

SEDIMENTATION

Sediment delivered to a stream channel may be transported or stored, depending on the amount, particle size, and timing of the input. The transportation of coarse materials by the stream changes channel equilibrium through aggradation or degradation processes. Increased sediment input may cause channel widening, abrading, storage of sediment on floodplains, in gravel bars, and within the channel causing decreased pool area (see section on channel morphology). Road building and timber harvest has been agents that have had impacts on timing and spatial extent on sediment delivery.

Soil materials are transported from hillslopes to streams channels chiefly by mass failure. Mass failure results if the shear stress acting on the material exceeds the available shear strength of that material (Swanston, 1974). Plant roots can help stabilize slopes by anchoring a weak soil mass to fractures in bedrock, by crossing zones of weakness to more stable soil, and by providing long fibrous binders within a weak soil mass.

TURBIDITY

Turbidity, or the loss of water clarity, is due to the presence of suspended particles of silt and clay. Other materials, such as finely divided organic matter can also contribute to the loss of water clarity. At this time, none of the streams within the project area have been placed on the 303(d) list for sediment that increases turbidity. Turbidity is measured in NTU's (nephelometric turbidity units) and is an indicator of sediment or dissolved solids moving through the system.

Briggs Creek yields high water quality under normal conditions. Historically the greatest impact to water quality has been mining operations. Some of the earliest mining in the area dates back to the mid 1800's. Briggs and its tributaries have high water clarity under most flow conditions, at or below 5 NTU's. The earliest measurements of effects that mining operations had on water quality of Briggs Creek was in 1976 below the Barr mine. On April 5, 1976, the water clarity below the active Barr mine was measured to be 272 NTU, which would equate to stream water with virtually no clarity. It was estimated that over a four month period, 70 tons of fine soils were added to the stream (Hansen, 1976). While no data is available, it is speculated that Briggs Creek considerably degraded the water quality of the Illinois River at that time

Improved water quality standards for mining operations have reduced impacts to water clarity. During the past decade, mining on Briggs Creek consisted of suction dredging that causes localized and short-term loss of water clarity. Currently, there are no approved plans of operations for any placer mining in Briggs Creek.

Turbidity was sampled and measured during the 1992, 1996, and 1999 wet season. Although peak flows were not represented, sampling did occur during storm periods. This study showed that when flows are rising and falling, turbidities range from .19 to 15 NTU on Briggs Creek in the Briggs Valley. The levels of turbidity at these sites are indicators of low-moderate amounts of fine suspended sediment and dissolved solids present during low-moderate storm events.

DISSOLVED OXYGEN

Dissolved oxygen concentration refers to the amount of oxygen dissolved in water. Dissolved oxygen is important for the viability of fish and other aquatic life and for the breakdown of organic material. Dissolved oxygen concentrations are related to water temperature, such that when water temperatures increase, oxygen concentrations decrease. High concentrations are needed to benefit aquatic species. Low dissolved oxygen can stress aquatic species and lower resistance to environmental variables. Low concentrations can also lead to changes in water and sediment chemistry. Currently none of the streams in the project area are on the 303(d) list for dissolved oxygen. Review of watershed analyses for the area show that there is a lack of dissolved oxygen data.

HAZARDOUS MATERIALS

Based on review of watershed analyses, there are no records of sites where hazardous materials would be entering streams within the project area. On lands managed by the Forest Service, Best Management Practices are required which minimize risk of chemical spills during equipment use

RIPARIAN RESERVES

One of the objectives in the Upper Briggs Creek project is to restore riparian reserves. Those goals are listed below:

- All project activities within riparian reserves will maintain or improve ACS objectives.
- Increase instream coarse woody debris where deficient and ensure adequate future delivery of coarse woody debris to stream channels.
- Increase the amount of large down wood and number of snags in riparian reserves where deficient.
- Use variable density or radial thinning, group selection, prescribed fire, directional falling, and/or targeted herbicide use to improve the diversity and composition of plant species within the riparian reserve to provide adequate temperature regulation, nutrient filtering, streambank stability, and amounts of coarse woody debris.

Riparian Reserves are lands along streams and unstable and potentially unstable areas where special Northwest Forest Plan Standards and Guidelines direct land use Reserves (USDA and USDI 1994). Intermittent streams, wetlands and unstable areas are included in Riparian Reserves. The Northwest Forest Plan Standards and Guidelines define intermittent streams as "…any nonpermanent flowing drainage feature having a definable channel and evidence of annual scour or deposition. This includes what are sometimes referred to as ephemeral streams if they meet these two physical criteria." Unstable and potentially unstable areas will include areas where Forest Service specialists have determined a potential for mass movement of soil, regardless of the presence of water or a defined channel.

Many of the candidate stands being considered for density management are known to contain Riparian Reserves. For the Upper Briggs Creek project, a stream network was generated from a digital elevation model. A mapped perennial channel is initiated when a collection area reaches 20 acres. The stream network was then "buffered" according to site potential tree height (180 feet for Upper Briggs Project), and fish-bearing status (one or two tree heights each side of stream course). Riparian Reserves and their appurtenant Standards and Guidelines apply where these reserves overlap land allocations other than Matrix (i.e., within Late-Successional Reserve). Consequently, field identification and marking of unmapped Riparian Reserves and validation of fish-bearing status will be required before implementation of treatments. Project Design Criteria for Riparian Reserves is located in Table 99.

The vegetation in Riparian Reserves is comprised of riparian and upland forest communities. The more common and dominated species include Douglas-fir, Port Orford cedar, ponderosa pine, canyon live oak, bigleaf maple, alder, pacific yew, tanoak, madrone and vine maple (SRG,2003). The forest vegetation is overstocked in some of the Riparian Reserves due to past fire exclusion and harvesting practices. In their present state, some of the riparian reserves are as vulnerable to stand replacement wildfires as the adjacent uplands.

STREAM FLOW

Several sub-watersheds come together in the project area of Briggs Valley (Horse, Dutchy, Brushy, and Meyers). Mainstem tributary summer low flows range from 2-3.5 cfs with average weather conditions. Extreme low flows during drought could be as low as 1 cfs.

Stream flow is measured quantitatively at gaging stations operated by the U.S. Geological Survey. Gaging stations nearest the project area are located on the Illinois near Agness. This station measures stream flow for an area much larger than the project area, and larger than the 6th field watershed in which the project area is located; thus, flow records do not contain information relevant to the scale of the project. Flows can be estimated using regional equations based on gage station data and watershed characteristic models (Cooper, 2005). Software utilizing the regional equations is available for use on the Oregon Department of Water Resources website (ODWR, 2008). The "autodelineation" feature of this software was used to select smaller watershed areas containing the proposed thinning units to generate flow information. The two year peak flow was selected as representative of bankfull discharge and most easily comparable between watersheds. Bankfull discharges usually have recurrence intervals in the one to two year range. Table 167 outlines a calculated average flow per square mile of watershed area for the purpose of comparison.

Stream flow largely depends on the size of the area drained and how much precipitation it receives. In the transient snow zone, peak stream flows are often a direct result of rapid snowmelt combined with rainfall. Table 167. Stream Flow. provides an index of variability (average stream flow per square mile) between the subwatersheds. They are similar with the exception of Horse Creek and Meyers Creek. Both these creeks occupy a smaller drainage and receive less rainfall resulting in a lower stream flow per square mile than those adjacent larger drainages at higher elevations where higher precipitation amounts occurs.

Table 167. Stream Flow.

Subwatershed	Drainage Area (square miles)	2 year recurrence interval stream flow (cfs)	Stream flow per square mile of subwatershed at 2 year recurrence flow (cfs/square mile)
Dutchy Creek	2.14	334	156
Brushy Creek	1.26	189	150
Horse Creek	4.13	374	91
Upper Briggs Creek	4.71	746	158
Lower Briggs Creek	5.06	650	128
Meyers Creek	2.70	208	77
Onion Creek	11.80	1280	108
Secret Creek	6.76	690	102

LARGE WOOD

In general, most of the main stem tributaries of Briggs Creek are 3rd to 5th order streams (intermediate sized streams) with enough stream power to move and redistribute large wood. Large in stream wood strongly influences the morphology of these stream channels and routing of sediment and water, and may be the principle natural factor in determining the characteristics and quality of localized aquatic habitats.

Over the longer term, timber harvest in riparian areas can have a beneficial or detrimental impact to channel stability by increasing or decreasing the availability of large woody material for recruitment to streams. Instream large wood aids in the trapping, storage, and sorting of sediment, and provides channel roughness that dissipates stream energy. Removal of trees from Riparian Reserves can affect source, number, size and mechanisms of delivery of large woody material to streams. In-channel large

woody material in region 6 is defined as a minimum of 50 feet long with a diameter at breast height (DBH) of 36 inches at the small end. Currently, few of the trees within Riparian Reserves meet this criterion.

In riparian areas over-stocked with small diameter trees, thinning or partial timber harvest can be used to allow more rapid growth of the remaining trees, which over the longer term contributes to a more stable and functional channel.

There is limited recruitment of large woody material to riparian areas and stream channels partly due to human related activities and maintained facilities on and near stream banks. Large in channel wood is scarce because large wood has been removed to facilitate roads, timber harvest, and stream cleaning. Past Timber harvest and mining activity has contributed to the loss. Horse, Meyers, Brushy, and Secret Creeks are currently deficient in their ability to contribute to future large wood supply.

NATURAL DISTURBANCE

Droughts and floods have the potential to change the magnitude and frequency of stream flow. Southwest Oregon was in a drought cycle during 1985-1994. Lower than average flows were recorded in Siskiyou National Forest during these years.

There are few flow records or documented accounts of amount of stream flow resulting from flood events. The 1964 flood produced an estimated range of a 15-50 year event and a peak flow of 3500 cfs in Briggs Valley (Hanson, 1976). Flows were strong enough to move large wood through the mainstem and at the mouth of the major tributaries and to scour out bankfull and flood prone banks of lower mainstem riparian vegetation. No inner gorge or other landslides were recorded as a result of this event. It is expected that similar magnitude storm events would have similar localized effects on riparian productivity. Sediments moved from recent storm events have left minor long-term hydrologic effects (occasional localized bars or high channel terraces, prevention of late seral stage vegetation in bankfull-flood prone area)

Historic floods did not have cataclysmic site specific effects in this watershed. This may be attributed to the lack of local storm intensity or the lack of management related activity at the time of floods. In 1964, there were ½ the amount of roads and logged area than is present today.

There has been a general lack of natural fire in the watershed during the past 56 years (time period fire reports have been accurately kept). During this time period of fire suppression activities, large fires (over 5 acres in size) burned a total of only 81 acres. Fires suppression activities interrupted the natural fire cycle of the watershed (20-40 years for low-moderate intensity, 50-70 for moderate to high intensity, 200-300 years for stand replacement) and has increased the risk for catastrophic and stand replacement fire. Riparian reserves, especially those that contain intermittent and smaller perennial streams, are currently at higher than historic risk to stand replacement fire due to increases in fuel loading (brush and dead vegetation) related to the interruption of natural fire cycles. Many of these riparian areas would benefit from fuels reduction activity but should be assessed site specifically.

TIMBER HARVEST

Past and present day timber harvest has had considerable influences regarding seral stage development in the sub-watershed including riparian reserves (Table 4 of the hydrology report).

Approximately 18% of the watershed, has been harvested, reverting mid-late seral stage vegetation to early seral conditions. This is well below the level of concern for water yield effects. The predominant localized effects include the lack of both standing and down large wood on these acres.

3.1.4.2 ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1—NO ACTION

Water Quality

The "No Action" Alternative would have no direct effects to water quality since there would be no thinning or prescribed fire activities implemented. Natural recovery and processes would continue to occur. The composition and character of forest stands adjacent to streams would not be altered. Thus, there would be no effect to stream shading and no change to stream temperature. The risk of stand replacement fire would remain unchanged in overstocked stands which could result in extensive mortality within Riparian Reserves if this type of fire occurred. Stand replacement wildfire could reduce the supply of future large wood recruitment and reduce stream shade. Therefore, there could be an indirect effect on stream temperature in the project area. There could also be effects to stream temperature from channel widening (See Channel Morphology – Coarse Sediment section below).

There would be no direct effects from fine sediment to streams from the "No Action" Alternative. Since there would be no soil disturbance from management activities, there would be no fine sediment delivery and no change in turbidity. Indirect effects could occur from the increased risk of stand replacement fire in Riparian Reserves (See above). Stand replacement wildfire could trigger erosion and increase fine sediment inputs to stream channels. This could have adverse impacts on turbidity.

If sediment delivery and temperature increase due to the impacts of stand replacement wildfire (see above), there could be effects to macroinvertebrates and dissolved oxygen. Increases in temperature and fine sediment inputs to streams could affect macroinvertebrate populations. Dissolved oxygen could be impacted by increases in stream temperature through loss of stream shading or channel widening from increased coarse sediment delivery (See Channel Morphology – Coarse Sediment section below).

Channel Morphology – Coarse Sediment

There would be no direct effects to channel morphology from implementation of the "No Action" Alternative. Since there would be no treatment and no erosion through soil displacement, there would be no adverse impacts. Natural recovery and processes would continue to occur. If stand replacement wildfire occurred in Riparian Reserves (See above), there could be indirect effects on coarse sediment. Erosion triggered by this type of wildfire could cause channel changes, such as pool filling, channel widening, and stream bank failures. Channel widening could have subsequent effects on water quality by causing increases in stream temperature.

Riparian Reserves - Riparian Vegetation

The "No Action Alternative" would have no direct effects to riparian vegetation and large wood recruitment in Riparian Reserves. There would be no direct loss of vegetation through thinning or prescribed burning activities. Natural recovery and processes would continue to occur. However, the risk of stand replacement fire would remain unchanged in overstocked stands which could result in extensive mortality within Riparian Reserves if this type of fire occurred. Although the future supply of large wood to stream channels could be reduced due to extensive mortality from fire, there could be

in increase in the amount of large wood in the stream channels in the short term, depending on the severity to which trees are burned.

Peak Flows

The "No Action" Alternative would have no direct effects to peak flows since there would be no thinning or prescribed fire activities implemented. Natural recovery and processes would continue to occur. However, the risk of stand replacement fire would remain unchanged in overstocked stands which could result in extensive mortality within Riparian Reserves if this type of fire occurred. Depending on the extent and severity of the wildfire, there could be a subsequent increase in peak flows. There would be an increase in young stands and the watershed would not be considered hydrologically recovered.

EFFECTS COMMON TO BOTH ALTERNATIVE 2, PROPOSED ACTION & ALTERNATIVE 3, REDUCED TREATMENT

System Road Decommissioning, Storage, and Stream Crossing Improvements

As shown in Figure 23, both action alternatives involve the decommissioning and roadbed restoration of 11.1 miles of system roads, the storage (convert to Maintenance Level 1) of 1.6 miles of system roads, and stream crossing improvement at 4 road crossings (see Table 6). Additional road information related to soil effects can be found in the Upper Briggs Creek Soil Specialist report.

Road decommissioning, storage, and stream crossing improvement on these identified roads provide an opportunity to minimize risk of road failures along road prisms, by providing proper drainage and improving areas that are recognized to be at risk of failure. In particular, the decommissioning of FSR 2500617 would eliminate the potential for fillslope failures at multiple channel crossings as well as linear fillslope locations that are currently showing evidence of instability (fillslope cracking and slumping).

Project Design Criteria and Mitigation Measures that have been designed for the Upper Briggs Creek project, including best management practices (BMPs) for temporary and system road activities in the National Core BMP Technical Guide (USFS 2012) and the Region 6 General Water Quality Best Management Practices (USFS 1988), have influenced the planning of road activities during project development. They would be implemented to reduce or eliminate potential future failure risk on system roads to be decommissioned, put into storage, and storm proofed at stream crossings.

System road decommissioning, for roads that are no longer needed, would involve taking the road off the road system and restoring the roadbed. Roadbed restoration could include any combination of the following potential actions for road decommissioning: shallow ripping, deep subsoiling, partial to full roadfill pullback/recontouring, mulching/placing slash, pulling cross-drain and drainage culverts and associated fill, shaping stream crossings to natural channel dimensions, water-barring, seeding, planting, and blocking the entrance with a barrier (such as berm construction and/or boulder placement). No ground disturbing actions may be needed where a roadbed is already on a successful passive restoration trajectory (from Upper Briggs Soil Specialist report).

"Storage" for roads that are currently not needed but will be in the future, could include any combination of the following potential actions for converting an open, system road to Maintenance Level 1, closed: pulling cross drain and drainage culverts and associated fill, ripping or subsoiling a portion of the roadbed, installing rolling dips, water barring, seeding, mulching/placing slash, and blocking the road entrance with a barrier (such as berm or gate). Putting a classified road into storage

still commits the soil resource to something other than soil productivity over the long term. However, eliminating regular use of the road reduces the potential for surface erosion, as organic matter builds up on the road prism. Over time with continued closure, some shallow rooted vegetation is able to establish in the road prism and temporarily improve productivity, until the road is re-opened (from Upper Briggs Soil Specialist report).

Storm proofing (for stream crossing improvements), roads currently needed and needed into the future, would improve the hydrologic function of these systems and reduce or eliminate the potential for fill failures at the crossings during high flow events, which would reduce or eliminate the potential domino effects of downstream inner gorge slope failures or mass wasting that can occur when road crossings blow out (from Upper Briggs Soil Specialist report).

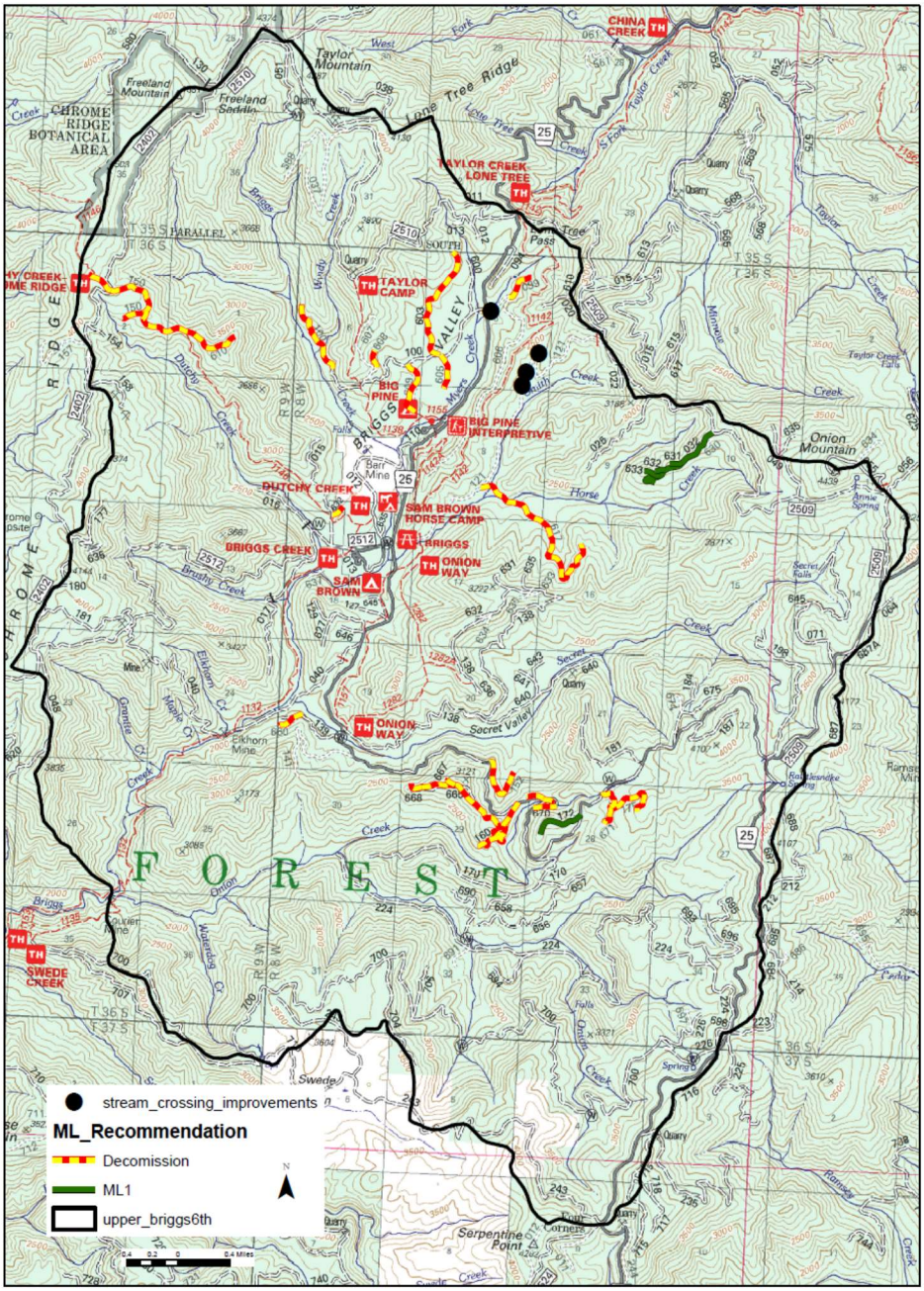


Figure 23. Road Decommissioning and Stream Crossing Improvements.

Water Quality

Fine Sediment and Turbidity (Suspended Sediment)

Road Decommissioning/storage/stormproof

Culverts in the stream channel can be removed as part of road decommissioning and storage. Culverts can also be removed and replaced with upgrades as part of storm proofing. Both of these activities could cause localized and short term increases in turbidity. The effects are minimal and short term and the benefit of removing the culverts far exceeds the risk to the aquatic system if the culverts are left in place.

Thinning within and outside of Riparian Reserves

Soil disturbance from management activities can cause sediment to be delivered to a stream. Sediment delivered to a stream most often is comprised of both suspended sediment (silt and clays) and coarser materials (sand and gravels) that are transported as bedload. Suspended sediment that can affect water clarity is usually quickly transported through the stream system.

Sediment can either be delivered by mass wasting or surface erosion. Mass wasting can deliver large amounts of sediment in a short time. Following mass wasting to a stream, there is an accompanying increase in turbidity from fine sediment. Surface erosion delivers a smaller amount of sediment over a longer time period. Rather than affecting whole stream systems, such as mass wasting, fine sediment from erosion usually causes localized increases in turbidity or it is so small that it is undetectable.

Several studies have been conducted to determine the effectiveness of riparian buffers in reducing sediment delivery to a stream from upslope skyline timber harvest. All of the studies used clear cut harvest methods, and not the less impacting method of thinning as proposed in this project. In these studies, buffer widths of 100 feet were found to be effective in preventing sediment delivery from timber harvest (Lynch et al. 1985, Moring 1982).

Following salvage logging of the fire killed trees from the 1987 Silver Fire on the Siskiyou National Forest, the effectiveness of riparian buffers were monitored before and after helicopter harvest. The Silver Fire used the following Siskiyou Forest Plan buffer widths: 150 feet on fish bearing streams; 100 feet on perennial streams; and 25 feet on intermittent streams. A summary of the monitoring results found that buffer areas were very effective in maintaining stream bank integrity as well as blocking sediment delivery (Kormeier 1995).

For the Upper Briggs Creek Project, all units where thinning and subsequent harvest of merchantable trees would occur would have a designated Riparian Reserve of 360 feet on fish-bearing perennial streams, 180 feet on non fish-bearing perennial streams, and 180 feet on intermittent streams and wetlands. The proposed Riparian Reserves are greater than or equal to the widths found in the studies described above (Corbett and Lynch 1985, Lynch et al. 1985, Moring 1982, Kormeier 1995) to prevent sediment delivery to streams and maintain stream bank integrity. Further, with the less disturbing activity of thinning (as compared to clear cut methods used in published studies), the Riparian Reserves would be more than adequate to prevent any fine sediment from reaching a stream. By implementing the Riparian Reserve widths and the Project Design Criteria described in Table 99 of this report, there would be no increase in fine sediment delivery to a stream or associated increase in turbidity from thinning activities.

Haul of Logs and Road Maintenance

Road maintenance, such as blading and ditch cleaning, and haul traffic are two activities that affect sediment production from forest roads. Road grading can break up the armor layers on the road

surface or the ditch and temporarily increase road surface erosion. The Rocky Mountain Research Station conducted a study on the effects of traffic and road maintenance on forest road sediment production in the Oregon Coast Range. The study compared the sediment production from road maintenance (blading) and the combination of road maintenance with heavy traffic. The study concluded that there was statistically no difference between grading-only and grading with traffic (Luce and Black 2001). These conclusions are based on the assumption that there would be no wet weather haul. There would be no wet weather haul permitted with the Upper Briggs Creek Project. Although road maintenance is programmatic and does not require a project level cumulative effects analysis, the study by Luce et al. demonstrates that traffic on these roads does not increase sediment production. Thus, there would be no further impacts from road sediments as a result of log hauling on maintained roads if there is no wet weather haul.

Most of these road segments are on slopes less than 30%. Based on the locations of existing roads and implementation of BMPs (USDA 1988 and 2012), effects of sediment to streams from haul of logs and road maintenance would be minimal.

Stream Temperature

Thinning within and outside of Riparian Reserves

Stream temperature is affected by riparian vegetation shading and channel form. Riparian Reserves act as buffer strips, moderating water temperature by intercepting incoming solar radiation (Brazier and Brown, 1973). For a given treatment, the amount of shade lost following vegetation removal is dependent on stream width, tree height, vegetation proximity to the stream, and stream orientation. Thinning can remove trees that are providing stream shade which can increase summer stream temperatures. Figure 24 illustrates the effects of riparian thinning (e.g., reduced basal area) on increasing stream temperature.

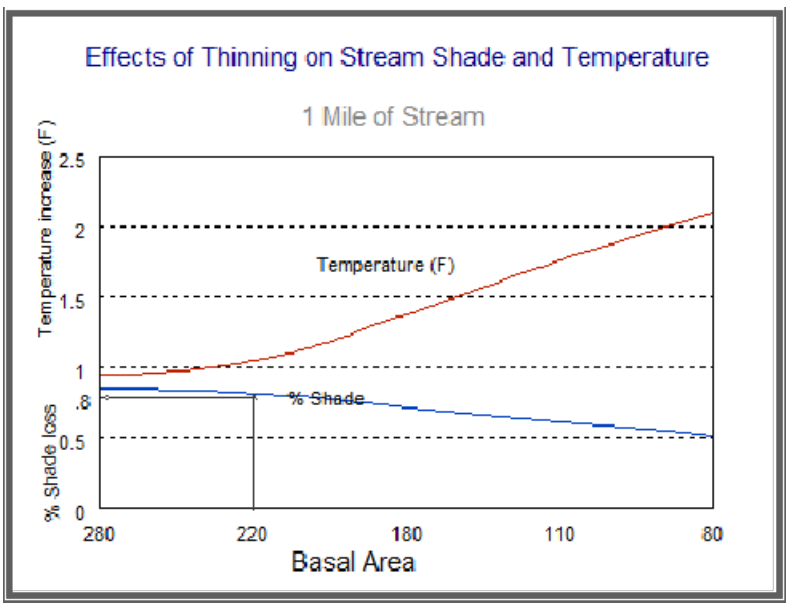


Figure 24. Modeled Effects of Thinning on Stream Temperature (SHADOW).

Implementation of the Northwest Forest Plan accommodates vegetation treatment necessary or desirable to restore ecological health in Riparian Reserves that have been harvested or affected by fire exclusion or other disturbance. The Northwest Forest Plan Temperature Strategy, developed for the

Forest Service, Bureau of Land Management and Oregon Department of Environmental Quality, demonstrates that thinning can occur in the Riparian Reserve without affecting stream shade if the overstory canopy in the primary shade zone is not treated. The following table from the NWFP Temperature Strategy defines the primary shade zone and area of no overstory treatment to be applied to protect shade on perennial streams (USDA Forest Service, ODEQ, and BLM, 2012).

Table 178 Minimum Width of Primary Shade Zone (feet) based on Slope and Tree Height.

Height of Tree	Hill slope <30%	Hill slope 30 to 60%	Hill slope >60%
Trees < 20 feet	12 feet	14 feet	15 feet
Trees 20 to 60 feet	28 feet	33 feet	55 feet
Trees >60 to 100 feet	50 feet	55 feet	60 feet
Trees > 100 to 140 feet	70 feet	75 feet	85 feet

No impacts to stream temperature would be expected from thinning because existing stream shade would be maintained. Activities would be implemented according to the parameters in Table 178 above and the Project Design Criteria in Table 99, such that the primary shade zone is not treated.

Increased sediment loading can cause the channel to become wider and shallower, exposing more surface area to solar radiation, resulting in higher stream temperatures. No channel changes would occur from the proposed activities (See Coarse Sediment section).

Haul of Logs and Road Maintenance

Forest Service regulations require that haul roads be maintained for safe travel. Roadside brushing is necessary for visual safety. This requires the cutting of roadside vegetation and could include riparian vegetation at stream crossings (Figure 25).

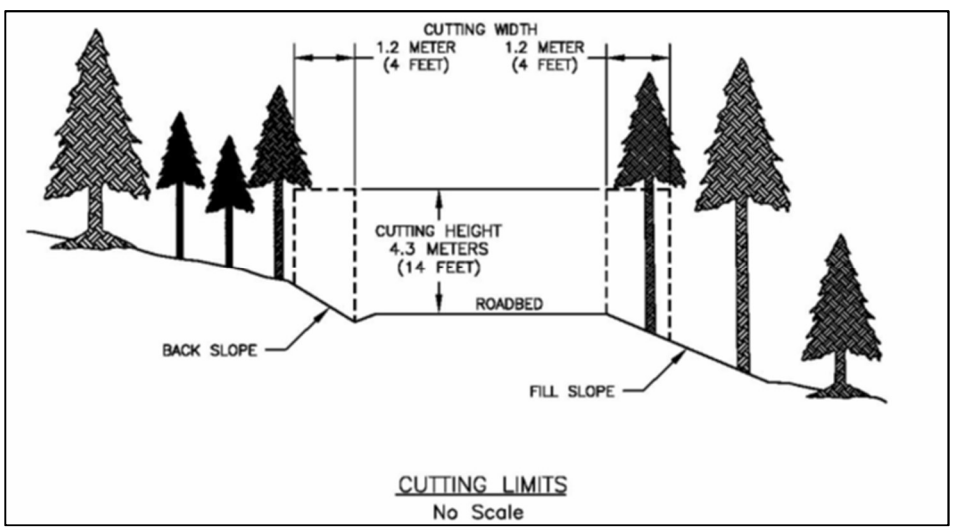


Figure 25. Typical Roadside Brushing.

Vegetation pruning is the removal of branches from the ground up to a height of eight feet. The treatment will remove only the bottom branches of the tree and maintain the overstory canopy. Since roads are usually constructed outside the flood zone of a stream and trees are located back away from the stream, trees that can provide stream shade along a roadside are typically 50 feet or taller. For

trees 50 feet tall, pruning will not remove branches in the upper 75% of the crown. Thus, the portion of the tree that provides most of the shade throughout the day would not be affected (Figure 26). Further, none of the trees that are proposed for treatment overhang the stream. For stream crossings, the road fill over the culvert shades the stream, not riparian vegetation. Thus, road maintenance activities would not affect stream temperature.

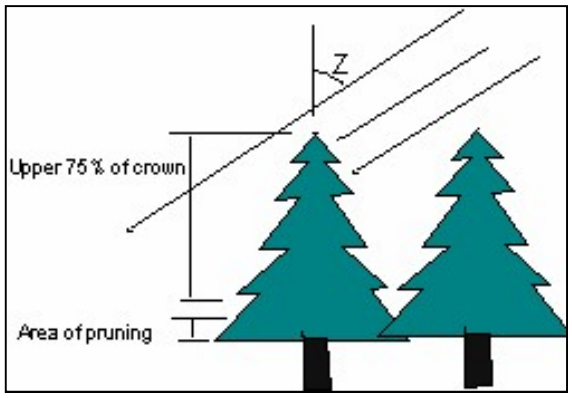


Figure 26. Tree Shading.

Biological Criteria

Thinning, Haul of Logs, Road Maintenance, and Prescribed Burning Activities

None of the streams in the project area are listed as water quality limited for macroinvertebrate populations. Since there would be no increase in stream temperature or sediment (see stream temperature, fine sediment, and coarse sediment sections) from the proposed action, no effects to biological criteria would be expected

Dissolved Oxygen

Thinning, Haul of Logs, Road Maintenance, and Prescribed Burning Activities

None of the streams in the project area are listed as water quality limited for dissolved oxygen. The only potential effects on reducing dissolved oxygen from the proposed activities would be a reduction in stream shade or mass wasting of sediment into a stream resulting in changes to channel morphology. There would be no loss of stream shade (See Temperature section) or increase in sediment delivery (See Fine and Coarse Sediment sections). No changes in dissolved oxygen associated with the proposed activities would occur.

Hazardous Materials

Thinning, Haul of Logs, Road Maintenance, and Prescribed Burning Activities

The project does not place equipment near stream channels where it would be possible for chemicals to spill. A spill plan will be in place prior to any activity which would encompass appropriate BMPs for minimizing any risk of spills associated with equipment use.

Channel Morphology – Coarse Sediment

Thinning within and outside of Riparian Reserves and Prescribed Burning Activities

Coarse sediment, sands, and gravels are transported in a stream as bedload. Excessive amounts of coarse sediment in a stream as compared to the stream's ability to transport it can cause channel changes such as pool filling, burial of spawning gravels, channel widening, and stream bank failures.

Logging activities can increase the rate of erosion through soil displacement by logging equipment, cable yarding, and skidding of logs.

To detect changes in channel morphology from sediment delivery following riparian thinning and burning, photo points were established on a stream prior to activities for the 1995 Waters Thin Project. Monitoring sites on the stream included areas sensitive to increases in sediment delivery and flow from the project activities. This included a pool, a vertical stream bank on a bend, and a vegetated low gradient section. In January 1997, two years after the project activities, there was a 50-year storm event. Comparison of the 1995 and 2005 photo points showed no change in the stream channel. There were no sediment deposits in the pool or low gradient stream section. The stream bank was unchanged. No evidence of sediment movement was present in the 25-foot no treatment area or in the riparian area where thinning and burning occurred (Park and Jubas 2005). Based on the similarity in treatments between the Waters Thin Project and the Proposed Project, no effects from coarse sediment as a result of thinning and prescribed burning would be expected.

The proposed buffers are more than adequate to prevent any sediment from reaching a stream (See Fine Sediment section). There would be no increase in coarse sediment delivery to a stream from thinning or prescribed burning activities.

Haul of Logs and Road Maintenance

Fine sediment delivery, not coarse sediment, is associated with haul and maintenance (See Fine Sediment section). No coarse sediment delivery to a stream would occur from haul of logs and road maintenance.

EFFECTS SPECIFIC TO ALTERNATIVE 2 – PROPOSED ACTION

There are 4,017 acres within the proposed vegetation treatment units in Alternative 2 (Table 18). This includes all of the primary management objectives (develop and enhance late seral habitat (DELSH), restore pine-oak communities, restore sensitive plant habitat, restore meadow systems, restore riparian reserves, and create and maintain strategically located fuel management zones (FMZs)). Treatments would involve multiple silvicultural prescriptions, including variable density thinning to 60 or 40% canopy cover, hardwood retention, and ¾ acre maximum patch cuts. Fuels treatments would involve pruning, piling, and burning post vegetation treatment, with underburning 1 to 5 years post treatment. Treatment methods would involve a combination of manual (hand) work, and mechanized equipment including ground-based, cable-yarding, and helicopter equipment. It is estimated that approximately 3 miles of temporary roads would be needed to provide temporary access to meet project objectives.

Table 189. Acres by Primary Treatment Objective.

Primary Treatment Objective of Unit	Alternative 2 Acres	Alternative 2 % Watershed	Alternative 3 Acres	Alternative 3 % Watershed
DELSH	1053	4%	556	2%
Riparian Restoration	183	<1%	128	<1%
Roadside FMZ	713	3%	794	3%
Pine Oak	706	3%	479	2%
Rare Plants	42	<1%	42	<1%
Meadow Restoration	188	<1%	126	<1%
Ridgeline FMZ	1132	4%	503	2%
Total Acres	**4017**	**16%**	**2628**	**11%**

Note: this table displays the total number of acres for which each objective is the primary objective. However, many units are designed to meet multiple objectives. Refer to Table for the total number of acres to be treated for each objective.

Water Quality

Stream Temperature

Temporary Road Construction

There is no new road construction proposed in this project. There would be a maximum of 3 miles of temporary road construction. Temporary roads would be defined as a created travel way, for the purpose of transporting logs that is built, utilized, and decommissioned (obliterated) over the course of the treatment. Temporary roads would **only include** reconstruction of existing non-system roads where there is an existing road template. The obliteration of these roads would occur at the completion of their intended use and be left in an improved condition. In addition, no new temporary roads would be located within Riparian Reserves. Therefore, there is no loss of vegetation within the primary shade zone and no effect to stream temperature from temporary roads. No sediment from temporary road construction will affect stream channel morphology of perennial, intermittent, or ephemeral streams (See Coarse Sediment section). Thus, no increase in stream temperature would occur from channel widening due to temporary roads.

Prescribed Burning Activities

Fuels treatment in Riparian Reserves would be accomplished by manual thinning and backing prescribed fire into the riparian area. Ignition points would not occur closer than 100 feet from perennial streams. In addition, no hand piles would be burned within 25 feet of a stream Table 99.

Similar treatments were implemented on the Forest for the 1995 Waters Thin Hazardous Fuels Reduction Project (Waters Thin Project). For this project, monitoring sites were established to determine if there were any changes in the stream channel or shade as a result of the thinning and fuels treatment. The monitoring sites were established to validate the findings in the 1995 Waters Thin Hydrology Cumulative Effects Analysis that concluded there would not be a notable risk to the integrity of the aquatic system if the treatments occurred. Sites were monitored before thinning and fuels treatment began. Monitoring included measuring stream shade using a solar pathfinder and tracking channel changes using photo points. This baseline data was then compared to data collected in 2005 after treatment and several winter storms including the 1997 storm that was a 50-year event (Park and Jubas 2005).

Based on monitoring results of past prescribed fire treatments in the Waters Thin Project (Park and Jubas 2005), fire in Riparian Reserves for the Upper Briggs Creek Project would be a low intensity ground burn stopping at least 25 feet from the stream. In addition, no primary shade zone overstory riparian canopy (Table 178) would be affected by the prescribed burning activities. Therefore, there would be no increase in stream temperature from prescribed burning.

Fine Sediment & Turbidity (Suspended Sediment)

Temporary Road Construction

There is no new road construction proposed in this project. There would be a maximum of 3 miles of temporary road construction. Temporary roads would be defined as a created travel way, for the purpose of transporting logs that is built, utilized, and decommissioned (obliterated) over the course of the treatment. Temporary roads would **only include** reconstruction of existing non-system roads where there is an existing road template. The obliteration of these roads would occur at the completion of their intended use and be left in an improved condition. In addition, no new temporary roads would be located within Riparian Reserves. No sediment from temporary road construction will affect stream channel morphology of perennial, intermittent, or ephemeral streams (see Coarse Sediment section).

Prescribed Burning Activities

Fuels treatment in riparian areas will be accomplished by manual thinning and then backing prescribed fire into Riparian Reserves to reduce fuels. Monitoring results of past prescribed fire activities in the 1995 Waters Thin Project show that the fire will be a low intensity ground burn, stopping at least 25 feet from the stream. No surface erosion, that could deliver fine sediment to a stream, has been detected in the monitoring of that project (Park and Jubas 2005). Based on the similarity in treatments between the Waters Thin Project and the Proposed Project, no effects from fine sediment as a result of prescribed burning would be expected.

Even with some loss of short term infiltration associated with moderate and high intensity wildfires burns, it is rare to observe overland flow and surface erosion on the Rogue River-Siskiyou National Forest-managed lands. Turbidity was monitored following the 1987 Silver Fire and subsequent salvage logging. A summary of the data concluded, "There have been no noticeable effects in increases in turbidity or sediment" and "Turbidity does not appear to be a significant area of concern" (Kormeier, 1995). In addition, after the Biscuit wildfire in 2002, no changes in turbidity were observed or monitored following the first winter (Jubas 2005). Thus, since prescribed burning activities are less disturbing than wildfire burns, prescribed fire (as implemented according to PDCs in Table 99) in Riparian Reserves would not cause fine sediment to be delivered to streams. Therefore, there would be no resulting increase in turbidity.

Riparian Reserves - Vegetation

Variable Density Thinning

Variable density thinning (VDT) is proposed in both managed stands and natural stands. These stands are primarily even-aged or two aged. Single storied plantations or even-aged as the result of fire disturbance. These stands are dominated by Douglas-fir. This treatment aims to enhance structural and species diversity, and result in a stand containing a variety of stand densities for development into late-successional conditions to meet Aquatic Conservation Strategies (USDA, USDI 1994). The desired variability and structural complexity from this treatment is explained under *Density Management* (see silviculture specialist report). Treatments would retain at least 60 percent canopy cover and other habitat features in both dispersal and NRF habitat. Management scenarios would differ by harvest system. Stands that would maintain at least 60 percent canopy cover where helicopter yarding is proposed would see gap-only treatments ranging in size from 1/5 to ¾ acre. Stands in upland riparian reserves would maintain at least 60 percent canopy cover in NRF and dispersal habitat. Treatments would retain components of understory and intermediate trees for complex structural development. Thinning would be distributed across canopy layers and tree classes, create canopy gaps, and vary in tree sizes and species.

A total of 957 acres is proposed for riparian reserve treatment. Secret Creek subwatershed will have the largest number of riparian acres treated or 291 acres followed by Horse Creek at 245 acres. Overall, 14% of riparian reserves in the project area will be treated as shown in Table 30, Table 19, and Figure 27. Riparian Reserve Treatment Areas— Alternative 2, Proposed Action.

Table 30. Treatment Summary in Riparian Reserves—Alternative 2, Proposed Action.

Subwatershed Name	Riparian Reserves (acres)	Treatment in Riparian Reserves (acres)	Percent of Riparian Reserve Treatment in Subwatershed
Brushy Creek	192	0	0
Dutchy Creek	364	6	1.6 %
Horse Creek	770	245	29 %
Lower Briggs Creek	969	105	11 %
Meyers Creek	672	237	35 %
Upper Briggs Creek	735	25	3.4 %
Onion Creek	1926	48	2.5 %
Secret Creek	1086	291	27 %
Overall Total (Project Area HUC 6)	**6714**	**957**	**14 %**

Table 191. Riparian Treatment Acres—Alternative 2, Proposed Action.

Unit	Primary Objective Alternative 2	Treatment Acres Primary Shade Zone (25' -85').	Treatment Acres Adjacent to Perennial (85'-360')	Treatment Acres Adjacent to Intermittent (25'-180')
1	FMZ			1.1
2	DELSH		6.7	16.1
3	Pine Oak/rare plants		1.3	48.4
3S	Rare Plants		3.1	8.3
4	DELSH	1.0	4.0	13.4
5	DELSH			8.1
8	DELSH			5.1
9	DELSH			13.6
10	Pine Oak			23.5
11	Meadow Restoration			1.8
12	DELSH	0.3	6.8	
12A	DELSH			1.3
14	DELSH			4.4
16	DELSH			6.4
20	FMZ			0.3
21	Pine Oak		5.2	8.9
22	Pine Oak			3.5
24	DELSH			0.9
26	FMZ			0.1
29	FMZ			0.1
31	DELSH	0.5	5.4	1.9
31A	DELSH			0.1
31B	Riparian Restoration		3.9	13.2
32	Pine Oak			29.3
36	DELSH			1.9
38	FMZ			5.6
39	Pine Oak			3.3
42	FMZ			0.1
43	FMZ			10.3

Unit	Primary Objective Alternative 2	Treatment Acres Primary Shade Zone (25' -85').	Treatment Acres Adjacent to Perennial (85'-360')	Treatment Acres Adjacent to Intermittent (25'-180')
47	FMZ			2.6
48	Meadow Restoration	12.9	49.8	45.7
50	Meadow Restoration	17.1	61.3	16.1
51	DELSH			5.5
55	Pine Oak	1.5	9.5	10.2
57	FMZ			1.8
58	FMZ			62.2
59	DELSH			0.9
61	FMZ/DELSH			4.3
63	Riparian Restoration	1.1	38.7	24.8
64	DELSH			9.6
67	FMZ			14.3
69	DELSH			4.7
70	DELSH			
71	DELSH			2.4
80	DELSH	0.9	10.2	0.9
101	DELSH			2.9
102	Pine Oak			12.6
103	FMZ			
104	Riparian Restoration			2.5
118	FMZ			0.3
165	DELSH	0.5	6.0	4.4
240	DELSH		1.3	17.4
253	DELSH		1.6	
262	DELSH	9.6	36.6	14.8
500	Roadside FMZ	2.1	12.3	28.2
501	Roadside FMZ			8.1
502	Roadside FMZ		0.7	
503	Roadside FMZ			3.7
504	Roadside FMZ			8.6
505	Roadside FMZ		0	13.9
506	Roadside FMZ			0.1
507	Roadside FMZ		4.6	
509	Roadside FMZ			10.5
510	Roadside FMZ		5.5	4.8
511	Roadside FMZ			0.2
513	Roadside FMZ		3.3	26.5
516	Roadside FMZ			5.6
517	Roadside FMZ			7.1
652	DELSH			21.8
Subtotal		47.5 acres	278 acres	631 acres
TOTAL	**956.5 Acres**			

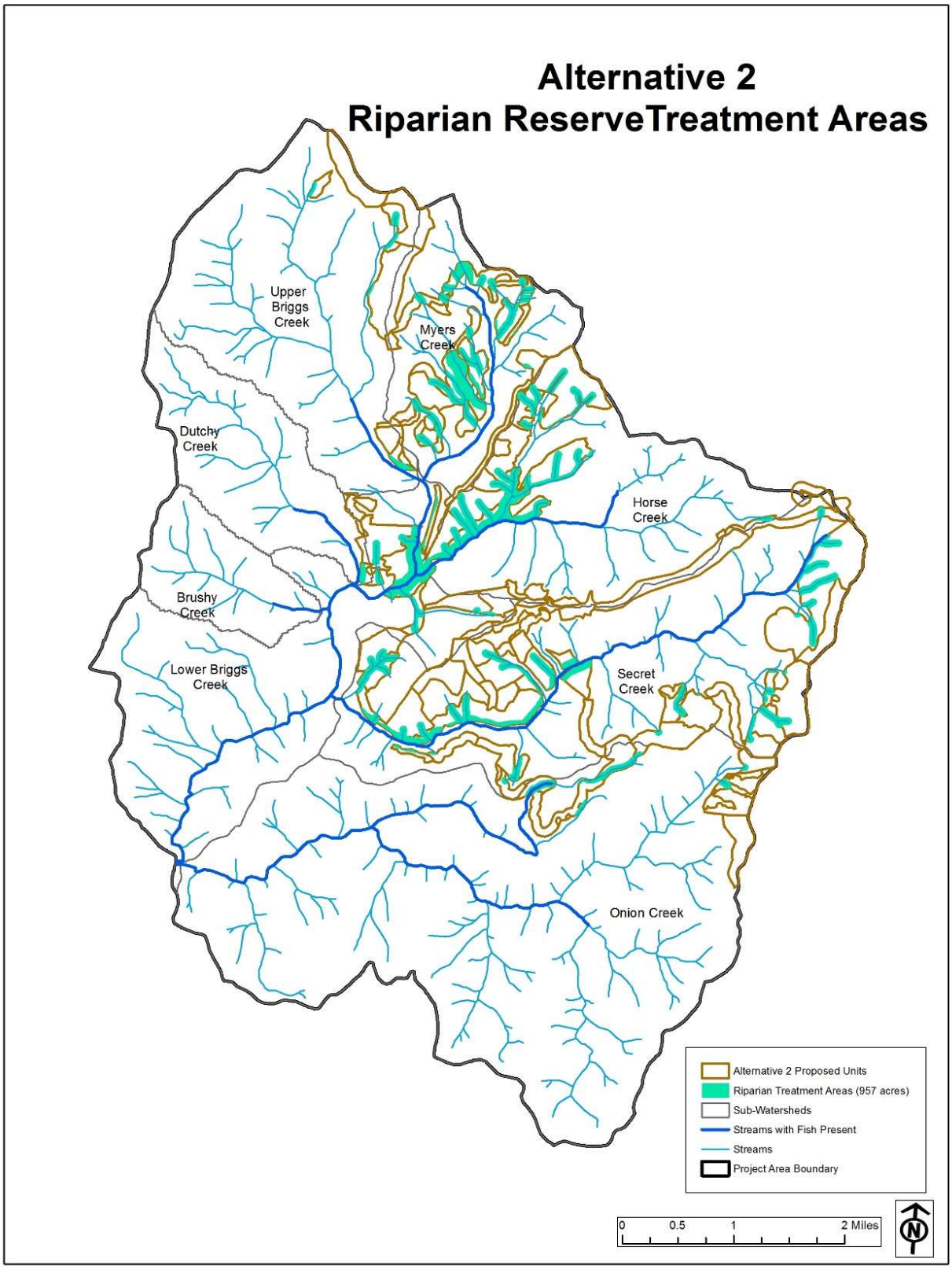


Figure 27. Riparian Reserve Treatment Areas— Alternative 2, Proposed Action.

Thinning within and outside of Riparian Reserves and Prescribed Burning Activities

The perennial portions of the Riparian Reserves proposed for thinning and prescribed burning have been harvested in the past. Since much of the project area has been harvested, there is a shortage of large wood for recruitment. Thinning would increase tree growth and lessen the time needed to establish future large wood delivery. Both thinning and fuels treatment would lower the likelihood of a stand replacement fire in the overstocked Riparian Reserves.

Corridors for cable rigging needed for skyline operations would be allowed to pass through Riparian Reserves. A maximum clearing width of 12 feet is required and logs may be yarded through these perennial corridors. Corridors are required to be spaced at a minimum of 200 feet apart. If skyline operations occur through Riparian Reserves, vegetation would be impacted by this clearing and subsequent yarding. Loss of vegetation through these areas would occur. Corridor "rub trees" would be left on site if impacted or felled.

By implementing PDCs (Table 9), the Northwest Forest Plan Temperature TMDL Implementation Strategies (Table 6) and BMPs (USDA Forest Service 1988 and 2012), impacts to riparian vegetation would be minimal. No timber harvest or fuels treatments would be allowed within 25 feet of streams. Since most of the riparian areas on streams with the project area are located within 25 feet of the stream channel, the riparian vegetation would not be impacted by the proposed treatments.

Stand Examination data collected in 2008, 2011 and 2015 were used in the FSVeg Spatial Data Analyzer to perform a robust statistical analyses for desired future conditions (see Silvicultural Specialist Report). Riparian Reserve Stand summaries are listed below with desired future conditions set for 40 years which will include commercial thinning, fuels thinning, punning, piling, pile burn and under burns. Modeling results show Riparian Stands would maintain the proposed desired condition of 60% canopy cover (Table 202).

Table 202. Silviculture Modeling Results for Riparian Stands— Alternative 2, Proposed Action.

Year	Average Uniform Canopy Cover (%)	Average Tree Top Height (ft.)
2017	85	107
2018	79	103
2022	76	107
2027	76	111
2037	77.1	120
2047	77.4	128
2057	77.5	136

Peak Flows

Stream response to storms and runoff is generally measured in terms of increased water flow volume and velocity. Precipitation and snowmelt increase stream flow until a peak is reached and stream flow declines toward ground-water supported levels. The speed and duration of stream response is a function of the size and drainage network configuration of the watershed, topographic and vegetative watershed characteristics, and storm/runoff event size and duration. Peak flows are categorized in terms of their return interval, that is, the highest expected flow for a specific time interval. The two year return interval generally determines basic stream morphology since it occurs regularly over the long term and thus distributes the bulk of the long term sediment load (Rosgen 1996).

Effects of Forest Practices on Peak Flows and Consequent Channel Response paper is a state-of-the-art synthesis of effects of forest harvest activities on peak flows and channel morphology in the Pacific Northwest (Grant et al 2008). The study reviewed peak flow data across rain, transient and snow dominated hydrologic zones. The paper provides guidance as to how to evaluate the potential risk of peak flows for specific management treatments employed.

For basins within the transitional snow hydrologic zone, Grant et al. found that the detection threshold for changes in peak flows occurs at 20% of watershed area clear cut or regeneration harvested. Thus, changes in peak flows cannot be detected at harvest levels of less than 20% (Grant et al 2008). Based on the hydroregions developed by Grant et al., the Upper Briggs project area would be located in the transitional hydroregion. Based on the detection threshold for changes in peak flows occurring at 20% of watershed area harvested, changes in peak flows cannot be detected at harvest levels of less than 20%. The study **examined clear-cuts** and **shelter wood harvests**. The Upper Briggs project proposes approximately 16% of the watershed for thinning treatments (Table 11 of the hydrology report).

Again, the existing studies examined were for clear-cut and shelter-wood harvests. Thus, evaluating this type of treatment would interpret the maximum likely effects and exceeds the potential effects for the thinning treatments proposed in the Upper Briggs Project. Gordon et al. also concludes that partial cutting and thinning should result in peak flow changes that are commensurately lower than those indicated and may be undetectable in some basins (Grant et al. 2008). For thinning treatments with riparian buffers the study finds a low likelihood of peak flow increase.

Considering the low likelihood of peak flow increases from thinning and the proposed area for treatment is below 20% threshold for detecting increases in peak flow from clear-cut harvest, there will be no increase in peak flow from the proposed thinning.

An identified information gap in current studies is that road effects are not separated from harvest effects since these activities generally occur together or with only a brief delay. It is generally accepted that roads increase peak flows if they are hydrologically connected to streams; conversely, stream buffers and road rehabilitation decrease hydrologic connectivity and the peak flow effect of roads.

No new system roads are proposed for the Upper Briggs Creek project. There will be no increase in FS system road miles that could affect peak flow. The project is proposing ~ 3 miles of temporary roads under Alternative 2 that will be decommissioned and the natural drainage pattern restored after they are no longer needed for the thinning treatment.

Cumulative Effects

Cumulative effects are those that result from the incremental accumulations of all land management activities across all ownerships. Cumulative effects for the project area encompass the entire Upper Briggs Creek 6th field watershed (24,645 acres). Past activities are considered part of the existing condition. To understand the contribution of past actions to the cumulative effects of the proposed action, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment, and might contribute to future cumulative effects.

The concept of hydrologic recovery is commonly applied to assess cumulative effects. By assessing the percent of watershed with young stands, or stands less than 30 years old, the relative risk of adverse cumulative effects of the watershed can be identified. If less than 15 percent of the watershed is young stands, the watershed risk is considered low. If 15 to 30 percent of the watershed is young

stands, there is a moderate risk, and there is a high risk if greater than 30 percent of the watershed is comprised of young stands (USDA Forest Service 1993).

Past Activities

The proposed action to treat 4,017 acres (Alternative 2) would have no effect on cumulative effects because approximately 12% of the planning area (Figure 11) has stands less than 30 years old, therefore there is currently a low cumulative watershed risk in terms of hydrologic recovery (USDA 1993). There are 11 tax lots owned by 5 private entities within the planning area. 4 of these holdings are owned by limited corporation holdings. The corporations are likely forest product companies. One is the old Bar Mine a private in holding, which is a patented placer mine owned by a private landowner. The landowner has a wash plant and heavy equipment. Approximately 1.2 miles of roads are in place on private land holdings.

Current/Ongoing and Reasonably Foreseeable Activities in the Planning Area

There are mining activities (89 active placer claims) currently occurring on Forest Service-managed lands in the Upper Briggs Creek Watershed. Other future activities planned on Forest Service managed lands include tree planting (121 acres), road decommissioning (11.1 miles of ML1 roads) and 1.6 miles of road to ML1, various fuels treatment projects, road and trail maintenance, noxious weed control and stream crossing improvement at four road crossings. None of these activities would create new young stands. The placer mine has not operated for several years. It is reasonable to infer that current actions and road use occurring on private lands will continue.

No predictable effects are expected to occur to the streams within the project area or downstream. There would be no increase in negative cumulative effects when combined with activities presently occurring or planned for the foreseeable future. Overall the streams within the watershed would be considered hydrologically recovered from past timber harvest.

EFFECTS SPECIFIC TO ALTERNATIVE 3

There are 2,628 acres within the proposed vegetation treatment units in Alternative 3 compared to 4,017 acres in Alternative 2 (Table 213). This includes all of the primary management objectives (develop and enhance late seral habitat (DELSH), restore pine-oak communities, restore sensitive plant habitat, restore meadow systems, restore riparian reserves, and create and maintain strategically located fuel management zones (FMZs)). Treatments would involve multiple silvicultural prescriptions, including variable density thinning to 60 or 40% canopy cover, thinning from below to maintain 60% canopy cover, hardwood retention, and ¾ acre maximum patch cuts. Fuels treatments would involve pruning, piling, and burning post vegetation treatment, with underburning 1 to 5 years post treatment. Treatment methods would involve a combination of manual (hand) work, and mechanized equipment including ground-based, cable-yarding, and helicopter equipment. It is estimated that less than 0.61 miles of temporary roads would be needed to provide temporary access to meet project objectives.

Table 213. Acres by Primary Treatment Objective.

Primary Treatment Objective of Unit	Alternative 2 Acres	Alternative 2 % Watershed	Alternative 3 Acres	Alternative 3 % Watershed
DELSH	1053	4%	556	2%
Riparian Restoration	183	<1%	128	<1%
Roadside FMZ	713	3%	794	3%
Pine Oak	706	3%	479	2%
Rare Plants	42	<1%	42	<1%
Meadow Restoration	188	<1%	126	<1%
Ridgeline FMZ	1132	4%	503	2%
Total Acres	**4017**	**16%**	**2628**	**11%**

Note: this table displays the total number of acres for which each objective is the primary objective. However, many units are designed to meet multiple objectives. Refer to Table for the total number of acres to be treated for each objective.

Water Quality

Stream Temperature

Temporary Road Construction

There is no new road construction proposed in this project. There would be a maximum of 3,221 feet (~ 0.61 mile) of temporary road construction. Temporary roads would be defined as a created travel way, for the purpose of transporting logs that is built, utilized, and decommissioned (obliterated) over the course of the treatment. Obliteration of these roads would occur at the completion of their intended use. Temporary roads would only include reconstruction of existing (Unclassified) roads where there is an existing road template. These temporary roads would be located near ridgelines. In addition, the temporary roads would not be located within Riparian Reserves or within 100 feet of ephemeral streams. Therefore, there is no loss of vegetation within the primary shade zone and no effect to stream temperature from temporary roads. No sediment from temporary road construction will affect stream channel morphology of perennial, intermittent, or ephemeral streams (See Coarse Sediment section). Thus, no increase in stream temperature would occur from channel widening due to temporary roads.

Prescribed Burning Activities

Fuels treatment in Riparian Reserves would be accomplished by manual thinning and backing prescribed fire into the riparian area. Ignition points would not occur closer than 120 feet from perennial streams. In addition, no hand piles would be burned within 120 feet of a stream (Table 99).

Similar treatments were implemented on the Forest for the 1995 Waters Thin Hazardous Fuels Reduction Project (Waters Thin Project). For this project, monitoring sites were established to determine if there were any changes in the stream channel or shade as a result of the thinning and fuels treatment. The monitoring sites were established to validate the findings in the 1995 Waters Thin Hydrology Cumulative Effects Analysis that concluded there would not be a notable risk to the integrity of the aquatic system if the treatments occurred. Sites were monitored before thinning and fuels treatment began. Monitoring included measuring stream shade using a solar pathfinder and tracking channel changes using photo points. This baseline data was then compared to data collected in 2005 after treatment and several winter storms including the 1997 storm that was a 50-year event (Park and Jubas 2005).

Based on monitoring results of past prescribed fire treatments in the Waters Thin Project (Park and Jubas 2005), fire in Riparian Reserves for the Upper Briggs Creek Project would be a low intensity ground burn stopping at least 120 feet from the stream. In addition, no primary shade zone overstory riparian canopy (Table of this report) would be affected by the prescribed burning activities. Therefore, there would be no increase in stream temperature from prescribed burning.

Fine Sediment and Turbidity (Suspended Sediment)

Temporary Road Construction

There is no new road construction proposed in this project. There would be a maximum of 3,221 feet (~ 0.61 mile) of temporary road construction. Temporary roads would be defined as a created travel way, for the purpose of transporting logs that is built, utilized, and decommissioned (obliterated) over the course of the treatment. Obliteration of these roads would occur at the completion of their intended use. Temporary roads would only include reconstruction of existing (Unclassified) roads where there is an existing road template. These temporary roads would be located near ridgelines. In addition, the temporary roads would not be located within Riparian Reserves or within 100 feet of ephemeral streams. No sediment from temporary road construction will affect stream channel morphology of perennial, intermittent, or ephemeral streams.

Prescribed Burning Activities

Fuels treatment in riparian areas will be accomplished by manual thinning and then backing prescribed fire into Riparian Reserves to reduce fuels. Monitoring results of past prescribed fire activities in the 1995 Waters Thin Project show that the fire will be a low intensity ground burn, stopping at least **120 feet** from the stream. No surface erosion, that could deliver fine sediment to a stream, has been detected in the monitoring of that project (Park and Jubas 2005). Based on the similarity in treatments between the Waters Thin Project and the Proposed Project, no effects from fine sediment as a result of prescribed burning would be expected.

Even with some loss of short term infiltration associated with moderate and high intensity wildfires burns, it is rare to observe overland flow and surface erosion on the Rogue River-Siskiyou National Forest-managed lands. Turbidity was monitored following the 1987 Silver Fire and subsequent salvage logging. A summary of the data concluded, “There have been no noticeable effects in increases in turbidity or sediment” and “Turbidity does not appear to be a significant area of concern” (Kormeier, 1995). In addition, after the Biscuit wildfire in 2002, no changes in turbidity were observed or monitored following the first winter (Jubas 2005). Thus, since prescribed burning activities are less disturbing than wildfire burns, prescribed fire (as implemented according to PDCs in Appendix A) in Riparian Reserves would not cause fine sediment to be delivered to streams. Therefore, there would be no resulting increase in turbidity.

Riparian Reserves - Vegetation

Variable Density Thinning

Variable density thinning (VDT) is proposed in both managed stands and natural stands. These stands are primarily even-aged or two aged. Single storied plantations or even-aged as the result of fire disturbance. These stands are dominated by Douglas-fir. This treatment aims to enhance structural and species diversity, and result in a stand containing a variety of stand densities for development into late-successional conditions to meet Aquatic Conservation Strategies (USDA, USDI 1994). The desired variability and structural complexity from this treatment is explained under *Density Management* (see silviculture specialist report). Treatments would retain at least 60 percent canopy cover and other habitat features in both dispersal and NRF habitat. Management scenarios would

differ by harvest system. Stands that would maintain at least 60 percent canopy cover where helicopter yarding is proposed would see gap-only treatments ranging in size from 1/5 to ¾ acre. Stands in upland riparian reserves would maintain at least 60 percent canopy cover in NRF and dispersal habitat. Treatments would retain components of understory and intermediate trees for complex structural development. Thinning would be distributed across canopy layers and tree classes, create canopy gaps, and vary in tree sizes and species.

A total of 451 acres is proposed for riparian reserve treatment Meyers Creek subwatershed will have the largest number of riparian acres treated or 141 acres followed by Horse Creek at 133 acres. Overall, 6.7% of riparian reserves in the project area will be treated as shown in Table 224, Table 235 and Figure 28.

Table 224. Treatment Summary in Riparian Reserves—Alternative 3.

Subwatershed Name	Riparian Reserves (acres)	Treatment in Riparian Reserves (acres)	Percent of Riparian Reserve Treatments in Each Subwatershed
Brushy Creek	192	0	0
Dutchy Creek	364	8	2.2 %
Horse Creek	770	133	17 %
Lower Briggs Creek	969	55	5.7 %
Meyers Creek	672	141	21 %
Upper Briggs Creek	735	7	1.0 %
Onion Creek	1926	14	0.7 %
Secret Creek	1086	93	8.6 %
Overall Total (Project Area HUC 6)	**6714**	**451**	**6.7 %**

Table 235. Riparian Treatment Acres—Alternative 3

Unit No.	Primary Objective Alternative 3	NO CUT 0'–120'	Treatment Acres Adjacent to Perennial (120'–360')	Treatment Acres Adjacent to Intermittent (120'–180')
1	FMZ			0.6
2	DELSH		7.2	5.9
3	Pine Oak/rare plants		1.1	44.3
3S	Rare Plants		3.1	8.3
4	DELSH		0.4	3.4
5	DELSH			5.8
8	DELSH			5.1
9	DELSH			4.5
10	Pine Oak			15.8
11	Meadow Restoration			0.9
12	DELSH		0.7	
32	Pine Oak			12.9
36	DELSH			1.5
38	FMZ			2.6

Unit No.	Primary Objective Alternative 3	NO CUT 0'–120'	Treatment Acres Adjacent to Perennial (120'–360')	Treatment Acres Adjacent to Intermittent (120'–180')
39	Pine Oak			1.7
43	FMZ			2.7
47	FMZ			0.4
48	Meadow Restoration		26.8	23.0
50	Meadow Restoration		36.1	8.7
51	DELSH			2.3
57	FMZ			1.1
59	DELSH			0.9
61	FMZ/DELSH			0.4
63	Riparian Restoration		32.5	10.5
64	DELSH			3.4
67	FMZ			4.7
69	DELSH			1.8
71	DELSH			0.9
80	DELSH		8.5	0.5
102	Pine Oak			2.8
104	Riparian Restoration			1.2
118	FMZ			0.2
165	DELSH		5.1	4.4
240	DELSH		1.2	6.1
253	DELSH		1.6	
262	DELSH		29.4	12.8
500	Roadside FMZ		8.7	20.0
501	Roadside FMZ			8.0
502	Roadside FMZ		0.7	
503	Roadside FMZ		1.1	7.3
504	Roadside FMZ			3.3
505	Roadside FMZ			6.6
506	Roadside FMZ			0.1
507	Roadside FMZ		4.6	
509	Roadside FMZ			3.3
510	Roadside FMZ		4.1	1.7
511	Roadside FMZ			0.2
513	Roadside FMZ		3.3	11.2
516	Roadside FMZ			2.5
517	Roadside FMZ			3.0
652	DELSH			5.8
TOTAL	**451 acres**		**176 acres**	**275 acres**

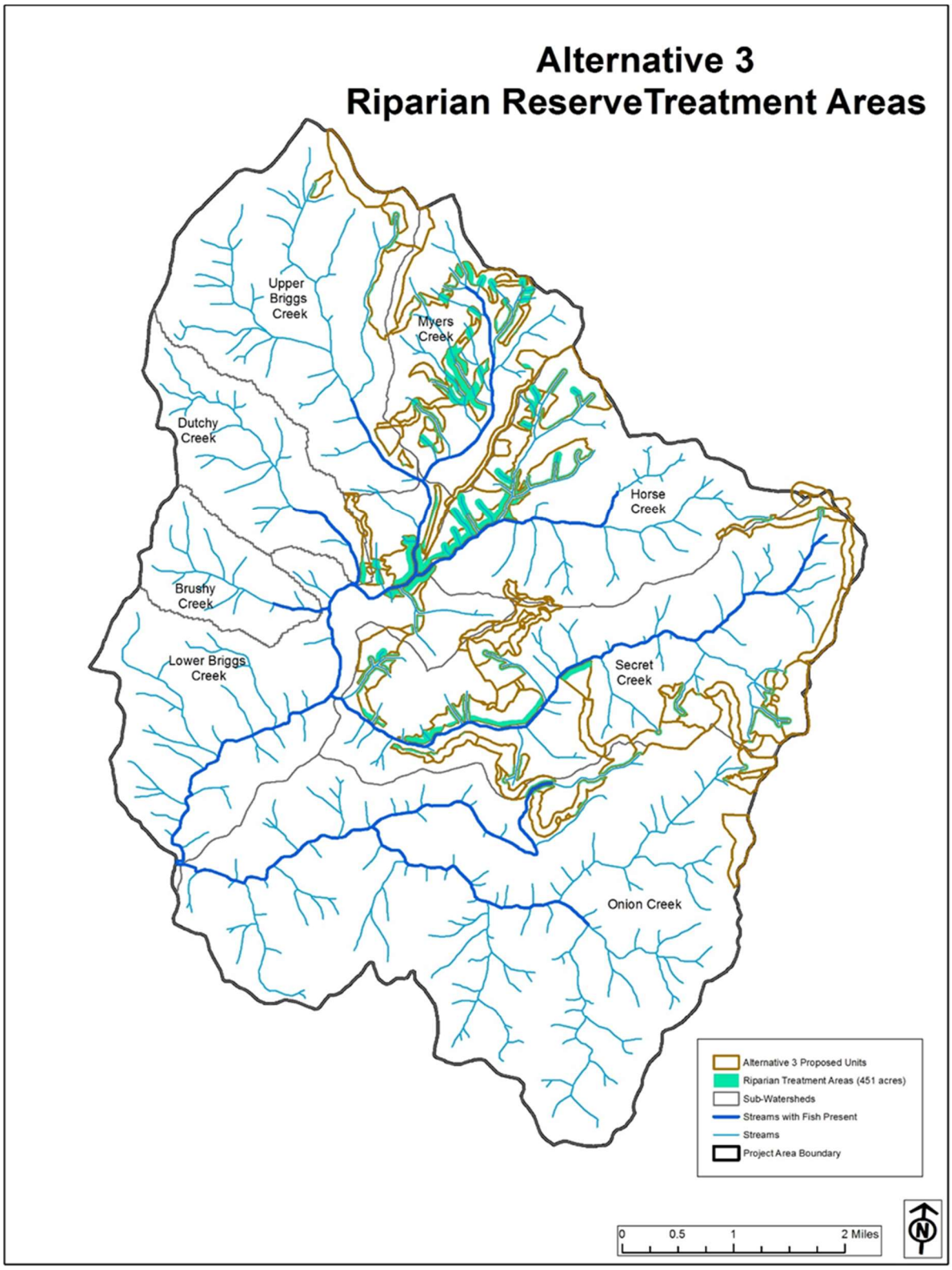


Figure 28. Riparian Reserve Treatment Areas— Alternative 3, Reduced Treatment.

Thinning within and outside of Riparian Reserves and Prescribed Burning Activities

The perennial portions of the Riparian Reserves proposed for thinning and prescribed burning have been harvested in the past. Since much of the project area has been harvested, there is a shortage of large wood for recruitment. Thinning would increase tree growth and lessen the time needed to establish future large wood delivery. Both thinning and fuels treatment would lower the likelihood of a stand replacement fire in the overstocked Riparian Reserves.

Corridors for cable rigging needed for skyline operations would be allowed to pass through Riparian Reserves. A maximum clearing width of 12 feet is required and logs may be yarded through these perennial corridors. Corridors are required to be spaced at a minimum of 200 feet apart. If skyline operations occur through Riparian Reserves, vegetation would be impacted by this clearing and subsequent yarding. Loss of vegetation through these areas would occur. Corridor "rub trees" would be left on site if impacted or felled.

By implementing PDCs (Table 9), the Northwest Forest Plan Temperature TMDL Implementation Strategies and BMPs (USDA 1988 and 2012), impacts to riparian vegetation would be minimal. No timber harvest or fuels treatments would be allowed within 120 feet of streams. Since most of the riparian areas on streams with the project area are located within 25 feet of the stream channel, the riparian vegetation would not be impacted by the proposed treatments.

Stand Examination data collected in 2008, 2011 and 2015 were used in the FSVeg Spatial Data Analyzer to perform a robust statistical analyses for desired future conditions (see Silvicultural Specialist Report). Riparian Reserve Stand summaries are listed below with desired future conditions set for 40 years which will include commercial thinning, fuels thinning, punning, piling, pile burn and under burns. Modeling results show Riparian Stands would maintain the proposed desired condition of 60% canopy cover (Table 246).

Table 246. Silviculture Modeling Results for Riparian Stands—Alternative 3.

Year	Average Uniform Canopy Cover (%)	Average Tree Top Height (ft)
2017	86	108.4
2018	82	106.4
2022	80.5	110.2
2027	80.8	114.3
2037	81.7	123.4
2047	82	131.7
2057	82	139.3

Peak Flows

Stream response to storms and runoff is generally measured in terms of increased water flow volume and velocity. Precipitation and snowmelt increase stream flow until a peak is reached and stream flow declines toward ground-water supported levels. The speed and duration of stream response is a function of the size and drainage network configuration of the watershed, topographic and vegetative watershed characteristics, and storm/runoff event size and duration. Peak flows are categorized in terms of their return interval, that is, the highest expected flow for a specific time interval. The two year return interval generally determines basic stream morphology since it occurs regularly over the long term and thus distributes the bulk of the long term sediment load (Rosgen 1994).

Effects of Forest Practices on Peak Flows and Consequent Channel Response paper is a state-of-the-art synthesis of effects of forest harvest activities on peak flows and channel morphology in the Pacific Northwest (Grant et al 2008). The study reviewed peak flow data across rain, transient and snow dominated hydrologic zones. The paper provides guidance as to how to evaluate the potential risk of peak flows for specific management treatments employed.

For basins within the transitional snow hydrologic zone, Grant et al. found that the detection threshold for changes in peak flows occurs at 20% of watershed area clear cut or regeneration harvested. Thus, changes in peak flows cannot be detected at harvest levels of less than 20% (Grant et al 2008). Based on the hydroregions developed by Grant et al., the project area would be located in the transitional hydroregion. Based on the detection threshold for changes in peak flows occurring at 20% of watershed area harvested, changes in peak flows cannot be detected at harvest levels of less than 20%. The study examined clear-cuts and shelter wood harvests.

The Upper Briggs project proposes approximately 11% of the watershed for thinning treatments (Table 16 of hydrology report).

The existing studies examined were for clear-cut and shelter-wood harvests. Thus, evaluating this type of treatment would interpret the maximum likely effects and exceeds the potential effects for the thinning treatments proposed in the Upper Briggs Project. Gordon et al. also concludes that partial cutting and thinning should result in peak flow changes that are commensurately lower than those indicated and may be undetectable in some basins (Grant et al. 2008). For thinning treatments with riparian buffers the study finds a low likelihood of peak flow increase.

Considering the low likelihood of peak flow increases from thinning and the proposed area for treatment is below 20% threshold for detecting increases in peak flow from clear-cut harvest, there will be no increase in peak flow from the proposed thinning.

No new system roads are proposed for the Upper Briggs Creek project. There will be no increase in system road miles that could affect peak flow. The project is proposing ~ 0.61 miles of temporary roads that will be decommissioned and the natural drainage pattern restored after they are no longer needed for the thinning treatment.

Cumulative Effects

Cumulative effects are those that result from the incremental accumulations of all land management activities across all ownerships. Cumulative effects for the project area encompass the entire Upper Briggs Creek 6th field watershed (24,645 acres). Past activities are considered part of the existing condition. To understand the contribution of past actions to the cumulative effects of the proposed action, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment, and might contribute to future cumulative effects.

The concept of hydrologic recovery is commonly applied to assess cumulative effects. By assessing the percent of watershed with young stands, or stands less than 30 years old, the relative risk of adverse cumulative effects of the watershed can be identified. If less than 15 percent of the watershed is young stands, the watershed risk is considered low. If 15 to 30 percent of the watershed is young stands, there is a moderate risk, and there is a high risk if greater than 30 percent of the watershed is comprised of young stands (USDA Forest Service 1993).

Past Activities

The proposed action to treat 2,628 acres (Alternative 3) would have no effect on cumulative effects because approximately 12% of the planning area (Figure 29) has stands less than 30 years old, therefore there is currently a low cumulative watershed risk in terms of hydrologic recovery (USDA 1993). There are 11 tax lots owned by 5 private entities within the planning area. 4 of these holdings are owned by limited corporation holdings. The corporations are likely forest product companies. One is the old Bar Mine a private in holding, which is a patented placer mine owned by a private landowner. The landowner has a wash plant and heavy equipment. Approximately 1.2 miles of roads are in place on private land holdings.

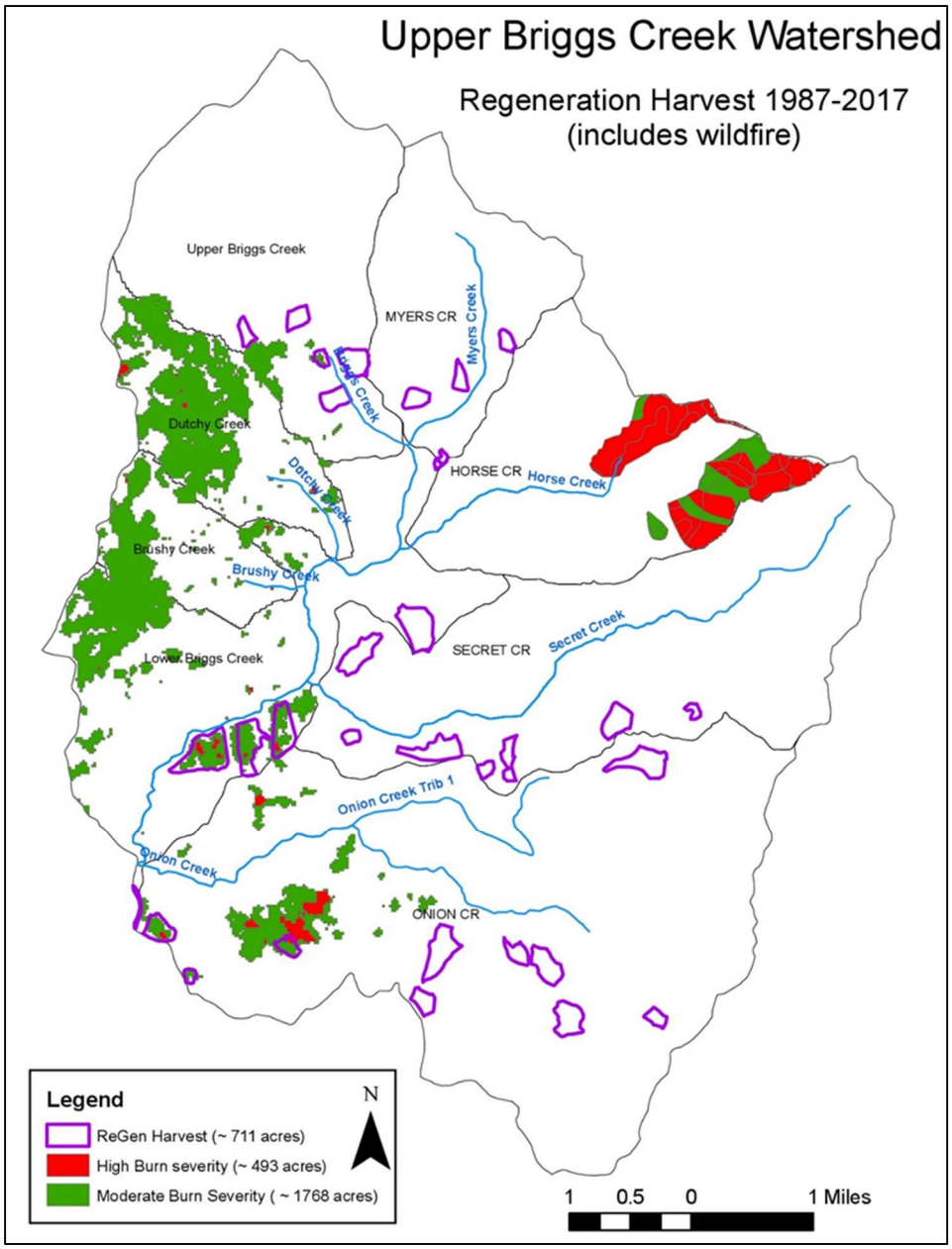


Figure 29. Upper Briggs Creek Watershed Regeneration Harvest 1987-2017.

Current/Ongoing and Reasonably Foreseeable Activities in the planning area

There are mining activities (89 active placer claims) currently occurring on Forest Service-managed lands in the Upper Briggs Creek Watershed. Other future activities planned on Forest Service managed lands include tree planting (~ 121 acres), road decommissioning (11.1 miles of ML1 roads) and 1.6 miles of road to ML1, various fuels treatment projects, road and trail maintenance, noxious weed control and stream crossing improvement at four road crossings. None of these activities would create new young stands. The placer mine has not operated for several years. It is reasonable to infer that current actions and road use occurring on private lands will continue.

No predictable effects are expected to occur to the streams within the project area or downstream. There would be no increase in cumulative effects when combined with activities presently occurring or planned for the foreseeable future. Overall the streams within the watershed would be considered hydrologically recovered from past timber harvest.

3.1.4.3 COMPLIANCE WITH THE AQUATIC CONSERVATION STRATEGY OBJECTIVES PROVIDED BY THE NORTHWEST FOREST PLAN

In order for a project to proceed, "a decision maker must find that the proposed management activity is consistent with the Aquatic Conservation Strategy objectives" (USDA and USDI, 1994). The nine objectives are listed on page B-11 of the Record of Decision (ROD). Portions of the effects analysis in this document focus on key parameters or indicators that make up elements of the nine Aquatic Conservation Strategy objectives, to determine if the project would restore, maintain, or degrade these indicators. Once this determination is made, the indicators are examined together with the Range of Natural Variability to ascertain whether the project is consistent with the objectives. The following list displays specific indicators that comprise the Aquatic Conservation Strategy objectives and the effects section that covers this indicator in the EA.

Indicator	Effects Section of EA
Water Temperature	Water Quality
Sediment	Soils, Water Quality, Fisheries
Chemical Contamination	Water Quality, Fisheries
Physical Barriers	Water Quality, Fisheries
Substrate	Fisheries
Large Woody Debris	Fisheries
Pool Frequency	Fisheries
Pool Quality	Fisheries
Off-Channel Habitat	Fisheries
Refugia	Fisheries
Width/Depth Ratio	Fisheries
Streambank Condition	Water Quality, Fisheries
Floodplain Connectivity	Water Quality, Fisheries
Peak/base Flows	Water Quality
Drainage Network Increase	Water Quality
Riparian Reserves	Water Quality, Fisheries

As stated above, a description of the range of natural variability of the "important physical and biological components" (USDA and USDI 1994) is necessary for determining whether a project "meets" or "does not prevent attainment" of the Aquatic Conservation Strategy objectives. Historically, in the Upper Briggs Creek project area, sediment input to streams appears to have been more episodic than continual. Rain-on-snow events could result in high levels of erosion and rockfall on steeper slopes in the Transition Zones. High intensity rainstorms shortly after a high severity stand-replacing fire could also generate large sediment input. In general, natural sediment input tends to be episodic in nature and large pulses are associated with natural disturbances such as floods and fires.

The table below (Table 25) displays the individual indicators and the effect the action alternatives have on those indicators at the 5th, 6th and 7th field watershed scale. Fifth field watersheds are generally large in size (40,000 acres to 250,000 acres), while 6th and 7th field watersheds are smaller (5,000 acres to 40,000 acres and 2,000 acres to 5,000 acres respectively).

Table 257. Comparison of Effects.

INDICATORS	EFFECTS OF THE ACTIONS								
	No Action			Alternative 2			Alternative 3		
	Restore[1]	Maintain[2]	Degrade[3]	Restore	Maintain	Degrade	Restore	Maintain	Degrade
Water Quality Temperature		X			X			X	
Sediment		X			X			X	
Chemical Contamination		X			X			X	
Habitat Access Physical Barriers		X			X			X	
Habitat Elements Substrate		X			X			X	
Large Woody Debris		X			X			X	
Pool Frequency		X			X			X	
Pool Quality		X			X			X	
Off-channel Habitat		X			X			X	
Refugia		X			X			X	
Channel Conditions & Dynamics: Width/Depth Ratio		X			X			X	
Streambank Condition		X			X			X	
Floodplain Connectivity		X			X			X	
Flow/Hydrology Peak/Base Flows		X			X			X	
Drainage Network Increase		X			X			X	
Watershed Conditions Riparian Reserves		X		slight improv ement			slight improv ement		

[1] Restore means the action(s) would result in acceleration of the recovery rate of that indicator.

[2] Maintain means that the function of an indicator does not change by implementing the action(s) or recovery would continue at its current rate.

[3] Degrade means changing the function of an indicator for the worse.

The following is a summary the Aquatic Conservation Strategy objectives (ROD B-10) and how the action alternatives would influence them:

- ***Objective #1*: Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.**

The project would maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations, and communities are uniquely adapted. The Action Alternatives are expected to have no effect on aquatic resources. For both Alternatives a connected action will include temporary roads. Best Management Practices pertaining to drainage and location, and field review during implementation will be an effective means for eliminating localized impacts such as site erosion of flow modification. Logging systems will employ extensive Project Design Criteria and Mitigation Measures. Wildfire protection would also be improved through management of fuel levels and distribution, reducing the severity of effects on watershed vegetation and soils. No new road crossings of streams or wetlands are proposed.

All of the Action Alternatives would have an undetectable effect with a long-term beneficial effect on the watershed and landscape-scale features.

- ***Objective #2*: Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.**

No activities included in any of the Action Alternatives would sever existing linkages (movement conduits) between watersheds or permanently obstruct existing connections in the drainage network. Thinning and prescribed burning treatments would be designed to improve stand structure and composition. Logging systems will employ extensive Project Design Criteria and Mitigation Measures. All temporary roads in the Proposed Action Alternatives will be developed outside of Riparian Reserves and decommissioned after use. No new road crossings of streams or wetlands are proposed. Finally, none of the activities or results proposed would chemically or physically impede routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species, especially native fish species. None of the Action Alternatives would have an effect on network connections and or create any physical obstructions.

- ***Objective #3*: Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.**

This project would meet this objective through mitigation measures, design criteria and the protection provided by Riparian Reserves. Mitigation measures and design criteria aimed at reducing soil compaction and erosion, establishment of undisturbed vegetative buffers next to all stream networks, prescriptions for Riparian Reserves that are intended to maintain or enhance the development of a diverse, healthy riparian area and the lack of any new crossings on perennial streams would greatly reduce risks of sedimentation, increased peak flow, and resulting bank erosion and channel bed scour. Runoff/streamflow changes are not anticipated. Logging systems and use of temporary roads for haul would employ extensive Project Design Criteria, Best Management Practices, and Mitigation Measures.

Project would also maintain existing physical integrity of the aquatic system with restoration at specific locations (i.e. failed road/stream crossings; road decommissioning).

- ***Objective 4*: Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.**

Thinning and prescribed burning treatments would improve the biological, physical and chemical integrity of the aquatic system. All action alternatives would maintain existing stream temperatures. Logging systems and use of temporary roads for haul would employ extensive Project Design Criteria, Best Management Practices, and Mitigation Measures. Mitigation measures and design criteria aimed at reducing erosion are further discussed in detail in the soil section in Chapter 3. All alternatives would maintain water quality necessary to support healthy riparian and aquatic ecosystems because thinning and prescribed burning treatments would not prevent attainment of this objective and no temporary roads would be constructed within Riparian Reserves.

- ***Objective #5*: Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.**

Project avoids direct contributions to stream sediment; contributes to long term soil protection by reducing severity of future wildfire behavior.

Proposed Action is sensitive to sediment that could be generated by the disturbance of steep slopes, unstable areas, and high gradient stream courses. The project avoids direct contribution to stream sediment and contributes to long term soil protection by reducing severity of future wildfire behavior. Logging systems have been selected to avoid soil damage on steep slopes and unstable areas are excluded from treatment. Logging systems and use of temporary roads for haul would employ extensive Project Design Criteria, Best Management Practices, and Mitigation Measures. Collectively, these measures ensure that the current sediment regime is maintained. These alternatives would have no measureable effect on the sediment regime.

- ***Objective #6*: Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.**

Project's effect on stream flow would be negligible; would not prevent attainment of this objective.

- ***Objective #7*: Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.**

Project's effect on floodplain inundation and water tables would be negligible; would not prevent attainment of this objective.

- ***Objective #8*: Maintain and restore the species composition and structural diversity of plant communities in Riparian Reserves and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.**

The Action Alternatives are expected to maintain species composition and structural diversity of plant communities in the Riparian Reserves and wetlands. There would be some removal of vegetation

associated with thinning, prescribed burning, and temporary road construction aimed at producing a more natural vegetative composition and density that has been lost through many decades of fire suppression.

No effects are anticipated that would affect species composition and structural diversity of plant communities within Riparian Reserves and wetlands.

- ***Objective #9*: Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.**

The project would meet this objective with mitigation measures, Project Design Criteria, Best Management Practices and vegetative treatments that are designed to simulate a more natural disturbance regime within the area. Refer to botany and wildlife reports.

3.2 Biological Resources

3.2.1 Aquatic Resources

The Upper Briggs aquatic biota resource report presented in this EA evaluates aquatic biota potentially present within the project area and provides a full explanation of measurements and metric used in evaluating the information for the no action and action alternatives. The information presented relies heavily on the conclusions of the Hydrology and Soils reports contained within this EA.

3.2.1.1 EXISTING CONDITIONS

THREATENED, ENDANGERED, & SENSITIVE AQUATIC SPECIES

In compliance with Section 7 of the Endangered Species Act (ESA) and the Forest Service Biological Evaluation (BE) process for **Endangered**, **Threatened, Proposed** or **Sensitive** fish species (Siskiyou LRMP S&G 4-2; page IV-27), the USDA Forest Service Region 6 Sensitive Species List (updated July 13, 2015) was reviewed and field reconnaissance was conducted in regard to potential effects on any of these species by actions associated with the Upper Briggs Restoration Project. The results are summarized in the Table 26. Also see Figure 30. Fish Distribution in the Upper Briggs Planning Area.

Table 268. Potentially Affected Species, Status, and Habitats Assessed (Pacific Northwest Regional Forester's Sensitive Species List (Updated July 2015).

R6 Regional Forester's Sensitive Aquatic Biota on the Rogue River-Siskiyou National Forest *3rd and 4th columns completed for the Upper Briggs Restoration Project*			
Species/Habitat		**Pre-field Review**	**Field Surveys**
Common Name	**Scientific Name**	**Existing Sighting or Potential Habitat (Yes/No)**	**Habitat or Species Confirmed (Yes/No)**
ESA THREATENED SPECIES			
SONCC coho salmon	*Oncorhynchus kisutch*	N	N
OC coho salmon	*O. kisutch*	N	N
S. DPS North American green sturgeon	*Acipenser medirostris*	N	N
S. DPS Pacific eulachon	*Thaleichthys pacificus*	N	N
ESA CRITICAL HABITAT (CH)			
SONCC coho salmon	*O. kisutch*	N	N
OC coho salmon	*O. kisutch*	N	N
MSA ESSENTIAL FISH HABITAT (EFH)			
Coho salmon	*O. kisutch*	N	N
Chinook Salmon	*O. tshawytscha*	N	N
R6 FORESTER'S SENSITIVE SPECIES			
Fish			
Pacific lamprey	*Entosphenus tridenttatus*	Y	Y
KMP steelhead	*O. mykiss*	Y	Y
OC steelhead	*O. mykiss*	N	N
SONCC Chinook salmon	*O. tshawytscha*	N	N
Mollusk			
California floater	*Anodonta californiensis*	N	N
Western ridged mussel	*Gonidea angulata*	N	N
Highcap lanx	*Lanx alta*	N	N
Scale lanx	*L. klamathensis*	N	N
Rotund lanx	*L. subrotunda*	N	N
Robust walker	*Pomatiopsis binneyi*	N	N
Pacific walker	*P. californica*	N	N
Insect			
Haddock's Rhyacophilan caddisfly	*Rhyacophila Haddocki*	N	N
Yes *– The proposed project's potential effects on these species will be further analyzed in this document.* ***No*** *– No further analysis is necessary, and a determination of "No Impact" is rendered.*			

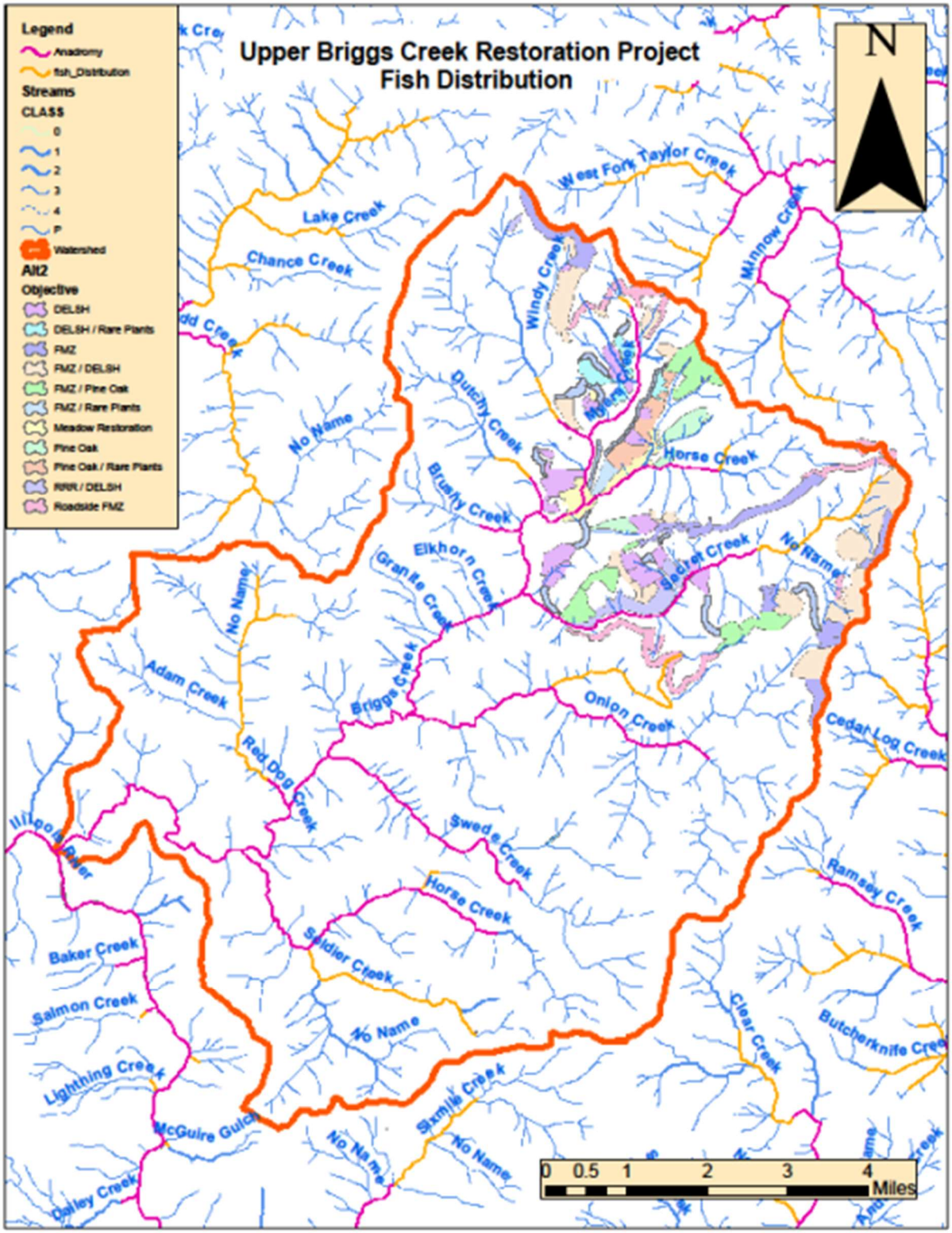


Figure 30. Fish Distribution in the Upper Briggs Planning Area.

Status of Listed Species, Essential Fish Habitat, & Critical Habitat Southern Oregon/Northern California Coasts Coho Salmon & Critical Habitat (Threatened)

Southern Oregon/Northern California Coasts (SONCC) coho Evolutionarily Significant Unit (ESU)[6] was listed as threatened on August 10, 1998 (63 FR 42587). This listing was reevaluated and NMFS determined listing SONCC coho was not warranted on January 17, 2006. The listing was once again reevaluated and NMFS determined a listing of threatened was warranted on February 4, 2008 (73 FR 7816). SONCC coho salmon critical habitat was designated as threatened also on February 11, 2008 (73 FR 7816). Final protective regulations for SONCC coho salmon were issued on February 11, 2008 (73 FR 7816). On April 28, 2009 NMFS announced that it was initiating a status review of SONCC coho. On May 26, 2010, NMFS affirmed the listing of the SONCC coho salmon as Threatened (75 FR 29489).

Critical habitat is defined in Section 3(5)(A) of the ESA as "the specific areas within the geographical area occupied by the species Southern Oregon/Northern California Coasts Coho on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection." Section 7 of the ESA prohibits the destruction or adverse modification of designated critical habitat (CCH).

NMFS developed a list of Primary Constituent Elements (PCEs) that are essential for the conservation of SONCC coho, and which are based on the life history of the coho salmon. These PCEs are: freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, estuarine areas, nearshore marine areas, and offshore marine areas. These PCEs in concert with SONCC coho distribution data, were used to delineate the spatial extent of the critical habitat. The lateral extent of this designation is limited to the ordinary high water mark (i.e., bankfull elevation). For the purposes of this BE, the PCEs are cross referenced with the respective Habitat Indicators in Table 279. SONCC Coho Critical Habitat Essential Habitat Features & Respective Habitat Indicators..

Table 279. SONCC Coho Critical Habitat Essential Habitat Features & Respective Habitat Indicators.

PCEs of SONCC Coho Critical Habitat	Habitat Indicator
Freshwater Spawning Sites	Change in Peak/Base Flows, Water Temperature, Sediment/Turbidity, Chemical Contamination/Nutrients, Substrate
Freshwater Rearing Sites	Change in Peak/Base Flows, Floodplain Connectivity, Water Temperature, Sediment/Turbidity, Chemical Contamination/Nutrients, Water Quality Indicators, Riparian Reserves, Substrate, Large Woody Debris, Pool Frequency, Pool Quality, Width/depth Ratio, Off-channel Habitat, Streambank Condition
Freshwater Migration Corridors	Physical Barriers, Change in Peak/Base Flows, Water Temperature, Sediment/Turbidity, Chemical Contamination/Nutrients, Riparian Reserves, Substrate, Large Woody Debris, Pool Frequency, Pool Quality, Width/depth Ratio, Floodplain Connectivity, Off-channel Habitat, Streambank Condition
Estuarine Areas	Physical Barriers, Water Temperature, Sediment/Turbidity, Chemical Contamination/Nutrients, Change in Peak/Base Flows, Water Quality Indicators, Riparian Reserves, Substrate, Large Woody Debris, Pool Frequency, Pool Quality, Width/depth Ratio, Floodplain Connectivity, Off-channel Habitat, Streambank Condition
Nearshore Marine Areas	N/A to RRSNF Actions

[6] As defined by the Endangered Species Act.

PCEs of SONCC Coho Critical Habitat	Habitat Indicator
Offshore Marine Areas	N/A to RRSNF Actions

Essential Fish Habitat

Interim final rules for Essential Fish Habitat (EFH) under the Magnuson-Stevens Act (16 U.S.C. 1855(b)) were published in the Federal Register/ Vol. 62, No. 244, December 19, 1997 and final rules published in the Federal Register/ Vol. 67, No. 12, January 17, 2002. These rules are pertinent to Chinook salmon and coho salmon habitat within the Southern Oregon Coastal Basin. Essential Fish Habitat (EFH) has been defined by NMFS as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." This definition includes all waters historically used by anadromous salmonids of commercial value.

Because federally listed Threatened fish species and/or critical habitat are present as associated with this project, consultation requirements were conducted in accordance with the ESA (SIS LRMP S&G 4-2).

Action Area

The Action Area, as defined by the Endangered Species Act (ESA), is all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action [50 CFR § 402.02]. The Action Area not only includes the immediate footprint of the harvest and road related activities, but any downstream reaches which may be affected indirectly. The ESA Action Area is also analyzed for Forest Service Sensitive Species.

The proposed action is located within the Briggs Creek 5th field watershed. All proposed project activities would occur within the Upper Briggs Creek 6th field subwatershed. All potential effects are also expected to occur within the boundaries of the Upper Briggs Creek 6th field subwatershed.

Pacific Lamprey (Sensitive)

On the RRSNF, Pacific lamprey might occur within the Briggs Creek watershed, although they have not been documented by RRSNF biologists. For this analysis, the watershed is considered occupied by Pacific lamprey.

The USFWS was petitioned to list the Pacific lamprey (and three other lamprey species) under the ESA in 2003. In 2004, the USFWS found that the petition did not present substantial scientific or commercial information to warrant listing. The petition finding did, however, recognize that Pacific lampreys have declined in the Columbia River basin and in many other parts of their range.

The Pacific lamprey has and continues to face a variety of threats associated with: passage and entrainment at dams and water diversion structures, altered stream flows including dewatering of stream reaches, dredging, chemical poisoning, degraded water quality, poor ocean conditions, disease, over-utilization, introduction and establishment of non-native fishes, predation, and stream and floodplain degradation/simplification (Luzier et al 2009).

KMP Steelhead (Sensitive)

On the RRSNF, Klamath Mountain Province (KMP) steelhead occur within the Briggs Creek watershed. The KMP steelhead trout distinct population segment (DPS) was proposed as threatened

under the ESA on August 9, 1996 (61 FR 41541), but was found not warranted for listing. KMP steelhead is currently listed as a species of concern by NMFS and as a Sensitive Species by the USFS Region 6.

Other Species (Sensitive)

California floater, Western ridged mussel, highcap lanx, scale lanx, rotund lanx, robust walker, Pacific walker, Haddock's Rhyacophilan caddisfly, Oregon Coast (OC) steelhead, and SONCC Chinook salmon are not known to occur or have suitable habitat within proximity to any of the proposed changes included within any of the action alternatives. As such, a **No Impact** determination is rendered and these species will not be discussed further within this document.

DESCRIPTION OF HABITAT ENVIRONMENTAL BASELINE

Information used in this analysis includes Geographic Information System data, Aquatic Habitat Inventories (2014 and 2015), Properly Functioning Condition ratings are based on the NMFS Table of Population and Habitat Indicators, as modified by the Rogue River/South Coast Level 1 Team for the Klamath Province/Siskiyou Mountains.

This analysis evaluates the direct and indirect potential effects of the proposed actions on KMP steelhead trout and Pacific lamprey. There is no potential to affect SONCC coho salmon, CCH, and EFH that exist over 10 miles downstream and outside of the action area. There is an impassable barrier to the upstream migration of coho and Chinook salmon in the lowest reach of Briggs Creek, therefore a determination of **No Effect** is rendered for these resources. There is potential to affect Pacific lamprey and KMP steelhead trout since these species are known or expected to occupy the Upper Briggs Creek subwatershed. Pacific lamprey and KMP steelhead are located in the Action Area, so any effect to one (Pacific lamprey) would potentially result in an effect to the other (KMP Steelhead).

3.2.1.2 ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1—NO ACTION

With this alternative, no activities would occur; there would be no direct effects from this alternative. The indirect effects of this alternative would be that riparian stands, particularly plantations would continue to have natural suppression occurring, and younger non-dominant trees would continue to die off. The stands would continue on the same trajectory of attaining late-successional habitat characteristics of large diameter trees, multi-storied canopy, and a diverse species component, but it could take several hundred years for this to occur through the natural process of stand development.

ALTERNATIVE 2—PROPOSED ACTION, & ALTERNATIVE 3

As stated earlier, the proposed activities under the Upper Briggs Creek Restoration Project were split into four project elements: 1) Timber Falling, Yarding, and Haul 2) Road Maintenance, 3) Fuels Treatment, 4) Road Maintenance, Temporary Road Construction and Decommission, Road Reconstruction, Landing Construction/Reconstruction and New Road Construction, and 5) Stream Enhancement Activities.

Direct Effects

The Proposed Action for Upper Briggs Restoration Project has only stream enhancement activities in Secret Creek occurring directly within the stream channels that contain fish or fish habitat. The direct effects from the Proposed Action are expected on KMP steelhead and Pacific lamprey. All of the instream activities are intended to improve spawning and rearing habitat for aquatic species by providing much needed roughness and complexity to the degraded channel of Secret Creek. While some negative, short-term direct effects may occur to steelhead or lamprey individuals, effects will be moderated by following the design criteria for instream restoration listed in this document, such as ODFW's instream work timing (June 15 – September 15). Similar project criteria have been implemented in other watersheds on the RRSNF with great success, minimal direct impact to aquatic organisms, and favorable long-term benefits to fish habitat.

Indirect Effects

Most of the effects described here have been evaluated by a professional hydrologist for the Upper Briggs Creek Restoration Project. An in-depth discussion of potential effects to stream channels, temperature, sediment, Riparian Reserves, and wood recruitment can be found in Chapter 3 of the Upper Briggs Creek Restoration Project Environmental Assessment under the Hydrology Section 3.1.4.

Temperature

Implementation of the Northwest Forest Plan accommodates vegetation treatment necessary or desirable to restore ecological health in Riparian Reserves that have been harvested or affected by fire exclusion or other disturbance. The Northwest Forest Plan Temperature Strategy, developed for the Forest Service, Bureau of Land Management and Oregon Department of Environmental Quality, demonstrates that thinning can occur in the Riparian Reserve without affecting stream shade if the overstory canopy in the primary shade zone is not treated. The following table from the NWFP Temperature Strategy defines the primary shade zone and area of no overstory treatment to be applied to protect shade on perennial streams (USFS, DEQ, and BLM, 2005).

Table 40. Minimum Width of Primary Shade Zone (Feet) Based on Slope & Tree Height

Height of Tree	Hill slope <30%	Hill slope 30 to 60%	Hill slope >60%
Trees < 20 feet	12 feet	14 feet	15 feet
Trees 20 to 60 feet	28 feet	33 feet	55 feet
Trees >60 to 100 feet	50 feet	55 feet	60 feet
Trees > 100 to 140 feet	70 feet	75 feet	85 feet

No impacts to stream temperature would be expected from thinning because existing stream shade would be maintained. Activities would be implemented according to the parameters in Table 40 above and the Project Design Criteria, such that the overstory in the primary shade zone is not degraded.

Because no changes to stream temperature are expected from project activities, there is No Impact to KMP steelhead trout and Pacific lamprey.

Sediment

Soil disturbance from management activities can cause sediment to be delivered to a stream. Sediment delivered to a stream most often is comprised of both suspended sediment (silt and clays) and coarser materials (sand and gravels) that are transported as bedload. Suspended sediment that can affect water clarity is usually quickly transported through the stream system.

Sediment can either be delivered by mass wasting or surface erosion. Mass wasting can deliver large amounts of sediment in a short time. Following mass wasting to a stream, there is an accompanying increase in turbidity from fine sediment. Surface erosion delivers a smaller amount of sediment over a longer time period. Rather than affecting whole stream systems, such as mass wasting, fine sediment from erosion usually causes localized increases in turbidity or it is so small that it is undetectable.

Harm may include habitat modification or degradation that actually kills or injures an aquatic species by substantially impairing essential behavior patterns such as breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 217.12). Therefore, indirect adverse effects are those that reduce fish growth and ultimately survival through changing the quality or quantity of physical (e.g. temperature, cover, pool depth, spawning gravels), chemical (e.g. pH), or biological (e.g. decreased prey availability) parameters. Indirect effects that improve habitat parameters could also be beneficial to the species. For example, indirect effects caused by treating (stormproofing, closing, or decommissioning) forest roads are those that could also modify fish habitats depending on proximity, magnitude, duration, and timing of the road treatments.

In general, road construction and use have adverse effects to fish habitat through a variety of mechanisms including urbanization, industrial development, habitat fragmentation, and sediment and chemical delivery. Forest roads built for timber harvest and access to other natural resources can be abundant sources of sediment to aquatic systems, both through increased surface erosion, landslide risk, and drainage density (Cederholm et al. 1980; Furniss et al. 1991).

Specifically, increased sediment production in stream systems has been shown to adversely affect Pacific Northwest salmonid species through reduction in gravel permeability and reduced egg to fry survival (Cederholm et al. 1980; Furniss et al. 1991). Further, sediment can reduce macroinvertebrate production and fill pools, reducing habitat quantity and salmonid food availability (Suttle et al. 2004; Harvey et al. 2009). A direct linkage also exists between sediment supply and stream habitat indicators such as gravel permeability and pool depth. Likewise, inverse relationships exist between sediment-related stream habitat indicators and fish survival (Suttle et al. 2004; Harvey et al. 2009).

Several studies have been conducted to determine the effectiveness of riparian buffers in reducing sediment delivery to a stream from upslope skyline timber harvest. All of the studies used clear cut harvest methods, and not the less impacting method of thinning as proposed in this project. In these studies, buffer widths of 100 feet were found to be effective in preventing sediment delivery from timber harvest.

The Upper Briggs Creek Restoration Project will implement a minimum 25’ no-cut buffer on all streams and a 100’ buffer in which no equipment will be allowed. The 100’ buffer is designed to limit soil disturbance and the potential for sedimentation of streams. By implementing the mandatory buffer widths found in the Project Design Criteria, there would be no increase in fine sediment delivery to a stream or associated increase in turbidity from thinning activities.

No new temporary roads would be constructed in Riparian Reserves or across any stream channels, therefore temporary road construction does not have a mechanism to contribute sediment to the aquatic system. Road maintenance associated with the project will be required to follow all criteria in the

National Best Management Practices for Water Quality Management on National Forest System Lands (USDA, 2012) to mitigate any potential for road related sediment from entering any watercourse or ditch connected to the stream network.

Proposed road maintenance and reconstruction would reduce road-derived sediment generated during increased road use over the life of the project. Road-derived sediment would be directed onto the forest floor through cross drains where it would be filtered before reaching stream channels. No-harvest riparian buffers, intermittent stream status, and proximity to fish bearing streams would be sufficient to prevent measurable amounts of sediment delivery from all temporary spur road construction and road maintenance activities to downstream occupied habitat.

Based on the above information, no measurable sedimentation with a connection to stream channels is expected to occur from any project activities. Therefore, project activities will result in No Impact to KMP steelhead trout and Pacific lamprey.

Large Wood

The lack of large wood is an important shortcoming of aquatic habitat in Briggs Creek and its tributaries. In large streams large wood is an important component to add channel complexity along channel margins, in side channels, at heads of point bars, and at heads and margins of islands. This wood plays a critical role in providing over-wintering habitat for salmonids as well as spring and summer habitat for salmonid fry. Large wood is crucial to retaining fine organic matter and thereby trapping nutrients and providing substrate for aquatic macroinvertebrate communities.

Knowing exactly how much large wood “should” be present in higher order main stem channels is nearly impossible to determine because pristine stream and river systems of this size on which to base a comparison are rare to nonexistent along the Pacific coast (Bisson et al. 1987). Primary processes of large wood input to Briggs Creek are from streamside trees falling into the stream, however inputs also include transport from upstream, streamside debris avalanches, earthflows, or debris torrents from tributaries (Bisson et al. 1987).

Large wood recruitment over time will be maintained and enhanced by the same strategy employed to protect stream shading as described above in the Temperature section. The majority of instream large wood in Briggs Creek tributaries originates within 70 feet of stream channels. The minimum no-cut buffer in Riparian Reserves around perennial streams with trees greater than 100’ tall would be 70’ or greater, ensuring that wood recruitment rates over time will be largely unaffected by project activities.

This project proposes to add large wood to Secret Creek where historic timber harvest has limited the ability of the stream to recruit suitable large wood. Large wood will help to provide channel roughness, overhead cover, accumulate gravels and fine sediment, and encourage a dynamic meandering channel. Large wood will be added to specifically enhance habitat for KMP steelhead and Pacific lamprey. Therefore, project activities will result in a short term Negative Impact (that will not contribute to future listing) and a long-term Beneficial Impact to KMP steelhead and Pacific lamprey.

Cumulative Effects

Past, present, and future activities have the potential to work synergistically with the proposed activities in the Upper Briggs Creek Restoration Project. Past, present, and reasonably foreseeable future activities that have occurred on National Forest System lands are documented in the Upper Briggs Creek Restoration Project Environmental Assessment (EA, Chapter 2).

The only direct and indirect effects identified to aquatic resources from project activities is from Stream Enhancement activities. These activities are designed to be beneficial to aquatic resources and are not expected to work synergistically with any known past, present, or reasonably foreseeable future activities. Because there are no negative effects associated with proposed project activities, there can be no negative cumulative effects.

SUMMARY & COMPARISON OF ALTERNATIVES

Table 281. Comparison of Effects to Aquatic Species by Alternative & Activity Type.

Alternative	Timber Falling, Yarding, & Haul	Fuels Treatment	Road Maintenance, Construction and Decommissioning	Stream Enhancement
1	Neutral	Neutral	Neutral	Neutral
2	Neutral	Neutral	Neutral	Short-term negative, long-term beneficial
3	Neutral	Neutral	Neutral	Short-term negative, long-term beneficial

The No Action Alternative would not alter the project area on National Forest System land. Thus, a neutral effect to aquatic species or habitat would occur.

The Action Alternatives, 2 and 3, would have a similar effect to Sensitive aquatic species due to the potential of direct negative and indirect long-term beneficial effects from Stream Enhancement activities.

Specific to Alternatives 3, there would be less riparian vegetation treated from “Variable Density Thinning” as compared to Alternative 2. Falling fewer trees in the riparian areas would promote less growth of larger trees as well as less growth of understory species to provide for diverse, healthy, riparian vegetation. By falling less riparian vegetation as compared to Alternative 2, other species would not come in under the current Douglas-fir dominated stand and this would result in a longer timeframe to attain late-successional habitat characteristics within the Riparian Reserve, when compared to Alternative 2. This could result in a smaller average size of future LWD recruited within the project’s perennial, intermittent, and ephemeral streams above fish habitat, when compared to Alternative 2.

Effects to Endangered, Threatened, Proposed or Sensitive aquatic species are similar under all of the Action Alternatives. This is due to many of the same site specific design elements being included in all of these alternatives. The differences in activities between Action Alternatives are not large enough to create any measurable difference downstream on aquatic species.

CONCLUSIONS & DETERMINATIONS

Alternative 1— No Action

Alternative 1 would have no direct, indirect or cumulative effects to SONCC coho salmon, SONCC coho CH, California floater, Western ridged mussel, highcap lanx, scale lanx, rotund lanx, robust walker, Pacific walker, Haddock’s Rhyacophilan caddisfly, Oregon Coast (OC) steelhead, and SONCC Chinook salmon since there is no action. Therefore, a “***No Impact***” determination is rendered.

Alternative 2—Proposed Action, & Alternative 3

The direct and indirect effects from Alternatives 2 and 3 would result in a short term negative and long-term beneficial effect from Stream Enhancement activities. As a result, project activities **May Impact Individuals or Habitat, But Will Not Likely Contribute to a Trend Toward Federal Listing or Cause a Loss of Viability to the Population or Species** for KMP steelhead trout and Pacific lamprey due to the potential to injure individuals directly from Stream Enhancement activities, while providing a long-term benefit of improved instream habitat conditions.

These Alternatives would have **No Impact** to California floater, Western ridged mussel, highcap lanx, scale lanx, rotund lanx, robust walker, Pacific walker, Haddock's Rhyacophilan caddisfly, and SONCC Chinook salmon because these species are not known to occur or have suitable habitat within proximity to any of the proposed activities.

These Alternatives would have **No Effect** to SONCC coho salmon, SONCC coho CH, Pacific eulachon, North American green sturgeon, and Essential Fish Habitat.

Table 292. Summary of Conclusion of Effects.

Endangered, Threatened, Proposed or Sensitive Species	Alternative		
	1	2	3
SONCC coho salmon	NE	NE	NE
SONCC coho CH	NE	NE	NE
EFH – coho	NE	NE	NE
EFH – Chinook	NE	NE	NE
KMP steelhead	NI	MIIH	MIIH
Pacific lamprey	NI	MIIH	MIIH
SONCC Chinook salmon	NI	NI	NI
California Floater	NI	NI	NI
Western ridged mussel	NI	NI	NI
Rotund lanx	NI	NI	NI
Highcap lanx	NI	NI	NI
Scale lanx	NI	NI	NI
Robust walker	NI	NI	NI
Pacific walker	NI	NI	NI
Haddock's Rhyacophilan caddisfly	NI	NI	NI

NE *– No Effect*
NI *– No Impact*
MIIH *– May Impact Individuals or Habitat, But Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species*

3.2.2 Wildlife Resources

The Upper Briggs wildlife resource report (Allison 2018) evaluates wildlife potentially present within the project area and provides a full explanation of measurements and metrics used in evaluating the information for the no action and action alternatives. The information provided in this EA is summarized from the wildlife report. The wildlife report is available here: http://www.fs.fed.us/nepa/nepa_project_exp.php?project=45593

We reviewed all terrestrial wildlife species which are documented or suspected to occur on the Rogue River-Siskiyou National Forest and are designated as sensitive within USFS Region 6 (Pacific Northwest Region). This includes species which are federally listed or proposed for listing. Appendix C of the wildlife report lists these species by common name, scientific name and primary habitat.

In addition, we reviewed and described impacts to species listed as survey and manage under the Northwest Forest Plan (December 2003 species list but with red tree vole as category C and giving special consideration to 12 species), assessed the population viability of management indicator species (MIS) from the Siskiyou National Forest LRMP, and assessed project impacts on groups of species covered under a presidential executive order or an agency memo of understanding.

Table 3 of the wildlife report lists regionally sensitive species whose occurrence are neither documented nor suspected on Wild Rivers Ranger District. Because their ranges are unlikely to overlap the analysis area, they are not being analyzed further.

Table 4 of the specialist report lists regionally sensitive species whose occurrence is either documented or suspected on the Wild Rivers Ranger District, however there is no habitat for these species in the project area that would be affected by project activities. No impacts are anticipated to these species and rationale is provided in the table. These species will not be analyzed further.

Following are those regionally sensitive species and Siskiyou National Forest management indicator species (MIS) analyzed further because their habitat or individuals might be impacted by activities. All adverse impacts are minimal and would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.

R6 Regionally Sensitive Species

- Pacific fisher
- Pacific (coastal) marten
- Lewis' woodpecker
- White-headed woodpecker
- Purple martin
- Oregon shoulderband
- Travelling shoulderband
- Franklin's bumble bee
- Western bumble bee
- Coronis fritillary
- Johnson's hairstreak
- Pallid bat
- Fringed myotis

Siskiyou NF Management Indicator Species (MIS)

- Spotted owl
- Woodpeckers
- Pacific marten
- Deer & elk

3.2.2.1 EXISTING CONDITIONS

HABITATS

The basic descriptions of forest types and vegetation in the Upper Briggs watershed provided earlier characterize the habitats that are present (e.g. late, mid and early successional Douglas-fir-mixed conifer which includes sugar pine, ponderosa pine and a variety of hardwoods). Habitats vary based on aspect, soils and past management. Additional habitat information is described below and more details may be found in the Project Biological Evaluation (Allison 2018).

The entire watershed is in the Oregon Klamath Province with current and historic NSO occupancy. While some areas of high quality habitat (including high quality nesting, roosting and foraging (NRF) habitat) are present, many forested stands lack large trees > 30inches DBH, decadence components, and desired multi-layered canopies. Although the historic fire regime is believed to have benefitted spotted owls, uncharacteristically severe wildfire is considered the greatest current threat to owl habitat in the Klamath Province. According to the 2012 NSO Recovery Plan Appendix B, the Oregon Klamath Province experienced the greatest amount of habitat loss on federal lands of all provinces between 1996 and 2006 due to wildland fire (93,600 acres) much of this was in the 2002 Biscuit Fire which burned in watersheds adjacent to the west boundary of the Upper Briggs watershed. Burned Area Reflectance Classification (BARC) data from two wildland fires that have burned within the Upper Briggs watersheds since 2010 estimate that 1.6% of the watershed has experienced high severity fire and 7.5% has experienced moderate severity since 2010. Forest fire start history data indicate that between 1972 and 2015 there were 97 fire starts in the Upper Briggs Creek watershed. Of these, 40 were lightning caused, 51 were human caused, and 6 were unknown cause.

Approximately 20% of National Forest lands in the Upper Briggs Creek watershed are managed stands with past timber harvest including plantations ranging from 20 to 67 years in age. Of the remaining 19,377 acres in the watershed, approximately 3,923 acres are influenced by serpentine soils and outcrops. Meadow habitats (non-serpentine) are variable in size and consist of grassy areas with patches of brush, conifer and hardwood cover. Horse Creek Meadow is currently the largest meadow in the watershed that has been routinely treated for brush encroachment through brush-cutting and prescribed fire.

Furthermore, forested habitat in the watershed includes a considerable amount of hardwoods that commonly occur with a mix of conifer species such as Douglas-fir, incense cedar and ponderosa pine. These hardwood species are primarily Pacific madrone (*Arbutus menziesii*), tanoak (*Lithocarpus densiflorus*), canyon live oak (*Quercus chrysolepis*), California black oak (*Quercus kelloggii*) and Oregon white oak (Quercus garrayana). A combination of these hardwood species is often present in any given stand. According to the 2014 modified GNN vegetation data (Oregon State LEMMA GNN data derived from 2012 satellite imagery published in August 2014 http://lemma.forestry.oregonstate.edu/data/structure-maps), approximately 19,741 acres of the watershed have at least 2% canopy cover in hardwood. Any one of these species is represented as the dominant hardwood in approximately 10,195 acres (41%) of the watershed. Table 303. Acres With Dominant Hardwoods in the Upper Briggs Creek Watershed provides a breakdown of these acres by species.

Table 303. Acres With Dominant Hardwoods in the Upper Briggs Creek Watershed

Common Name	Acres	%Watershed
Pacific Madrone	4,340	18
Tanoak	3,370	14
Canyon Live Oak	1,687	7
California Black Oak	546	2
Oregon White Oak	84	<1
Total	**10,195**	**41**

The 2014 modified GNN data was used to delineate and quantify habitat for the project (Oregon State LEMMA GNN data derived from 2012 satellite imagery published in August 2014 http://lemma.forestry.oregonstate.edu/data/structure-maps), These data estimate 42% of the watershed in moderate to closed-canopy large conifer-dominant habitat (≥ 40% canopy cover, ≤ 37.5' DBH) and approximately 3% of open-canopy large conifer-dominant habitat (<40% canopy cover, ≤ 37.5' DBH). The later occurs primarily on the serpentine soils within the watershed and ages of these habitats vary depending on site productivity. In addition, over 40 percent of forest in the watershed has a hardwood component, primarily Pacific madrone and tanoak, followed by a smaller amount of canyon live oak and a very small amount of California black oak and Oregon white oak (< 3% of the watershed).

Forest Plan land use allocations in the watershed include objectives for wildlife habitat management. Over 50% of the watershed is Matrix and 17% is Late Successional Reserve. No activities are proposed in mapped or unmapped LSR.

Riparian reserves make up approximately 20% of the watershed and are composed of a mix of seral stages with approximately 32% in managed stands.

One botanical area in the northeast portion of the watershed is serpentine and approximately 224 acres of special wildlife sites are also in serpentine. These wildlife sites were affected by the Oak Flat and Onion Mountain fires and no activities are proposed in them.

The largest special wildlife site allocated by the Forest Plan is Horse Creek (1,242 acres). Forest Plan direction for this area is to maintain or improve habitat value for multiple wildlife species (Siskiyou Forest Plan, p IV-116). The Horse Creek area is a combination of dry and wet meadow, brush, pine/oak habitat, late seral forest and riparian habitat. Historic photos and information indicate that past fire has influenced habitat diversity in this area. In fact, 18 acres of low severity fire occurred within the Horse Creek site during the 2014 Onion Mountain fire. This project aims to continue habitat maintenance with thinning, prescribed fire and other treatments to improve and retain habitat diversity in this area.

DEAD WOOD

Site Specific

Dead wood in treatment units is variable with most having high levels of smaller diameter and some with large (>20-inch DBH) down wood. Down wood in several units on the southwest side of the project area is mostly knobcone pine and other units have considerable down black oak and madrone.

Snags are expected to continue to accrue in the treatment units due to stress from recent drought years and insect and disease infestations, wildland fire, and smaller to mid-size trees may be killed from pile burning and prescribed fire in treated areas.

Watershed Scale

The Forest Service Region 6 uses the DecAID model to evaluate snag and down wood densities at the watershed scale (http://www.fs.fed.us/r6/nr/wildlife/decaid/). DecAID is a research-based, advisory tool to help determine reference and current conditions for large snags and other dead wood at the watershed scale (Mellen-McLean and others 2012). It is based on data from plots in unmanaged stands and provides histograms of reference (natural) and current conditions to help evaluate the effects of management activities on organisms that use decayed wood. In this model, the natural condition is the current variability in dead wood populations in forests that have never been harvested, based on a summary of 'unharvested' inventory plots. These inventory summaries of 'natural conditions' in DecAID describe variability across space at a single point in time (late 20th century). This is distinct from 'historic variability' concepts, which typically refer to variation over very long time periods (see Landres et al. 1999). The current condition is the actual, current forest condition given all historic and modern human disturbances (including harvests, fire management, etc).

Summary

Three large fires have burned areas of the Briggs Creek 5th field watershed in the last 10 years. Burn severity mapping for the 2010 Oak Flat and 2014 Onion Mountain fires estimate 470 acres (1 percent) of high severity and 2,170 acres (5 percent) of medium severity burn in the watershed. In addition, the 2008 Horse Mountain fire burned approximately 1,165 acres total (2 percent of watershed), but no severity mapping was available. These acres are expected to be contributing to concentrated areas of high snag densities and areas with depleted large down wood (though snags will contribute to down wood over time) for a total of 8 percent of the watershed.

Figure 31 compares the reference and current distribution of all down wood > 5 inches diameter in the watershed. The current distribution is slightly higher than reference in all but one cover class (2-4

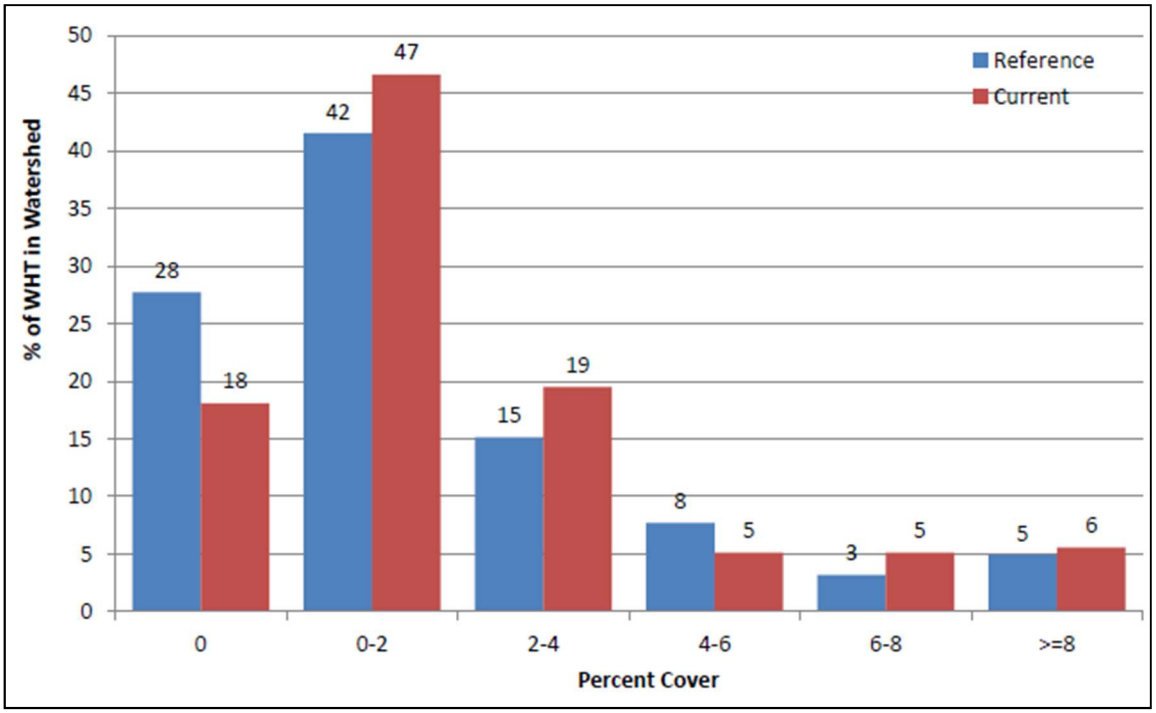


Figure 31. Down Wood > 5" Diameter—Comparison of Reference & Current Distributions.

percent cover), hence the watershed currently has a higher proportion down wood than historic conditions.

Figure 32 compares the distribution of large down wood (>20 inches) between current and reference conditions. Overall, the watershed is near reference conditions but actually has more area with large down wood cover than reference conditions in the ranges of 0 to 1 and 2 to 3 percent cover.

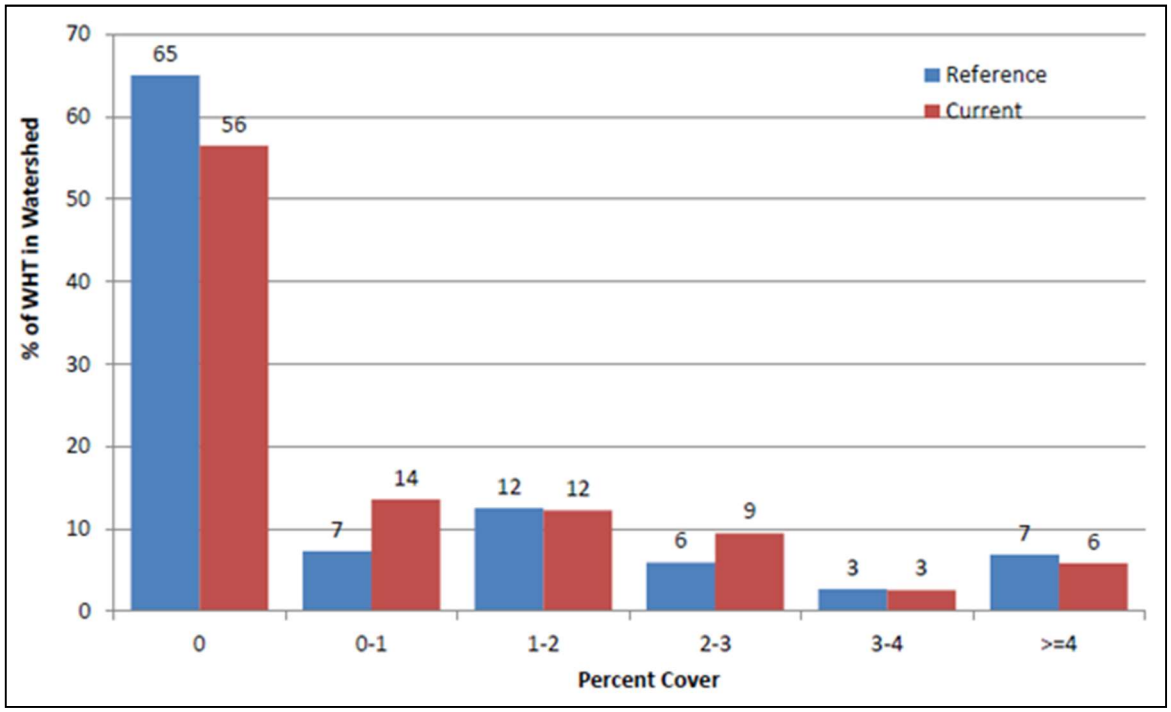


Figure 32. Down Wood >20" Diameter—Comparison of Reference & Current Distributions.

Figure 33 compares the current and reference distribution of all snags >10 inches diameter per acre in the watershed. Overall, current snag levels are approximately 6 percent lower than reference with deficiencies in the ranges of 0-4 and 8-12 snags per acre. However, the watershed is above reference condition in higher snag densities (>24 per acre).

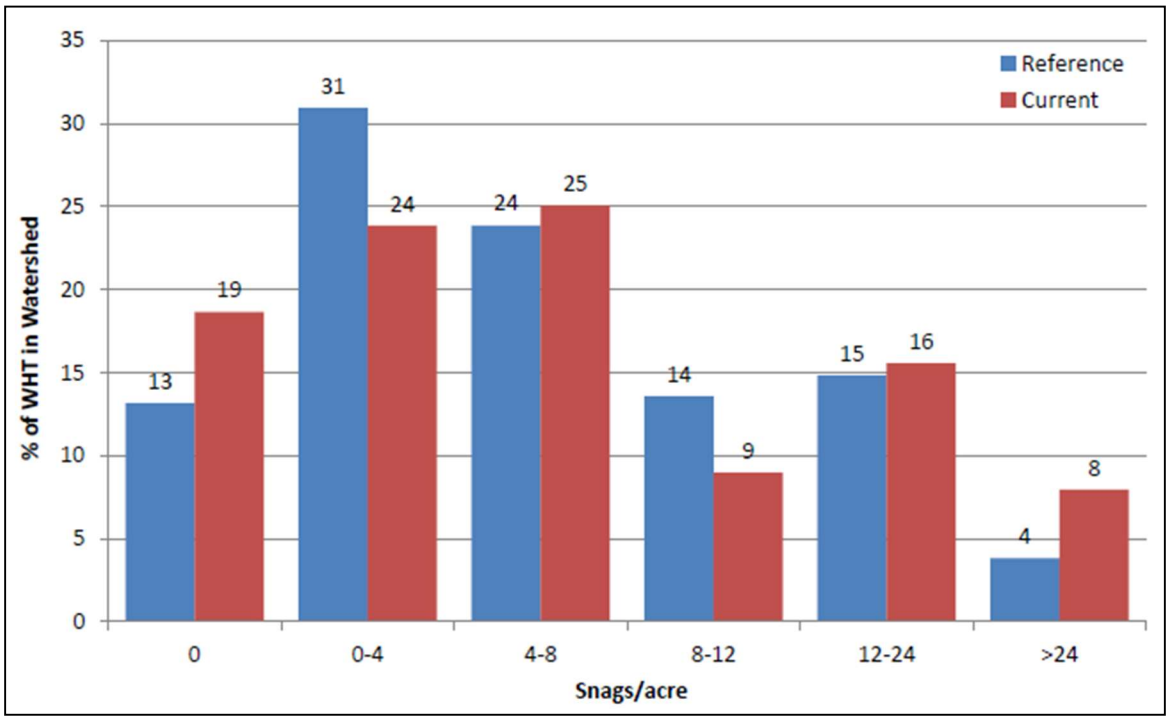
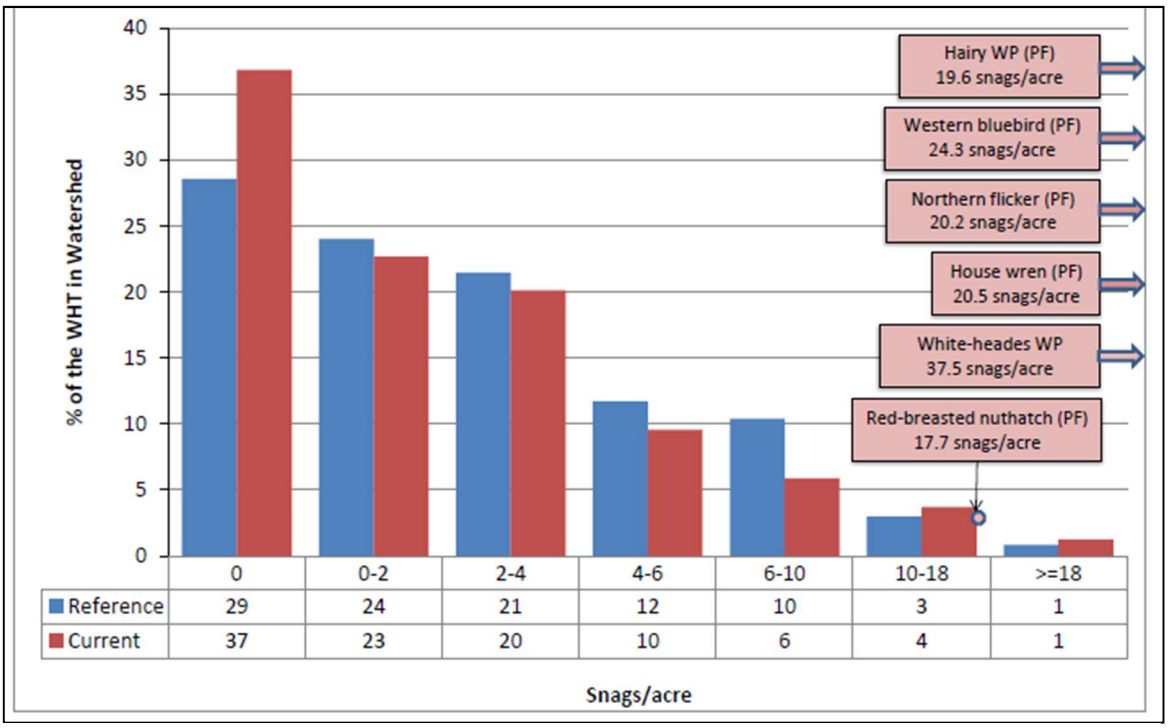


Figure 33. Snags/Acre—Comparison of Reference & Current Distributions.

The current distribution of snags greater than 20 inches DBH within the watershed has departed from reference data for some classes per DecAID. Figure 34 shows that 37 percent of the Briggs Creek 5th-field watershed has no measurable snags per acres which is an 8 percent more than the reference (historic) condition (29%), therefore the watershed is generally deficient in snags. This is apparent in the four density classes that represent 0 to 10 trees per acre.

Figure 34 also displays the 50 percent tolerance levels for certain bird species. These tolerance levels indicate the density of snags per acre that 50 percent of individuals would use, while the other 50 percent would use a higher density (for example, 50 percent of red breasted nuthatches would use habitat with approximately 18 snags per acre and the other 50 percent would use habitat with more snags per acre). Currently, we are slightly above the historical level of 18 or more snags per acre however this occurs in only 1 percent of the watershed, which is a very small amount when looking at the tolerance levels of many other bird species.



	0	0-2	2-4	4-6	6-10	10-18	>=18
Reference	29	24	21	12	10	3	1
Current	37	23	20	10	6	4	1

Figure 34. Snags/Acre > 20"—Comparison of Reference & Current Conditions, & Wildlife 50% TLs.

FEDERALLY LISTED OR PROPOSED SPECIES

There are four species listed under the Endangered Species Act known to occur on the Rogue River-Siskiyou National Forest. They are: marbled murrelet (threatened), northern spotted owl (threatened), gray wolf (endangered) and Oregon spotted frog (threatened).

Gray wolves would not be affected by proposed activities, so they are not analyzed further. Wolves have not been documented, nor are suspected, on the Wild Rivers Ranger District. The nearest documented occurrences are over 50 miles east in the Southern Cascades.

Oregon spotted frog would not be affected by proposed activities so they are not analyzed further. These frogs have not been documented, nor are suspected in the Upper Briggs Creek watershed. Nearest known occurrences are over 50 miles east in the Southern Cascades.

Marbled murrelet would not be affected. The project is not within occupied habitat or critical habitat for the marbled murrelet. The project overlaps a portion of survey zones C and D for which surveys are not required due to the low likelihood of murrelet presence in these zones and any impacts to murrelets in these two zones are considered negligible. (USFWS 2002, letter to RRSNF and Medford BLM, and USFWS 2002 Technical Assistance on the Final Results of Landscape level Surveys for Marbled Murrelets in Southwest Oregon [FWS reference: 1-7-02-TA-6401]).

Northern spotted owls would have short-term impacts with long-term benefits by proposed activities, primarily from habitat modification and disturbance. Because activities are likely to adversely affect spotted owls and designated critical habitat, formal consultation with the Service was completed in 2017. A Biological Opinion was transmitted to the RRSNF on June 29, 2017 (USFWS 2017, Tails# 01EOFW00-2017-F-0308). In a February 8, 2019 letter of concurrence, the Service concurred that the

effects of the proposed action, along with the impacts of the wildfires and suppression activities will not exceed effects anticipated in the 2017 Opinion. All mandatory conservation measures (project design criteria) and terms and conditions from the biological opinion would be implemented.

Northern Spotted Owl

A more detailed description of the northern spotted owl is provided in the project Biological Assessment (Allison 2017), the Biological Opinion (USFWS 2017). Relevant background information is summarized here.

Legal Status

The spotted owl was listed as threatened in1990 due to widespread loss and modification of suitable nesting habitat (USDI Fish and Wildlife Service 1990).

Critical Habitat

Approximately 85% of the Upper Briggs Creek watershed is with within critical habitat unit (CHU) KLW 2 (Klamath West). Appendix D provides additional details of this CHU and the full designation of critical habitat can be found in Federal Register notice Vol. 77, No. 233 at http://www.gpo.gov/fdsys/pkg/FR-2012-12- 04/pdf/2012-28714.pdf.

Threats

The project area is entirely within the Oregon Klamath Province. Although the historic fire regime is believed to have benefitted spotted owls, uncharacteristically severe wildfire is considered the greatest current threat to owl habitat in the Klamath Province. According to the 2011 NSO Recovery Plan Appendix B, the Oregon Klamath Province experienced the greatest amount of habitat loss on federal lands of all provinces between 1996 and 2006 due to wildland fire (93,600 acres) much of this was in the 2002 Biscuit Fire which burned in watersheds adjacent to the west boundary of the Upper Briggs watershed. In addition to loss of habitat to severe wildfire, competition from barred owls is also considered as one of the most pressing threats to the spotted owl. Disease and the effects of climate change were identified as potential threats (USDI Fish and Wildlife Service 2011b).

Population & Habitat Trends

Recent range-wide meta-analysis for data through 2013 showed a range-wide, spotted owl population decline of 3.8 percent annually and an overall decline in occupancy rates in Oregon (Katie M. Dugger et al. 2016). The realized population decline in Oregon since 1990 is from 31 to 64 percent. Dugger et al. also indicated that barred owl presence is having a strong positive effect on overall NSO extinction rates and a strong negative effect on colonization rates in some areas. The 2015 NWFP 20-year monitoring report estimate a net decrease of 6.7 percent in nesting/roosting habitat on federal lands in the Oregon Klamath Province since 1993 (Davis and others 2016). The decrease takes into account the loss of habitat to wildfire, timber harvest, insects and other causes; with some of those losses offset by forest succession. For this province, wildland fire accounted for 9 times more acreage lost than timber harvest. Dispersal habitat also had a net loss of 4.4 percent on federal lands with a similar degree of habitat loss due to wildfire.

Survey History

Protocol **s**urveys of all owl suitable nesting habitat (NRF) occurred in both 2014 and 2015 within the planning area. Three additional surveys were conducted in 2016. Historic owl nest sites were also searched. One NSO pair was detected at one site in early 2014, but no reproduction was confirmed and only a male was detected at the site in 2016. Territorial males were detected at 2 additional sites

along with barred owls in 2014 and 2015. There were no NSO or barred owl responses within the planning area in 2016. Because surveys may not continue to occur through the duration of the project, known sites and unsurveyed suitable NRF habitat outside of known nest patches will be assumed to be occupied and certain project activities would be restricted to minimize disturbance during the critical breeding season described in Appendix A of the wildlife report.

Description of Suitable Owl Habitat

In the Oregon Klamath Province, owl dispersal-only habitat is forest stands with average tree diameters are ≥ 11inches DBH, canopy closure is ≥ 40 percent and there is enough open space beneath the canopy for an owl to fly through. Nesting, roosting and foraging (NRF) habitat for owls is generally older than 80 years with average tree diameter of 21 inches DBH, basal areas between 180 and 240 square feet/acre and canopy closure ≥ 60 percent. NRF habitat also serves as dispersal habitat and contains adequate dead wood to support owl prey species; such as, northern flying squirrels, red tree voles, wood rats and other small mammals.

Owl Habitat Within Upper Briggs Action Area

The Upper Briggs Project action area is the area within 1.3 miles of proposed treatment units. This distance represents the approximate home range distance of northern spotted owls in the Oregon Klamath province and provides the area for evaluating effects of project activities on owl home ranges that overlap proposed treatment units. This action area includes 30,171 acres in federal ownership of which 34% are currently spotted owl NRF habitat. Sixteen percent of federal NRF acres are in reserved land allocations (e.g., LSR). In addition, approximately 36% of federal acres in the action area are currently dispersal-only habitat.

Proposed treatment units include NRF and dispersal habitat for northern spotted owls. The 2011 Revised Recovery Plan for the Northern Spotted Owl provides considerations and treatment guidelines when designing forest restoration projects (USDI Fish and Wildlife Service 2011b). During the Upper Briggs Restoration Project planning process, approximately 190 acres of high quality NRF habitat were dropped from treatment areas for habitat conservation per Recovery Action 32 of the Recovery Plan.

Furthermore, treatment objectives were influenced by the desired condition for the stand based on potential contribution to the overall function and resilience of the watershed. In addition, the MAXENT relative habitat suitability model described in the Recovery Plan was used in development of treatments based on the abiotic suitability of a site for NSO nesting habitat. For example, treatments proposed on strategic ridgelines are intended to reduce fuels and risk of high severity fire and provide opportunities to introduce prescribed fire into the watershed at a scale that would maintain certain desired habitat types such as open, late seral with large ponderosa and sugar pine, and mature oak trees. NRF habitat on these strategic ridgelines is generally considered low quality nesting habitat for spotted owls. Owls are not known to nest on these ridges; they tend to be warmer, drier and more exposed than drainages and northerly aspects commonly occupied by NSO.

Conversely, dispersal habitat that occurs in areas of high relative habitat suitability are proposed for treatments that would enhance their development into NRF (Allison 2018 Appendix D, Map 1) Furthermore, roadside FMZ treatments would include treatment in both NRF and dispersal habitats that would maintain their functionality post-treatment.

Known (historical) owl sites – There are seven NSO home ranges within 1.3 miles of the alternative 2 treatment units that overlap portions of the treatment units (Allison 2018 Appendix D, Map 1). As mentioned previously, only one of these sites has had a pair detection in the last five years of survey.

Habitat (NRF) within the known owl sites – based on the 2014 modified GNN habitat data is displayed in Table 31. The NRF minimum thresholds for owl site viability are 50 percent for the core area and 40 percent for the home range (Courtney and others 2004; Thomas and others 1990). Only one site, (Sam Brown) is at the minimum threshold for the core area. At the home range scale, two sites are at the minimum threshold (59, Sam Brown) and one site (Secret Creek) is above the minimum threshold.

Table 314. Acres of NRF Within Potentially Affected Owl Site Nest, Core & Home Range Areas.

Owl Site	Acres (%) of NRF Within Known Owl Sites		
	Nest Patch (300M; 70 ac.)	Core Area (1/2-mile; 500 ac.)	Home Range (1.3-mile; 3398 ac.)
50	16 (23%)	197 (39%)	1246 (36%)
55	37 (53%)	207 (41%)	1094 (32%)
59	38 (54%)	200 (40%)	1356 (40%)
60	60 (86%)	185 (37%)	948 (28%)
228	35 (49%)	151 (30%)	1007 (30%)
Sam Brown	38 (54%)	251 (50%)	1356 (40%)
Secret Creek	43 (61%)	185 (37%)	1488 (44%)

Haul routes – There are no proposed haul routes through or within disturbance distances for heavy equipment (105 feet) of a known owl site. The 2500 Road is the closest route to a known owl site, this road is paved and receives frequent traffic throughout the year when snow doesn't block access.

REGION 6 SENSITIVE SPECIES

The following sensitive species information is derived from more detailed species fact sheets found at the interagency special status/sensitive species program (ISSSSP) website: https://www.fs.fed.us/r6/sfpnw/issssp/planning-documents/species-guides.shtml

Pacific Fisher

The geographic distribution of fishers in the Pacific Coast states has been greatly reduced in extent from pre-settlement conditions. Prior to extensive European settlement, the fisher occupied most coniferous forest habitats in Washington, Oregon, and California (Aubry and Lewis 2003). Reintroduction of fishers has occurred in northern California and the Olympic Penninsula. The Rouge River-Siskiyou National Forest has fisher populations in the Siskiyou Mountains and southern Oregon Cascades with ongoing surveys and monitoring.

The fisher is one of the most habitat-specialized mammals in western North America (Buskirk and Powell 1994). Specialization appears to be tied primarily to denning and resting habitats. Rest structures chosen by fishers are often the largest diameter trees available in a particular landscape with a markedly higher canopy closure (≥75%) immediately adjacent to the rest site and include live trees with mistletoe brooms or rodent nests, logs and cull piles, snags, and cavities in both conifers and hardwoods (Aubry and Raley 2006). Den structures in the southwest Oregon can be live trees or snags with openings that access hollows created by heartwood decay or large hollow logs. Both conifer and hardwoods can provide these structures. In an ongoing fisher monitoring study for the Ashland Forest

Resiliency Project, natal and maternal dens found since 2012 have been in pine and hardwood tree (e.g. madrone and black oak) cavities with relatively small entrance holes several feet from the ground.

As with resting sites, high canopy closure (80%) within an acre or less of den sites has been shown to be important. (Aubry and Raley 2006) Reduction of canopy closure to below 80% around large live trees and snags that are clumped and large logs where there is a multi-storied stand component likely has the potential to have the most detrimental effect on potential den and rest sites. Since fishers use the largest live and dead trees for den and resting habitats, loss of these structures can also reduce habitat quality for resident animals.

While fishers require structures provided by older aged or residual stands for denning and resting, they appear to use a broad array of stand conditions for foraging from stands with high volumes of coarse woody material, to pole-sapling forests, edge habitats and gaps in forest cover with fruit-bearing shrubs and forbs (Weir and Harestad 2003, Jones and Garton 1994). Mammals, birds, reptiles, insects and plants have been found in the diet of fishers (Zielinski et al. 1999, Aubry and Raley 2006). There is some indication of seasonal variation in the fisher's diet which is likely linked to seasonal abundance of prey and forage species.

Riparian corridors (Heinemeyer and Jones 1994) and forested saddles between major drainages (Buck 1983) may provide important dispersal habitat or landscape linkages for fishers. A study of 7 juvenile fisher dispersals in the southern Oregon Cascades found that males dispersed an average of 29 km, and mean dispersal distance of females was 6 km. Two of the four females studied did not disperse from their natal areas and appeared to establish home ranges adjacent to and slightly overlapping their mother's home range (Aubry and Raley 2006). The same has been found in the Ashland watershed study.

Current threats for this species include habitat loss to wildland fire, vegetation management that reduces key habitat features, and use of poisons (anticoagulant rodenticides) in illegal marijuana grows on public lands.

No surveys have been conducted for fishers in the Upper Briggs project area. Fisher sightings are documented in the Forest NRIS database within 5 miles north and south of the Upper Briggs Creek watershed. The abundance of mixed conifer-hardwood habitat in the watershed including black and white oak and the proximity of sightings suggest it is likely they could occur within the project area.

The Upper Briggs Creek watershed is used as the analysis area for Pacific fishers. Suitable habitat for fishers is present throughout the project area. Potential denning and resting habitat for this analysis was defined as predominantly conifer forest with ≥ 60% canopy closure and a diameter of ≥ 20" DBH. The 2014 modified GNN data estimate approximately 10,700 acres of denning/resting habitat in the watershed. Dispersal and foraging habitat is sapling/pole conifer forest (9-19.9" DBH) with ≥ 60% canopy closure. The GNN data estimate 890 acres of dispersal/foraging habitat mapped within the project area, though practically the entire project area may provide foraging opportunities given the general nature of their food habits.

Lewis's Woodpecker

Lewis' woodpeckers are migratory in southwestern Oregon, with sporadically large populations in the winter and scattered breeding pairs in the summer reported. Gilligan et al. (1994) reports that they are common breeders in summer in Josephine County but there are few recent breeding records (Janes et al. 2002). The population of Lewis' woodpeckers has fallen dramatically across Oregon as pine – oak woodlands are lost (Gilligan et al. 1994). A contributing factor in the decline has been the spread of the European Starling, which aggressively out-competes this species for available cavities. Habitat loss is

due to a wide variety of concerns that include urbanization of valley floors, fire suppression and encroachment of conifer forests, timber harvest of pine components in the oak forests, etc.

This species is closely tied to the ponderosa pine/oak savannah habitats of eastern and southwest Oregon. Nests are often in the large Ponderosa Pine snags or mature oaks while the birds forage on insects and acorn meat. In winter they store acorn meat in crevices in trees and power poles. Because this woodpecker does not usually excavate its own cavity, they have a close tie to older snags within the forest that are likely to contain cavities and have crevices for food storage.

Potential habitat does exist for this species in areas where pine/oak restoration is proposed, though there are no known records of this species occurring in the project area. The nearest documented sightings in the Forest database are west between the coast and the Kalmiopsis wilderness, citizen sightings are also known in the Biscuit Fire burned area along the Illinois River.

White-Headed Woodpecker

White-headed woodpeckers have been confirmed breeding along the California border into Josephine County. There are no documented sightings in the Forest database of this species in the Upper Briggs Creek watershed, however, there are 8 observations in the database in the Sucker Creek watershed 20 miles south of project area. These woodpeckers breed in pine and mixed conifer forests with canopy openings and large-cone pine trees that produce seeds which are an important food source. They frequently nest open canopied forest patches next to closed canopy forest (Latif et al. 2015). This species is not migratory and can be found on the forest year round (Janes et al. 2002).

Thinned stands with large remnant trees provide suitable habitat, as well as old growth forests. Nest predation by small mammals has been found to be a common cause of nest failure for white-headed woodpeckers and they have been found to have better nesting success in pine stands with lower shrub cover (Mellen-McLean et al. 2013). In the Upper Briggs Creek watershed any dry, open forest stands with large trees and snags may serve as suitable foraging and breeding habitat for the species.

Purple Martin

Purple martins are neotropical migrants, spending the non-breeding season in Brazil and migrating to North America to nest West of the Rockies and in the deserts they largely nest in abandoned woodpecker nest cavities located in the mid-story of the canopy. In the Pacific Northwest, purple martins are known to use gourds and clusters of single-unit boxes for nesting. (Gough et al 1998, PMCA 2006).

Purple martins are aerial feeders with a diverse diet that includes a wide range of flying insects such as dragonflies, damselflies, grasshoppers, moths, wasps, beetles, bees, flying ants, butterflies, and others. (Gough et al 1998, PMCA 2001, PMCA 2006, Sauer and Droege 1992). Purple martins utilizes a wide variety of terrestrial habitats including cropland, hedgerow, desert, grasslands, savanna, shrubland, chaparral, suburban, orchard, conifer woodland and hardwood woodlands. Generally, they inhabit open areas and prefer an open water source nearby (PMCA 2001).

Suitable habitat for this species may occur around the larger meadow areas such as Horse Creek and Sam Brown. There are no known sightings of this species in the project area. The nearest citizen sighting is along the Applegate River near Grants Pass, OR.

Threats to this species include competition with European starlings and house sparrows for nest sites, lack of tree cavities near open water for nesting habitat, and adverse (cool) weather that limits availability of flying insects.

Oregon Shoulderband

This terrestrial snail is endemic to northern California and southwest Oregon. In Oregon, the range includes Jackson, Josephine, and Douglas Counties, with verified locations in Roseburg and Medford BLM Districts and the Umpqua National Forest.

The Oregon shoulderband is associated with rocks and woody debris in rocky areas within forest habitats, often adjacent to areas with substantial grass or seasonal herbaceous vegetation. Seasonal deep refugia include talus deposits and outcrops, which contain stable interstitial spaces large enough for snails to enter. These seasonal refugia also provide protection from fire and predation during inactive periods. Within rocky habitat, the species is also associated with subsurface water, herbaceous vegetation and deciduous leaf litter, generally within 30 m. (98 ft.) of stable talus deposits or rocky inclusions. Vegetation types where the species has been located include dry conifer and mixed conifer/hardwood forest communities as well as oak communities. Forest canopy cover moderates the extremes in environmental conditions and may provide additional moisture to the site in the form of condensation drip. Woody debris and deciduous leaf litter is often used as daily refugia during foraging and dispersal in the moist seasons. No strong riparian association has been identified.

Several sites in Roseburg BLM have been located in rock quarries and riparian areas adjacent to them. Additional sites were found on roadsides where large material from those quarries was used for the construction of culvert crossings, riprap for slope stabilizing, and other road-related uses. It is not known whether populations at these roadside locations are natural or were colonized by individuals transported there with quarry material. Road cuts which require removal of rock outcrops and talus, on the other hand, may result in loss of some natural sites, or transport of individuals from those sites to new remote locations which may not be suitable.

The project area contains suitable rocky, talus areas in stream drainages with hardwood and herbaceous components that also provide potential habitat. There are no records of this species occurring in the Upper Briggs project area. Mollusk surveys were conducted for the project in 2009, 2011, 2016 and 2017. Oregon shoulderband were not found.

Travelling Sideband

The travelling sideband is an Oregon endemic terrestrial mollusk. With the exception of one site in Josephine County, *Monadenia fidelis celeuthia* is documented at low to moderate elevations from Jackson County, Oregon. It has been found from Medford east and northeast in the eastern Rogue River and Little Butte Creek drainages; this is a rough approximation of the physical areas in which *Monadenia fidelis celeuthia* is recognized to occur.

Monadenia fidelis celuthia is found at low elevation in unaltered, somewhat dry and open forested terrain (Frest and Johannes 2000). It can be found in basal talus and rock outcrops with oak and maple overstory component; also along spring runs in rocks and moist vegetation and moss within mixed conifer-hardwood forest (western red cedar and maple); also very moist, silty alluvial bench adjacent to creeks in mixed conifer-hardwood forest (western red cedar, Douglas-fir and big-leaf maple) (Duncan 2005). Habitat is present in the Upper Briggs project area especially in mature stands with madrone and live oak and exposed rocky soils with moss and down wood which is the habitat that this species was found in during mollusk surveys conducted for the project.

Threats include logging, grazing, road construction and mining which can result in direct mortality or reduction of suitable habitat.

Franklin's Bumble Bee

Franklin's bumble bee is a typical primitively eusocial bumble bee. Females are generalist foragers for pollen, especially from lupine (*Lupinus*) and California poppy (*Eschscholzia*), and for nectar, especially from horsemint (Agastache) and mountain penny-royal (*Monardella*). Its nesting biology is unknown, but it probably nests in abandoned rodent burrows as is typical for other members of the subgenus *Bombus sensu stricto* (Hobbs 1968). Its flight season is from mid-May to the end of September (Thorp et al. 1983).

Franklin's bumble bee has the most limited geographic distribution of any bumble bee in North America and possibly the World (Williams 1998). It is known only from southern Oregon and northern California between the Coast and Sierra-Cascade Ranges. Stephen (1957) recorded it from the Umpqua and Rogue River Valleys of Oregon. Thorp et al. (1983) also recorded it from northern California and suggested its restriction to the Klamath Mountain region of southern Oregon and northern California. Its entire distribution, including recent range extensions (Thorp 2005), can be covered by an oval of about 190 miles north to south and 70 miles east to west between 122^0 to 124^0 west longitude and 40^0 58' to 43^0 30' north latitude.

It is known from Douglas, Jackson, and Josephine counties in Oregon and Siskiyou and Trinity counties in California. Elevations of localities where it has been found range from 540 feet (162 m) in the north to above 7,800 feet (2340 m) in the south of its historic range. The best habitat on the Forest where this species was last observed is high elevation meadows with a diverse abundance of flowers throughout the summer.

Common bumble bee species have been observed in the project area. Potential habitat for these bees in the project area is primarily in open shrub patches and roadsides, meadows, and riparian areas where there are flowering plants and shrubs, though diversity and availability of nectar and pollen throughout the summer is limited.

Western Bumble Bee

The western bumble bee was widespread and common throughout the western United States and western Canada before 1998 (Xerces Society 2009). The former range of U.S. states included: northern California, Oregon, Washington, Alaska, Idaho, Montana, western Nebraska, western North Dakota, western South Dakota, Wyoming, Utah, Colorado, northern Arizona, and New Mexico. Unfortunately, since 1998 populations of this bumble bee have declined drastically throughout parts of its former range. Populations of the western bumble bee in central California, Oregon, Washington and southern British Columbia have mostly disappeared. It is difficult to accurately assess the magnitude of these declines since most of this bee's historic range has not been sampled systematically.

The following from Evans et al., 2008 describes survey efforts conducted in southern Oregon. "Robbin Thorp has extensively searched several sites in southern Oregon and northern California where *B. occidentalis* used to be common. He has only found one *B. occidentalis* individual since 2002 (Thorp 2008). In yearly surveys of southern Oregon and northern California sites in which a total of 15,573 bumble bees were observed from 1998 to 2007, 102 *B. occidentalis* were observed in 1998, nine in 1999, one in 2000, one in 2001, one in 2002, and none in 2003, 2004, 2005, 2006, or 2007 (Thorp 2008, Figure 9). In 2008, a single *B. occidentalis* specimen was captured on Mt. Ashland in Oregon in a survey that included over 2,000 bees that were caught in blue vane traps (R. Thorp, personal

communication, September 2008). An additional 2,000 bumble bees were examined foraging at flowers. No additional *B. occidentalis* were observed, indicating that although present, *B. occidentalis* is still extremely rare."

In 2016, two individual *B. occidentalis* were confirmed by Thorp in a 2-day survey effort of approximately 30 volunteers (including the Project biologist) who examined over 1,000 bees foraging at flowers on Mt Ashland. Bumble bee surveys on the Wild Rivers Ranger District were conducted in habitat used by more common bumble bee species in 2015 and 2016. No western or Franklin's bumble bees were observed.

The western bumble bee also uses pre-existing holes such as abandoned rodent holes for nesting. These bees likely use a wide variety of flowering and pollen producing plants as most native bees.

There are no known occurrences of this bee in the Upper Briggs project area though more common bumble bees have been observed (*B. bifarius, B. vosnesenskii*). Potential habitat exists primarily in open shrub patches and roadsides, meadows, and riparian areas where there are flowering plants and shrubs, though diversity and availability of nectar and pollen throughout the summer is limited.

Coronis Fritillary

This species inhabits mountain slopes, foothills, dry gulches, lower elevation canyons, prairie valleys, meadows, chaparral, sage steppe, and forest glades, margins, and openings (Opler *et al.* 2011, Evergreen Aurelians 1996). Most known records are from lower slopes at elevations less than 2000 ft. (610 m), although elevations of 4400 ft. (1341 m) and 5100 ft. (1554 m) have also been recorded, one near Onion Mountain. Recent surveys in Josephine County found this species to be generally associated with serpentine influenced, rocky hill-slopes dominated by Jeffery pine (*Pinus jeffreyi*) and other serpentine associated forbes and grasses presence of *Viola hallii* (Hall's violet) which is a primary larval food for this species (Reilly & Black 2011). Adults have been observed using flowers of mint, thistles and other composites.

Aside from the observation at Onion Mountain, most records of this species nearest the project are along the Illinois River.

Johnson's Hairstreak

This small brown butterfly occurs in isolated pockets in the western mountains of California up into British Columbia. This butterfly is closely associated with late-successional and old-growth confier forests where it spends most of its time in the overstory canopy. They do nectar on some lower growing plants, like Oregon grape and males will use damp earth sites, such as seeps and springs for moisture and minerals. Caterpillars have been found to feed on dwarf mistletoe species (*Arceuthobium* spp) that grow on western hemlock, white fir, ponderosa pine, Jeffrey pine and Brewer's spruce (Davis et al, 2011). Ponderosa and Jeffrey pine would be the most common of these conifers in the project area that may provide mistletoe for this species. Nectar plants include vine maple, manzanita, Oregon grape, pussy paws, whitethorn ceanothus and several other shrubs and herbaceous species that have whitish flowers with yellow and pinkish hues (Davis et al, 2011).

Wildfire has been shown to be an important factor limiting the distribution and abundance of dwarf mistletoe (Hawksworth and Wiens 1996 in Davis et al, 2011). The recent Oak Flat and Onion Mountain fires may have resulted in loss of mistletoe habitat within approximately 9 percent of the watershed. Timber harvest of mature forests may also be a threat to this species. Other threats include spraying BT for tussock moth and other pests.

On the Rogue River-Siskiyou, they have been observed in the southern portion of the Wild Rivers Ranger District with more occurrence of white fir, and north and west of the Kalmiopsis wilderness where there is more western hemlock. Additional observations are in the Cascades on the west side of the Forest. The nearest observation to the project Area is 6 miles west in Silver Creek.

Pallid Bat

Pallid bats are known to occur throughout SW Oregon and NW California. Suitable roost habitat types include buildings, bridges, rock outcrops, and large decadent snags with loose bark, particularly associated with xeric sties. They feed primarily on beetles, moths, and other insects and often feed from the ground. (from *Land Mammals of Oregon* (Verts and Carraway 1998). Threats include damage or destruction of roost sites and hibernacula. These bats are also sensitive to disturbance around roost sites. The nearest pallid pat sighting documented in the Forest NRIS data is approximately 8 miles north of the project area. Habitat for this species occurs throughout the Upper Briggs watershed where there are large decadent snags.

Fringed Myotis

Fringed myotis also occur throughout SW Oregon and NW California. It is most common in drier woodlands (oak, pinyon-juniper, ponderosa pine) but is found in a wide variety of habitats including mesic coniferous forest. They commonly roost in crevices in buildings, mines, rocks, cliffs and bridges and are also known to roost in large decadent trees and snags. Beetles and moths are their primary diet. Forest NRIS data documents Fringed myotis at the northern edge of Horse Creek Meadow. Habitat for this species occurs throughout the Upper Briggs watershed where there are large decadent snags.

Pacific Marten (Coastal Population)

Much of the information below is summarized from the U.S. Fish and Wildlife Service's finding on the marten within coastal Oregon and northern California (also known as the Humboldt marten) (April 7, 2015: 80 FR 18742-18772). That document contains a detailed description of the species, its habitats and potential threats to the species. It is available on the internet at: *http://www.regulations.gov* at Docket Number FWS–R8–ES–2011–0105.

The American marten was historically recognized as a single species occurring across a broad range of North America. In 2012, the Pacific marten was split from the American marten based on genetic and morphological differences (Dawson and Cook 2012). The Pacific marten occurs largely in montane and coastal coniferous forest west of the Rocky mountain crest. There are two subspecies of Pacific marten recognized in Oregon. One in the coast and cascades range, and the other in the Blue Mountains of northeast Oregon. The Upper Briggs project area is on the eastern edge of the historic range of the coastal Oregon population of the Pacific Marten.

Marten tend to select for mature and old conifer forest with high stand complexity including dense shrub layers and high amounts of large down wood. These habitat characteristics provide foraging and cover advantages in their ability to be concealed from prey and predators. (USFWS 2015). They are preyed upon by larger mammals such as fox, bobcat, coyote and fisher. Martens consume a variety of prey including chipmunks, small birds, reptiles and even berries. Resting structures include large-diameter live trees, snags and down logs. When these structures contain cavities, denning habitat is also available. (80 FR 18747) Within the coastal southern Oregon population area,44 percent of the federal and state lands are in moderate or high suitability marten habitat. (80 FR 18769)

Habitat modification due to vegetation management was not found to be primary stressors on coastal marten habitat on federal lands compared to private lands. Wildfire and climate change were considered to be medium level stressors on habitat in southern coastal Oregon. Of the stressors evaluated for impacts to marten populations, disease, predation, and collision with vehicles were low and trapping and exposure to toxicants were low to medium level stressors in southern coastal Oregon (USFWS 2015).

Currently there's no data on which to estimate the abundance or a population trend for the coastal population of marten; however, strategic surveys were begun in 2014 and continued in 2015 for a large, long-term study conducted by the Pacific Northwest Research Station and Oregon State University to determine the extent and range of the marten population in coastal Oregon. It includes DNA analysis from hair samples to expand knowledge of the coastal population's relationship with the northern California subspecies (*Martes caurina humboldtensis*). These surveys included the Gold Beach and Powers Ranger Districts west of the Upper Briggs project area. The Forest NRIS database has several records of marten observations north and west of the project area. The nearest are one observation 2 miles south of the project area and one 4 miles north of the project area.

SURVEY & MANAGE (NWFP) SPECIES

See Allison 2018 Appendix B for a full discussion of current policy for survey and manage species, including the history of litigation through 2014. Table 19 lists all NWFP species and range. Information is also available at http://www.blm.gov/or/plans/surveyandmanage/.

The Upper Briggs Restoration project is within the range of the northern spotted owl and Oregon red tree vole. It is consistent with the survey and management standards and guidelines in the January 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (USDA Forest Service and USDI Bureau of Land Management 2001) and is based on the district court's remedy order issued on February 18, 2014 (*Conservation Northwest v. Bonnie*, W.WA No. C08- 1067-JCC). This remedy order followed after the 9th Circuit Court of Appeals rejected the 2011 Consent Decree executed in resolution of the district court action *(Conservation Northwest, et al v. Harris Sherman, et al and D.R. Johnson Company,* 715 F.3d. 1181, C.A. 9 (Wash), April 25, 2013).

The Upper Briggs project utilizes the December 2003 species list. This list incorporates species changes and removals made as a result of the 2001, 2002, and 2003 Annual Species Reviews with the exception of the red tree vole, Arborimus longicaudus. For the red tree vole, the Ninth Circuit Court of Appeals in KSWC et al. v. Boody et al., 468 F3d 549 (9th Cir. 2006) vacated the category change and removal of the red tree vole in a portion of its range, and returned the red tree vole to its status as existed in the January 2001 Record of Decision and Standards and Guidelines, which makes the species category C (see Table 19) throughout its range.

Pechman Exemption – Several proposed treatment units are consistent with a category of projects exempt from survey and manage standards and guidelines as stipulated by Judge Pechman (October 11, 2006). That category is: *thinning projects in stands younger than 80 years old*. Therefore, pre-disturbance surveys and application of known site-management recommendations is not required for these units which are included in both action alternatives.

Units that do not meet the Pechman exemption and include suitable habitat for Survey and Manage species that may occur in the project area were surveyed to protocol. Details of the project surveys and/or site management for these species are described below.

Great Gray Owl

The Survey Protocol for the Great Gray Owl version 3.0 January 12, 2004 was used for the Upper Briggs project. This protocol includes detailed natural history and habitat descriptions and is available at https://www.blm.gov/or/plans/surveyandmanage/protocols/ Key information is summarized below.

The great gray owl occupies boreal, montane and subalpine forests of the western United States. Prey items are primarily small rodents including pocket gophers and voles for which they hunt from perches near large open grassy and woodland areas. They do not build nests and use old hawk and raven stick nests, depressions on broken top snags or stumps, and platforms formed by dwarf mistletoe. Nest sites tend to be located in mature or remnant old-growth forests near large meadow opening with sufficient prey.

The great gray owl is currently a category A species on the December 2003 survey and manage list. Category A species require pre-disturbance surveys management of known sites.

Horse Creek meadow in the project area was determined to be potential suitable habitat for great gray owls and surveys were conducted in 2014 and 2015. No detections were observed. In addition, potential nesting habitat around the meadow has been walked numerous times during the day with no sign or observations of these owls.

Oregon Red Tree Vole

The survey protocol for red tree voles includes detailed natural history and habitat descriptions. It's available at: http://www.blm.gov/or/plans/surveyandmanage/files/sp- RedTreeVole-v3-0-2012-11.pdf. Key information is summarized below.

The Oregon red tree vole is highly arboreal, nocturnal and feeds primarily on Douglas-fir needles. They are usually associated with old growth forests but also occur in younger stands. Nests consist of twigs and discarded resin ducts in the canopy of larger trees.

The red tree vole is currently a category C species on the December 2003 survey and manage list. Category C species are uncommon and pre-disturbance surveys are practical. Management of high-priority sites is required. All sites are assumed to be high-priority unless determined to be otherwise through concurrence with the interagency programs in place. For the Upper Briggs Restoration Project, a high priority site management plan will be completed per interagency direction for the Briggs Creek 5th field watershed prior to the project decision.

The Upper Briggs project area contains suitable habitat for red tree voles. Protocol surveys for red tree vole nests within the project area occurred in 2009, 2010 and 2014 within proposed treatment units that did not meet the Pechman exemption. In addition, nests discovered by the Northwest Ecosystem Survey Team within the project area in 2012 were considered during project development. Of all 110 nests found by climbing, 68 were active, five were unknown occupancy and the rest were inactive. Results from all surveys were used to identify high priority sites for long-term red tree vole habitat management. These high priority sites are excluded from project activities and are expected to ensure persistence of the species in conjunction with additional high priority sites and reserved lands within the Briggs Creek 5th field watershed. Red tree vole nests outside of high priority sites are considered low priority for long-term management. Mitigation measures would prevent felling and minimize damage to known nest trees outside of high priority sites during operations.

Chase Sideband

The survey protocol used for the Chase Sideband was the Survey Protocol for Survey and Manage Terrestrial Mollusk Species from the Northwest Forest Plan version 3.0 2003. This protocol includes detailed natural history and habitat descriptions and is available at https://www.blm.gov/or/plans/surveyandmanage/protocols/ and a species fact sheet available in the project record. Key information is summarized below.

The Chase sideband is currently a category B species on the December 2003 survey and manage list. Category B mollusk species require equivalent-effort surveys and protection of known sites.

This species is endemic to northern California and southwest Oregon. In California, this species has been reported mainly from the Klamath Basin in northern Siskiyou County, from the vicinity of Happy Camp east to the Shasta and Little Shasta River Drainages, in the Goosenest Ranger District of the Klamath National Forest, with a few locations reported as far south and west as Trinity County, on the eastern slopes of the Trinity Mountains in the Weaverville Ranger District of Shasta-Trinity National Forest. In Oregon, sites occur in southern and eastern Jackson and Douglas Counties, in the Klamath-Siskiyou Mountains and the west slopes of the Cascades, north to the Umpqua River basin. One site has been reported from the Klamath River Basin in southwestern Klamath County, Oregon. This species has not been documented in Josephine County.

Chace sidebands are associated with forested and open talus or rocky areas. Vegetation types include dry conifer and mixed conifer/hardwood forest communities as well as oak communities. Mollusks which inhabit rocky habitats also utilize the surrounding forest areas for foraging and dispersal during moist, cool conditions. Seasonal deep refugia include talus deposits and outcrops, which contain stable interstitial spaces large enough for snails to enter. These seasonal refugia also provide protection from fire and predation during inactive periods. Within rocky habitat, the species is also associated with subsurface water, herbaceous vegetation and deciduous leaf litter. In some forested sites, especially in the OR Cascades Province, the species has been found associated with down wood where few rock substrates occur. Areas with frequent fire return intervals where rock crevice refugia are available may have historically favored this species over other, larger forms of *Monadenia.*

Protocol surveys were conducted in units that do not meet the Pechman exemption and contain suitable habitat in fall 2016 and spring 2017. No *Monadenia chaceana* were found.

MANAGEMENT INDICATOR SPECIES (MIS)

A forest-wide baseline and updated species accounts of management indicator species for the Siskiyou National Forest was produced in 2012 (USDA Forest Service 2012) and is available on the project website. It includes a full description of each species plus MIS law, regulation and policy. Relevant information is summarized in this document.

Management indicator species represent other wildlife species which utilize a similar habitat type. As such, MIS act as a barometer for the health of various habitats and are monitored to quantify habitat changes predicted in the Siskiyou LRMP (1989 pages IV-10 and 11, FEIS page III-102).

The current MIS species for Siskiyou National Forest and why they were selected are shown below in Table 325. Bald eagles are not documented in the Forest NRIS database within the Upper Briggs Creek watershed, and one osprey observation is recorded near Horse Creek meadow. Most observations of these birds are in watersheds east and north of Upper Briggs that include the Rogue River. As mentioned previously, American (Pacific) marten are not documented in the watershed, but suitable

habitat is present. All the other MIS species in Table 32 are documented within the Upper Briggs Creek watershed.

Table 325. Management Indicator Species for the Siskiyou National Forest – Wildlife (USDA Forest Service 2012).

Species	Habitat Represented	Why Selected
Bald eagle	Habitat corridors along major rivers	Endangered/Threatened
Osprey	Habitat corridors along large creeks and rivers	Represents Specific Habitat
Spotted owl	Old-growth forest	Endangered/Threatened
Pileated woodpecker, American	Mature forest	Represents Specific Habitat
Woodpeckers	Snags (standing dead trees)	Represents Specific Habitat
Black-tailed deer, Roosevelt elk	Early successional forest stages	Species Commonly Hunted

The amount of habitat on the Siskiyou National Forest for the above species in 2011 is summarized below in Table 33. An increase in high quality forage and early-seral habitat has occurred since 2011 due to fires which have burned approximately 16,000 acres in 2015 (Collier Butte and Buckskin fires), 4,000 acres in 2014 (Onion Mountain fire); 2,000 acres in 2013 (Labrador fire). Open (less than 10% canopy cover) and early seral habitat makes up approximately 51% of the 500,000 acre 2002 Biscuit Fire. Plantations and natural regenerated trees are less than 15 years in age.

Table 336. Amount of Habitat in 2011 for Management Indicator Species for the Siskiyou National Forest.

Species	Habitat in 2011 (acres)	Habitat as a Percent of Siskiyou NF	Percent of Habitat Protected (reserve LUAs)
Bald eagle	39,536	4%	98%
Osprey	39,536	4%	98%
Spotted owl	368,428	34%	86%
American marten	368,428	34%	86%
Pileated woodpecker	368,428	34%	86%
Woodpeckers (unmanaged)	864,290	83%	N/A
Deer and elk (thermal)	368,428	34%	86%
Deer and elk (forage)	486,985	45%	N/A

Habitat trends between 1989 and 2011 for MIS species for the Siskiyou National Forest are shown in Table 347. To summarize, between 1989 and 2011 there has been a 12 percent increase in habitats less than 40 years of age, a four percent decrease in habitats from 41 to 100 years in age, and a seven percent decrease in habitats greater than 100 years in age. The 2011 analysis is based on satellite and Landsat imagery; data reflect changes due to harvest, succession, wildfire, and disease/insects. Most of the decrease in mature forest was due to the 2002 Biscuit Fire (~468,000 acres on SNF).

Table 347. Habitat Trends for Management Indicator Species on Siskiyou National Forest 1989 to 2011 (USDA-FS 2012).

Size & Canopy Closure	Successional Stage	Age (Years)	1989 Acres (%)	1994 Acres (%)	2011 Acres (%)
Less than 9" DBH or less than 40% canopy closure	Cliffs, rock, balds, talus		11,000 (1%)	11,000 (1%)	11,000 (1%)
	Serpentine (scattered trees)	0-200+	150,000 (14%)	150,000 (14%)	150,000 (14%)
	Grass/forb	0-3	255,000 (23%)	264,276 (24%)	380,320 (35%)
	Low shrub	4-10			
	Tall shrub	11-20			
	Pole/sapling	21-40			
	Hardwoods – small	< 40			
9" – 20" DBH & 40%+canopy closure	Hardwoods - >9" & 40% canopy cover	41-100	233,000 (21%)	229,165 (21%)	181,283 (17%)
	Young including hardwoods meeting DBH & canopy closure	41-100			
21" – 31" DBH & 40%+ canopy closure	Mature	101-200	443,000 (41%)	436,587 (40%)	368,427 (34%)
32" + DBH & 40%+canopy closure	Old growth	200+			
Totals			**1,092,000**	**1,091,028**	**1,091,030**

OTHER SPECIES OF CONCERN

Migratory & Focal Bird Species

Executive Order 13186 (2001) and a 2008 memorandum of understanding with the U.S. Fish and Wildlife Service (extension signed August 1, 2016) direct the Forest Service to avoid or minimize adverse impacts on high priority migratory birds and their habitats during agency actions (for full policy description see Allison 2018 Appendix B).

The U.S. Fish and Wildlife Service published a list of birds of conservation concern (BCC) in 2008 for the northern Pacific forest bird conservation region 5 (BCR5). The full list of BCC species for BCR 5 is in Allison 2018, Appendix E, Table 18.

Focal bird species, which represent important habitat components in a functioning coniferous forest ecosystem, are used in our analysis on migratory birds. The concept is described in detail in *Habitat Conservation for Landbirds in the Coniferous Forests of Western Oregon and Washington* (Altman and Alexander 2012). In addition, Partners in Flight published a revised *Landbird Conservation Plan* for Canada and the Continental United States in 2016. This plan identifies additional species for BCR 5 of high conservation concern and common species in steep decline for which proactive management of habitat and reduction of threats are expected to reverse population declines. The full list of these species that could occur in the Upper Briggs Creek watershed, and their habitat attributes, is in Allison 2018 Appendix E, Table 20.

Habitat – Habitat within the Upper Briggs project area is primarily diverse mixed confer-hardwood forest that varies by aspect and elevation. Perennial streams such as Briggs Creek, Meyers Creek, Sucker Creek and Horse Creek provide areas with deciduous vegetation and conifer edges. The only open grassy

areas are Horse Creek meadow, Sam Brown meadow and smaller remnants of meadows scattered along the valley floor. Open brush occurs naturally on certain harsh sites, and in burned areas. Plantations provide shrub and young conifer habitat. Snags and legacy trees throughout the project area provide nest sites and foraging for some species.

Bird species present – The species of concern and focal species from the three combined lists associated with habitat that occurs within the Upper Briggs project are listed in Table , including their habitat attributes.

Surveys – No systematic, general bird surveys have occurred in the analysis area in the recent past. Christmas bird counts and breeding bird surveys occur regionally within the State of Oregon and information is aggregated and reported on the Partners in Flight (PIF) website at http://www.partnersinflight.org/. PIF maintains a species assessment database which contains detailed information of species at risk, including population trends. Also available on the website is the 2014 *State of the Birds* report which reports birds vulnerable to extinction and their population trends. Furthermore, citizen observations of birds are documented on www.ebird.org established in 2002 by the Cornell Lab of Ornithology and National Audubon Society. This database is gaining use by scientists for studying distributions of bird species.

Table 48. Migratory Bird Species of Concern & Associated Habitat Attributes in the Upper Briggs Project Area.

Focal Species	Forest Condition	Habitat Attribute
Allen's hummingbird	Forest Edge/Riparian	Dense, moist vegetation
Band-tailed Pigeon	Unique	Mineral springs/seeps
Black-throated Gray Warbler	Young/Pole	Deciduous canopy trees
Blue (Sooty) Grouse	Unique	Landscape mosaic forest
Brown Creeper	Old-growth/Mature	Large trees
Chestnut-backed chickadee	Mature	Large patches of moist conifer forest
Evening grosbeak	Conifer Forest Edge	Forest edge/shrub openings
Fox Sparrow	Klamath Mts. Mixed Forest	Montane brushfields
Hammond's Flycatcher	Mature/Young	Open mid-story
Hermit Thrush	Klamath Mts. Mixed Forest	Shrub-herbaceous interspersion
Hermit/Townsend's Warbler	Mature/Young	Closed canopy
Lazuli Bunting	Klamath Mts. Mixed Forest	Post-fire
Lincoln's Sparrow	Unique	Montane wet meadows
Mountain quail	Young/Shrub	Open shrub dominated
Nashville Warbler	Klamath Mts. Mixed Forest	Dense shrub understory
Northern Flicker	Sapling/Seedling	Snags
Northern goshawk	Mature	Conifer-deciduous canopy
Olive-sided Flycatcher	Sapling/Seedling	Residual canopy tree
Orange-crowned Warbler	Sapling/Seedling	Deciduous vegetation
Pacific-slope Flycatcher	Old-Growth/Mature	Deciduous canopy trees
Pileated Woodpecker	Old-growth/Mature	Large snags
Pine siskin	Conifer Hardwood Forest	Mixed conifer and hardwoods
Purple Finch	Klamath Mts. Mixed Forest	Pine-oak canopy/subcanopy trees
Rufous Hummingbird	Unique	Nectar-producing plants

Focal Species	Forest Condition	Habitat Attribute
Varied Thrush	Old Growth-Mature	Mid-story tree layers
Vaux's Swift	Unique	Large hollow snags
Western Tanager	Klamath Mts. Mixed Forest	Forest canopy edges
Willow Flycatcher	Edge/Riparian	Dense riparian shrubs (willow)
Wilson's Warbler	Mature/Young	Deciduous understory
Winter Wren	Mature/Young	Forest floor complexity
Wrentit	Young/Shrub	Dense brush/young plantations

Pollinators

In June of 2014 a Presidential Memorandum was issued to create a Federal strategy to promote the health of honey bees and other pollinators. Federal agencies were tasked with enhancing pollinator habitat on their managed lands, consistent with their mission and public safety. Best management practices for enhancing pollinator habitats have been developed (Xerces Society for Invertebrate Conservation 2015) and would be implemented within the Upper Briggs project area, where practical.

Habitat – Habitat for pollinators is varied and somewhat limited within the Upper Briggs project area. The best pollinator habitat consists of open landscapes with good sun exposure and many types of native, herbaceous plants (Xerces Society for Invertebrate Conservation 2015). One key is having a variety of plants that produce pollen and nectar from spring through early fall. The Upper Briggs project area includes manzanita, ceanothus, pacific madrone and Oregon grape which all provide nectar and some pollen. Native forbs are available in smaller amounts, mostly along roadsides and riparian areas. The meadows tend to have more grasses than forbs. Depending on the pollinator species present, other important components are dead wood and open soil for nest sites and open water.

Pollinator species – Allison 2018, Appendix C lists all regionally sensitive species considered during our analysis, including several species of butterflies and bumble bees. None of the regionally sensitive pollinator species are documented within the Upper Briggs project area, but certain butterflies are suspected to occur. Common bumble bee species have been observed in project area, but neither of the two sensitive species.

Surveys – Horse creek meadow was surveyed for mardon skipper in July, 2017. Eleven species of butterflies and one common bumble bee species (B. vosnesenskii) were observed. No protocol surveys for any specific pollinators have occurred within the project area.

3.2.2.2 ENVIRONMENTAL CONSEQUENCES

Mechanism for Effects

Table 35 shows the difference in treatment acres for each objective proposed by each action alternative. Acres shown are the primary treatment objective for a given unit which may include other habitat objectives (such as sensitive plant enhancement), however the primary treatment objective is what drives the mechanism for effects to wildlife species.

Table 359. Acres by Primary Treatment Objective.

Primary Treatment Objective of Unit	Alternative 2 Acres	Alternative 2 % Watershed	Alternative 3 Acres	Alternative 3 % Watershed
DELSH	1053	4%	556	2%
Riparian Restoration	183	<1%	128	<1%
Roadside FMZ	713	3%	794	3%
Pine Oak	706	3%	479	2%
Rare Plants	42	<1%	42	<1%
Meadow Restoration	188	<1%	126	<1%
Ridgeline FMZ	1132	4%	503	2%
Total Acres	**4017**	**16%**	**2628**	**11%**

Note: this table displays the total number of acres for which each objective is the primary objective. However, many units are designed to meet multiple objectives. Refer to Table for the total number of acres to be treated for each objective.

Table 50 lists potential effects to wildlife and their habitat, both negative and positive, that could result from proposed treatment activities. The extent and intensity of these effects will be evaluated for each species identified previously as known or likely to occur in the project area.

Table 50. Mechanisms for Effects. Potential Effects to Wildlife & Their Habitat That Could Result From Proposed Treatment Activities.

Treatment Activity	Potential Positive (+) Effect	Potential Negative (-) Effect
Thinning & Yarding	+ Maintenance of shade-intolerant species and meadows + Acceleration in development of large trees and complex stand structure. + Increased tree growth for future large dead wood.	− Decrease in or removal of canopy closure and understory; modification of habitat − Incidental destruction of existing down wood or snags; or felling of existing snags and danger trees. − Direct mortality from equipment and tree felling. − Noise disturbance
Fuels Treatments & Burning	+ Long-term maintenance of open canopy, fire-adapted and shade-intolerant species + Increase in fire resiliency of trees in burned areas + Increased opportunities for wildland fire containment	− Smoke disturbance during breeding season. − Reduction of understory habitat elements (short and long-term). − Direct mortality from burning (e.g. mollusks, insect larvae).
Temporary Road & Landing Construction or Reconstruction		− Localized, short-term habitat removal/modification
Road Closure & Decommissioning	+ Reduction of human disturbance + Reduction of habitat fragmentation	
Hauling of Removed Material		− Noise Disturbance

Summary of Terrestrial Wildlife Effects

The ESA determination for the federally listed northern spotted owl (NSO) and designated critical habitat is *may affect, and likely to be adversely affected* (LAA) by project activities. NSO suitable nesting, roosting, foraging habitat would be treated and downgraded on ridgelines where relative habitat suitability is low for spotted owls. A small amount of dispersal habitat would be removed for meadow restoration. These activities would also occur within designated critical habitat for NSO.

Anticipated project effects for all other Region 6 sensitive species listed in Table 36 may impact individuals or habitat, but would not likely contribute to a trend towards federal listing or cause loss of viability to population or species (MIIH). Furthermore, continued viability is expected for Siskiyou National Forest management indicator species (MIS) with habitat affected by the project.

Table 361. Summary of Effects Analysis for Wildlife Species for the Upper Briggs Creek Restoration Project.

Common Name	Summary of Effects
Northern spotted owl (ESA threatened, MIS)	May affect, and likely to adversely affect (LAA) through downgrade of up to 550 acres of nesting, roosting, foraging habitat, 509 of which are within designated critical habitat (dispersal function will be maintained). Long-term benefits include increased development of high quality NRF habitat and increased fire resilience from strategic fuel treatments throughout the watershed.
R6 Sensitive	
Pacific fisher	Habitat present, disturbance and reduction of canopy cover and incidental loss of mistletoe brooms and down wood from thinning and burning treatments may have short-term impacts in 9 percent of existing habitat and long-term in 12 percent (ridgeline FMZ). Pine-oak restoration and other treatments that promote large hardwoods (cavity dens) and late successional habitat would benefit this species.
Pacific (coastal) marten (also MIS)	Habitat present, may be impacted by disturbance and reduction of understory cover and complexity particularly in FMZ units, treatments that increase understory complexity and development of late successional habitat would benefit this species.
Lewis′ woodpecker	Habitat present, may be impacted from disturbance and incidental loss of snags for danger tree mitigation, treatments that increase open pine and pine-oak habitat and development of future large snags would benefit this species (FMZ units and pine-oak restoration).
White-headed woodpecker	Habitat present, may be impacted from disturbance and incidental loss of snags for danger tree mitigation, treatments that increase large open pine habitat and development of future large snags would benefit this species (FMZ units and pine-oak restoration).
Purple martin	Habitat present, may be impacted by disturbance and incidental loss of snags for danger tree mitigation. Treatments that increase riparian habitat diversity, meadow restoration and forest edge habitat complexity and snag development would benefit this species.
Oregon shoulderband (snail)	Unlikely inhabitant of the project area. May be impacted by disturbance of suitable rocky riparian habitat with hardwood component particularly in the spring when snails are most active. Treatments that increase deciduous diversity in riparian habitat and promote future large down wood would benefit this species.
Travelling sideband (snail)	Presence is widespread in project area. Individuals and habitat (stands with deciduous trees, down wood and rocky soils) may be impacted by ground disturbing activities (felling, yarding, burning), particularly in spring when they are most active.

Common Name	Summary of Effects
Franklin's bumble bee, western bumble bee	Presence is unlikely. May be impacted by short-term reduction of nectar and pollen sources from understory thinning and burning. Disturbance or destruction of ground nests possible with ground disturbing activities. Would benefit from long-term increase in nectar and pollen expected in treatments that increase understory flowering hardwoods, shrubs and forbs and restore meadow and open pine-oak habitats.
Coronis fritillary	Transitory presence suspected. Habitat with *Viola halli* host plant would not be impacted by this project, however adults may be impacted by disturbance or short-term reduction of nectar plants from treatment activities. Activities that increase flowering shrubs and forbs would benefit this species.
Johnson's hairstreak	Habitat present, individuals (eggs, catepillars, pupae) and habitat may be impacted by thinning and burning activities where suitable dwarf mistletoe host is disturbed or removed. May benefit from treatments that develop and enhance late successional habitat and increase nectar sources.
Pallid bat, Fringed myotis	Habitat present, individuals and habitat may be impacted by disturbance and incidental loss of habitat (large snags) for danger tree mitigation.
MIS	
Pileated woodpecker	At the forest scale, the project may cause minimal loss of snag habitat to danger tree mitigation, and treatments that enhance and develop late successional habitat would promote a small (1%) increase in habitat at the forest level.
Other woodpeckers	Minimal loss of snag habitat (danger trees) at the forest scale, project would have less than 1% contribution to open pine and oak habitats at the forest scale.
Deer & elk	Minimal loss of hiding or thermal cover in FMZ units, and small increase (1%) in cover and foraging habitat from treatments that enhance or rejuvenate shrubs and forbs at the forest scale.

BACKGROUND FOR CUMULATIVE EFFECTS

Approximately 98 percent of Upper Briggs Creek watershed is National Forest, managed by the Wild Rivers Ranger District. Approximately 20 percent of the watershed is composed of managed stands with some level of past timber harvest. Activities occurring or reasonably certain to occur on National Forest lands within the Upper Briggs Creek watershed separate from the proposed project include plantation thinning, slash treatment, and underburning; fuel wood cutting; road maintenance; and invasive weed treatments. To avoid or minimize adverse effects on spotted owls, all activities employ mandatory protection measures similar to Upper Briggs (appendix A),. Furthermore, burn severity mapping for the 2010 Oak Flat fire and 2014 Onion Mountain fires estimates 2 percent of the watershed with high burn severity and 7 percent of the watershed with medium burn severity. The effects of these recent fires are included in the habitat data used for this analysis.

The small amount of private land in the watershed is generally managed for timber production, mining and residential use. Industrial lands are managed in accordance with the Oregon Forest Practices Act. The OFPA requires modification of activities in some cases for wildlife species identified as sensitive, threatened, or endangered (http://www.oregon.gov/ODF/Working/Pages/FPA.aspx).

Recreational use occurs year-round as long as snow doesn't impede access. Trails and roads receive motorized and non-motorized use. Developed and dispersed camping and game and mushroom hunting occur seasonally. Larger group events that utilize the campgrounds and trails occur annually. The Upper Briggs area is also popular for small type mining, panning, sluicing, and suction dredging, since this area is not closed to suction dredging per the state of Oregon.

EFFECTS TO FEDERALLY LISTED SPECIES – NORTHERN SPOTTED OWL

The northern spotted owl is the only federally listed species in the project area. The project biological assessment used for consultation with the US Fish and Wildlife Service provides a detailed evaluation of effects to this species for Alternative 2. This evaluation provides a comparison of effects to this species for each alternative. To summarize, adverse effects are expected as a result of alternatives 2 and 3 where small patches of existing NRF habitat would be downgraded on strategic ridgelines and on south-facing slopes where pine-oak restoration would occur. These are areas with low relative habitat suitability where owls are not likely to nest, however proposed activities may change the roosting and foraging opportunities in these areas. These effects are expected to be outweighed by the long term benefits of increased NRF habitat, maintaining prey habitat diversity and increased resilience of the landscape to fire. The extent of these effects differs between Alternative 2 and 3 due to the difference in total acres treated as detailed below. The "action area" analyzed for effects to NSO is a 1.3 mile buffer (provincial home range size, 3,400 ac) of the treatment units which includes evaluation of the entire home range for owl sites that occur within this buffer area. All known NSO sites are buffered 1.3 mi for the home range, 0.5 mile for the core area (500 ac) and 300 m for the nest patch (70 ac) to evaluate effects to individual sites.

Alternative 1—No Action

Taking no action would have no direct effects on northern spotted owls or habitat. The stands would persist on their current trajectory toward attaining old-growth characteristics, but it would likely take an additional 50 to 100 years than stands with thinning treatment. For this project, a forest vegetation simulation model (FVS) was used to run treatment vs. non-treatment scenarios based on stand data collected within proposed units. The modeled scenarios indicate that the average size of trees in proposed treatment units would be greater than no-treatment within 40 years (see Silviculture Report for more details and appendix F for a comparison of FVS model for no action and action alternatives).

Units identified for DELSH or riparian restoration treatments currently lack complexity elements such as canopy layering, species diversity and large down wood. With no action, slow development of complex, old-forest conditions would continue with tree suppression and death due to competition for limited resources (light and water). These dead trees would increase small diameter dead wood, however they do not have the mass of larger diameter wood that provide hollows (dens) and adequate cover for carnivores, small mammals and herpetofauna (Bull 2002). Large diameter down wood also provides moisture refugia for production of hypogeous fungi (eg. truffles), a food source for many small mammals, especially flying squirrels (Maser and Maser 1988, Waters et al, 2000). Recruitment of large snags would continue through insect and disease infestations. More existing large snags would remain intact for longer in the absence of harvest activities and fire treatments which would contribute to large down wood in the long-term.

Stands with legacy pine and oak (black oak, live oak, white oak) and certain endemic botanical species which require disturbance and sunlight would continue to be encroached with Douglas-fir. Without disturbance events, opportunities for establishing species or structural diversity through natural processes would remain low. Natural disturbance events (wind, fire, disease) would eventually create openings in stands, allowing shade-tolerant species to become established in the understory, increasing stand diversity. Wildland fire would likely occur under high severity conditions. Based on characteristics of recent wildland fires in the area, loss of habitat would be expected from fire severity and suppression activities, particularly on ridgelines. Habitat connectivity would be subject to patterns and conditions of natural disturbance events. The use of prescribed fire would be limited to treatments in plantations and meadow burning covered under other NEPA.

Large-scale disease or insect infestations are also possible in the watershed especially on sites with shallow soils and high tree density (such as ridgelines) where recent drought has weakened trees. This would reduce canopy cover in existing NRF and dispersal habitat and possibly reduce the amount of these habitats.

Alternative 2, Proposed Action

Direct & Indirect Effects

DELSH, Riparian Restoration, Roadside FMZ

Treatments to develop and enhance late successional habitat (DELSH) and riparian restoration using variable density thinning with gaps (openings) are designed to maintain functionality of existing NRF and dispersal habitat by retaining minimum canopy cover (or more), basal area, existing down wood, canopy layers and other structure elements where they exist and currently contribute to the function of these habitats. These units comprise approximately 8 percent of the watershed and were chosen for treatment because they lack many of these characteristics and would benefit from thinning to accelerate development of complex late successional forest structure and decadence. These treatments are proposed in 4 percent of the Upper Briggs Creek watershed and 3 percent of the NSO action area. Variable density thinning treatments would increase the growth of larger diameter trees and improve conditions for development of large branches and deep crowns by reducing competition for sunlight and water. Less dominant species such as pine and hardwoods would be favored and would also benefit from increased sunlight. Reduction of tree density would also provide light to stimulate growth of understory shrubs and tree seedlings, thereby accelerating the development of multiple layers and large trees by 30 to 50 years. This understory diversity provides microsite conditions (moisture, cover, food) important for prey species of the spotted owl and other species associated with forest floor complexity. Landings, temporary roads and skyline openings would be included with the 20 percent of openings allowed within any treatment unit per consultation with the USFWS of effects to the northern spotted owl. These would be located before implementation of additional gap treatments to ensure this limit is not exceeded.

The DELSH and riparian restoration treatments would accelerate the amount of contiguous old-growth forest available to owls and lessen edge effects (desiccation, predation risk, etc). Increased tree spacing and development of thicker bark would reduce risk of a stand-replacing fire. Roadside FMZ treatments would also maintain existing NRF and dispersal habitat functionality, improve growth and fire resilience of large trees, and increase late successional habitat connectivity over the long term.

Short-term negative impacts from thinning may affect arboreal prey species for NSO such as flying squirrels and red tree voles. While these species commonly nest in larger trees that will be retained, they are known to use smaller diameter fir for nests and travel across the canopy, a portion of which would be removed by proposed treatments. All known red tree vole nest trees from previous surveys would be retained, and high priority sites for red tree voles in the watershed are excluded from this project and will remain undisturbed (See Project RTV High Priority Site Management Strategy). Thinning may reduce canopy connectivity in portions of units where the objective is to enhance light for pine, hardwoods and understory stimulation, however long-term development of the understory will increase canopy layering for hiding cover and travel.

Collectively, DELSH, riparian restoration and roadside FMZ treatments are considered as “treat and maintain” (hereafter, T&M) effects to spotted owl NRF and dispersal habitat with long-term benefits. Table 372 displays the amount of T&M treatments in NSO core areas and home ranges under Alternative 2 which are expected to increase the amount of high quality NRF for five of the seven sites

in the long-term. Dispersal T&M acres with these treatments are expected to increase NRF habitat in the long-term. Three sites (55, Sam Brown and Secret Creek) would have a 5 to 10 percent long-term increase in NRF that would put their home ranges above the minimum threshold (40 percent). These sites would also have a 9 to16 percent increase in core area NRF that would put their core areas above threshold (50 percent). Two sites, (60 and 228) would have 6 to 10 percent long-term increases in NRF in their home range and core area that would put them at 35 to 37 percent NRF at each scale. Two other sites, (50 and 59) have little overlap with project treatments and neither would have a measurable increase in NRF within their home range or core area.

Pine-Oak / Rare Plant Restoration, Meadow Restoration & Strategic Ridgeline FMZ

Pine-oak and rare plant restoration treatments comprise less than 4 percent of the watershed and 2 percent of the NSO action area. Strategic Ridgeline FMZs comprise 4 percent of the watershed and 2 percent of the NSO action area. Reduction of canopy closure to 40 percent in these treatments would increase spacing and sunlight for the shade-intolerant species of pine and oak that occur in these areas. In addition, vegetation simulation modeling of proposed ridgeline FMZ units indicates that 40 percent canopy cover would effectively reduce the risk of crown fire under conditions that would be within prescription for underburning. This is important where ridges would be used as holding lines for large area underburns and also provide opportunities for fire containment with minimal site preparation during wildland fire suppression activities. These treatments would result in a downgrade of 550 acres of existing NRF which is approximately 6 percent of the NRF in the Upper Briggs Creek watershed. However, these locations have low relative habitat suitability (RHS) for nesting habitat where owls are less likely to nest due to exposure to wind, temperature and precipitation extremes and likely less prey during the breeding season compared to more moderate climate conditions on northerly slopes and in drainages where NRF stands have more structural complexity. Therefore, this low RHS NRF is considered to have more value as roosting, foraging and dispersal habitat than for nesting. Post-treatment, these downgraded acres would function as dispersal habitat. These treatments would retain all trees greater than 120 years in age and primary shade zones for riparian areas. This would result in a variable canopy cover with some areas greater than 40 percent. Table 372 summarizes the degree of change in NRF for the home ranges and core areas affected by these treatments as well as the expected long-term increase in NRF habitat from the treatments that will develop NRF habitat.

Areas of dispersal habitat with 40 percent canopy cover in these treatments would remain and continue to function as dispersal habitat post-treatment. In addition, approximately 65 acres of dispersal habitat would be removed for treatment of meadow encroachment. These dispersal acres are spread out along the edges of meadows so the treatment would result in a shift of the edge habitat with a localized reduction of canopy cover which is less than 0.1 percent of the available dispersal habitat in the watershed.

Reduced canopy cover can decrease some important owl prey species, such as northern flying squirrels and red tree voles, which appear to be especially susceptible to the loss of the mid-story canopy layer (Wilson and Forsman 2013). Recent research indicates thinning reduces flying squirrel and red tree vole abundance, however small forest-floor mammal species such as mice, voles and shrews have shown early and positive responses to thinning and burning which are also prey species of spotted owls in the mixed conifer and mixed evergreen forests of the Klamath Province (Wilson and Forsman 2013, Ward et al. 1998).

Conifer-hardwood edge habitats are considered an important component of foraging habitat in the Klamath Province and are a primary constituent element of the Klamath Province critical habitat (USDI Fish and Wildlife Service 2012, Sakai and Noon 1993, 1997; Ward et al. 1998). Proposed

treatments to restore pine-oak woodlands would maintain mast production (acorns) used by prey species (e.g. woodrats) associated with this edge habitat.

Direct mortality of prey species could inadvertently occur during thinning treatments. Known red tree vole nest trees from previous surveys would be retained. Canopy connectivity would also be retained around nest trees where it exists. Some known nest trees in these treatment units are isolated large legacy trees with a canopy well above adjacent trees. Measures to retain legacy trees, large hardwoods and protect existing snags and coarse woody debris would be effective in minimizing impacts to owls and owl prey species in these units and retain dispersal habitat function.

Gaps, Danger Trees, Noise, Pile Burning & Underburning, Road Decommissioning

Gap creation and construction or reconstruction of temporary roads and landings would minimally impact owls which are capable of navigating small openings, and there is evidence that small openings may benefit owl foraging habitat (Sakai and Noon 1993, 1997). One study has found that better nutrition appears to occur along low-use forest roads and openings (Hayward and others 2011). Openings greater than 100 meters exceed the glide ability of flying squirrels, but retained trees in larger openings generally allow their movement (Baker and others 2013). Since the diameters of ¾-acre openings would be less than 63 meters, flying squirrel movement would not be appreciably suppressed. Total gap acreage including landings, skylines, and temporary roads would not exceed 20 percent of the area of the unit.

Felling of danger trees that would occur in small scattered locations at landings and along haul routes is not expected to measurably affect owl habitat. Felled trees would remain on site where dead wood is deficient to benefit owl prey species. The number of danger trees felled would be limited to 10 per side of road per mile and 5 within owl nest patches (appendix A), but are expected to be lower based on relatively low snag levels along roads and a very small amount of proposed treatments or haul routes in nest patches. No owl nest trees would be felled.

Research has shown that noise above ambient levels can increase stress responses in nesting birds and may cause them to flush from a nest during incubation of eggs or nestlings which can cause mortality and reproductive failure. Project activities that generate noise above ambient levels such as cutting, heavy equipment operation, and hauling within specific distances of known owl sites or unsurveyed NRF habitat would be restricted during the critical breeding period to minimize disturbance to nesting owls. Details about application of this seasonal restriction are provided in appendix A. Furthermore, project burning would be restricted during the critical breeding season to minimize the potential for smoke to disturb nesting spotted owls depending on smoke dispersal. This restriction is applied within ¼ mile of unsurveyed NRF habitat or known nest sites when drift smoke would settle into the stand rather than lift and disperse above the forest canopy. Project burning would most likely occur in late fall through early spring depending on precipitation, smoke management regulations and access to the project area during winter.

Treatment of activity fuels and periodic maintenance burning could result in inadvertent destruction snags and down logs and reduce suitable habitat for northern flying squirrels and other owl prey species. Efforts would be made to retain large snags and large down wood or large accumulations of down wood especially in the DELSH and riparian restoration treatment areas. Conversely, burning can also create snags and down wood though usually these are smaller diameter trees in the understory. Studies have found that low to moderate intensity underburning has limited or no effect on availability of hypogeous fungi which are the primary food of flying squirrels, or on flying squirrel densities, particularly when burned under moist vs dry conditions. (Sollmann et al 2016, Trappe et al, 2009,

Smith et al. 2004). Objectives of underburning would differ by restoration treatment objective. For example, underburning in DELSH or riparian restoration units would be less aggressive, less frequent and result in higher proportions of unburned areas than in other treatment units where conditions are drier and more fire adapted (pine-oak) or where separation of the overstory canopy from ground and ladder fuels is desired (FMZ). Research has shown that severely burned forest areas negatively impact spotted owls and their prey due to loss of habitat, however areas burned with low and moderate intensity do not have the same adverse effects to NRF habitat and may enhance foraging opportunities for spotted owls (Rockweit et al. in press, Jones et al. 2016, Tempel et al. 2015).

Four core areas and six home ranges would benefit from proposed road decommissioning which would reduce human disturbance at a local scale. The core area for site 228 would benefit the most with 0.25 miles followed by site 55 (0.4 mi), Secret Creek (0.1 mi) and site 60 (400 ft). The Secret Creek home range would benefit the most with approximately 4 miles of decommissioning followed by site 55 (3 mi), site 60 (2.5 mi), site 228 (1.3 mi), site 50 (1 mi) and Sam Brown (0.3 mi).

Effects to Designated Critical Habitat

The biological assessment prepared for this project determined that implementation of Alternative 2 would likely to adversely affect critical habitat for the northern spotted owl due to downgrade of NRF in ridgeline FMZ and pine oak treatments and removal of dispersal habitat for meadow restoration. These amount to 0.5 percent and 0.1 percent reductions of these habitats respectively, within the KLW-2 (Klamath West) critical habitat subunit. Though these percentages are small at the scale of the critical habitat subunit, the effects within 500 acres around treatment areas is a measureable reduction (16 percent) and expected to change habitat functionality at this localized scale. However, proposed treatments that would develop and enhance late successional habitat, riparian restoration or roadside FMZ would result in an 8 percent increase in NRF within the same 500-acre areas.

Furthermore, long-term befits of maintaining meadows and pine-oak habitats in this diverse landscape and increasing fire resilience through prescribed fire and strategically located fuel management zones outweigh the risk of habitat loss to encroachment and lack of fuel treatments in the watershed.

Proposed road decommissioning would decrease the miles of system roads in KLW-2 by 3 percent and would provide localized reduction of human disturbance in NRF and dispersal habitat.

Table 37. NSO Habitat Pre-Treatment Condition & Alternative 2 Effects for Sites Analyzed in Upper Briggs Project Action Area.

Site	Pre-treatment NRF Habitat[1] (acres)/%			NRF Reduced[2] (acres)		Dispersal Reduced (acres)		T&M in Nest Patch (acres)		T&M in Core (acres)		T&M in Home Range (acres)		Post-Treatment NRF Habitat (acres)/%		Effects Rationale (Increases in NRF are estimated from acres of T&M dispersal with DELSH, Riparian Restoration and Roadside FMZ treatments)
	HR	Core	NP	HR	Core	HR	Core	NRF	Disp	NRF	Disp	NRF	Disp	HR	Core	
50	1246 (36)	197 (39)	16 (23)	7	0	0	0	0	0	0	0	228	427	1239 (36)	197 (39)	7 ac NRF downgrade at edge of HR in small patches within low RHS pine-oak restoration. No short-term change in % NRF; <1% long-term increase in HR NRF.
55	1094 (32)	207 (41)	37 (53)	27	0	65	7	4	6	42	151	189	690	1067 (31)	207 (41)	27 ac NRF reduction in HR for low RHS pine-oak restoration; short-term 1% NRF reduction in deficient HR; ~10% long-term increase. ● No short-term change in CA % NRF; ~12% long-term NRF increase. ● Dispersal reduced: HR- 65 ac meadow restoration; CA - 7 ac meadow restoration. ● Nest Patch TM is along an existing road to be used as a holding line for underburning a pine-oak restoration treatment. Only ladder fuel treatment by hand to safely underburn would occur here.
59	1356 (**40**)	200 (40)	38 (54)	2	0	0	0	0	0	0	0	0	0	1354 (**40**)	200 (40)	2 ac NRF downgrade in low RHS ridgeline at edge of Home Range. No change in % NRF.
60	948 (28)	185 (37)	60 (86)	39	0	6	0	0	0	24	49	103	350	909 (27)	185 (37)	39 ac NRF reduction in HR on low RHS ridgeline. 1% short-term NRF reduction in deficient HR; ~8% long-term NRF increase in HR and 10% increase in CA. ● 6 ac dispersal removed for meadow restoration at edge of HR.
228	1007 (30)	151 (30)	35 (49)	17	0	0	0	0	0	9	52	64	369	990 (29)	151 (30)	17 ac NRF reduced in HR for low RHS pine-oak restoration. 1% short-term NRF reduction in deficient HR; ~6% long-term NRF increase. ● No short-term change in CA % NRF; ~6% long-term increase.
Sam Brown	1356 (**40**)	251 (**50**)	38 (54)	72	0	51	6	0	0	43	50	158	367	1284 (38)	251 (**50**)	72 ac NRF reduction in HR on low RHS ridgeline and pine oak restoration. 2% NRF reduction would move HR below threshold in the short-term; ~5% long-term HR NRF increase. ● No short-term change in CA % NRF. ~9% long-term increase in CA NRF. ● Dispersal reduced for meadow restoration.
Secret Cr	1488 (**44**)	185 (37)	43 (61)	170	0	0	0	0	0	34	82	185	436	1313 (39)	185 (37)	170 ac NRF reduction would occur in low RHS ridgeline FMZ and for pine-oak restoration. These acres are spread out at the edges of the Home Range. 5% NRF reduction would move HR 1% below threshold in the short term; ~7% long-term increase in HR NRF. ● No short-term change in CA % NRF. ~16% long-term increase in CA NRF

HR = Home Range, Core (CA) = Core Area, NP = Nest Patch, T&M = Treat & Maintain.

Alternative 3, Reduced Treatment

Direct & Indirect Effects

DELSH, Riparian Restoration, Roadside FMZ

These treatments under Alternative 3 would occur in approximately 6 percent of the watershed, only treat managed stands less than 80 years in age, cut only trees less than 20 inches DBH and increase the no-treat riparian buffer to 120 feet. Fewer acres would be treated to accelerate development of a multi-layered canopy and increase stand structure complexity to reduce NRF fragmentation. Conversely, there would be less incidental loss of dead wood to thinning operations and fuel treatments. This alternative would require fewer landings and no temporary road construction which would decrease habitat modification. Disturbance effects from hauling would be decreased because there would be fewer loads required. Total acres of these treatments that would maintain existing habitat function include approximately 646 acres of dispersal, and 323 acres of NRF. Treatments in existing NRF would increase the rate of development of high quality NRF, and dispersal treatment would result in a 3% increase in NRF at an accelerated rate within the watershed. Table 383 displays the amount of these treatments (T&M) in NSO core areas and home ranges under Alternative 3 which are expected to increase the amount of high quality NRF for six of the seven sites in the long-term. A three to five percent increase in NRF is expected in five home ranges which would put them closer to the minimum amount of NRF needed for successful breeding. Four core areas would have one percent or less increase in NRF and Secret Creek would have a 12 percent increase in NRF which would put it within one percent (49%) of the minimum NRF threshold in the core area. Two sites would have no change in long-term NRF under Alternative 3.

Pine-Oak / Rare Plant Restoration, Meadow Restoration & Strategic Ridgeline FMZ

These treatments would occur in less than 5 percent of the watershed in stands under 80 years in age and cutting limited to conifers less than 20 inches DBH, and hardwoods less than 10 in diameter at root collar (with exceptions for smaller black oak). Approximately half the acres of ridgelines would be treated resulting in less continuous fuel management zones and 1 percent fewer acres of pine-oak restoration would occur compared to Alternative 2. Downgrade of NRF habitat would occur on 13 acres within these treatment areas, though the diameter limit may result in more acres with higher than 40 percent canopy which would continue to benefit owls and their prey in the short-term. Approximately 56 acres of dispersal would be removed for meadow restoration which is about 10 acres less than Alternative 2 due to the wider no-cut buffer along streams. Restoration goals for pine-oak and meadow habitat would be accomplished in 2 percent less of the watershed than Alternative 2 and prescribed burning would be limited to smaller, disjunct areas which would be less effective for increasing fire resiliency and wildland fire management options in the future, therefore providing less potential for long-term owl habitat persistence in the watershed.

Gaps, Danger Trees, Noise, Pile Burning & Underburning

Implementation of Alternative 3 would not require temporary road construction, and fewer acres of landing construction. Landings and gaps would be limited to 20 percent of treated acres and limitations on danger tree felling would be the same as Alternative 2. In addition, seasonal restrictions to minimize noise and smoke disturbance to owls would be implemented the same.

Maintenance underburning would occur on treated acres but would be less extensive, particularly with reduced ridgeline FMZ maintenance, providing less fire resilience and habitat diversity than under Alternative 2.

Effects to Designated Critical Habitat

Implementation of Alternative 3 would adversely affect critical habitat for the northern spotted owl due to downgrade of NRF in ridgleline FMZ and pine oak treatments and removal of dispersal habitat for meadow restoration. These amount to less than 0.1 percent reductions of these habitats respectively, within the KLW-2 (Klamath West) critical habitat subunit. Though these percentages are small at the scale of the critical habitat subunit, the effects within 500 acres of the treated areas is a measureable reduction in NRF (4 percent) and expected to change the functionality of the habitat at this localized scale, however it would be balanced by a 4 percent long-term increase in NRF expected from DELSH, riparian restoration and roadside FMZ treatments.

Futhermore, Alternative 3 would provide long-term befits of maintaining meadows and oak woodlands in this diverse landscape and provide reduced fuel loading along publicly-used roads outweigh the potential risk of habitat loss to encroachment and lack of fuel treatments in the watershed. Road decommissioning would have the same benefits described for Alternative 2.

Cumulative Effects to Federally Listed Species

The private lands which comprise 2 percent of the Upper Briggs Creek watershed are not considered to contribute long-term owl habitat in the watershed. Treatment of approximately 500 acres of plantations throughout the watershed (covered by separate NEPA and consultation) and adjacent to proposed units may occur concurrently with proposed Upper Briggs treatments (e.g. underburning). These plantations are either non-habitat for owls or dispersal that would continue to function as dispersal habitat post-treatment. The same restrictions to avoid disturbance to owls during the critical breeding season would be applied to these activities. It is desirable to treat these young stands to promote their development into suitable dispersal or NRF habitat for owls. Because these treatments are not all expected to occur at once throughout the watershed the additive impacts of proposed treatments to owls and designated critical habitat would be minor.

There would be no accumulation of disturbance effects to owls during the critical breeding season with other activities such as recreation and mining, because seasonal restrictions to eliminate project-related noise and smoke disturbance would be implemented under both action alternatives.

Table 383. NSO Habitat Pre-Treatment Condition & Alternative 3 Effects for Sites Analyzed in Upper Briggs Project Action Area.

Site	Pre-treatment NRF Habitat[1] (acres)/%			NRF Reduced[2] (acres)		Dispersal Reduced (acres)		T&M in Nest Patch (acres)		T&M in Core (acres)		T&M in Home Range (acres)		Post-Treatment NRF Habitat (acres)/%		Effects Rationale (Increases in NRF are estimated from acres of T&M dispersal with DELSH, Riparian Restoration and Roadside FMZ treatments)
	HR	Core	NP	HR	Core	HR	Core	NRF	Disp	NRF	Disp	NRF	Disp	HR	Core	
50	1246 (36)	197 (39)	16 (23)	0	0	0	0	0	0	0	0	12	17	1246 (36)	197 (39)	No change in % NRF.
55	1094 (32)	207 (41)	37 (53)	10	0	56	7	2.5	4	26	96	87	388	1084 (32)	207 (41)	10 ac NRF reduction in HR for low RHS pine-oak restoration; < 1% short-term NRF reduction in deficient HR; ~4% long-term increase. ● No short-term change in CA % NRF; <1% long-term NRF increase. ● Dispersal reduced: HR- 56 ac meadow restoration; CA - 7 ac meadow restoration. ● Nest Patch TM is along an existing road to be used as a holding line for underburning a pine-oak restoration treatment. Only ladder fuel treatment by hand to safely underburn would occur here.
59	1356 (**40**)	200 (40)	38 (54)	2	0	0	0	0	0	0	0	0	0	1354 (**40**)	200 (40)	2 ac NRF downgrade in low RHS ridgeline at edge of Home Range. No change in % NRF.
60	948 (28)	185 (37)	60 (86)	10	0	2	0	0	0	22	47	72	266	938 (28)	185 (37)	10 ac NRF reduction in HR on low RHS ridgeline. <1% short-term NRF reduction in deficient HR; ~5% long-term NRF increase in HR and ~1% increase in CA. ● 2 ac dispersal removed for meadow restoration at edge of HR.
228	1007 (30)	151 (30)	35 (49)	13	0	0	0	0	0	8	46	35	260	994 (29)	151 (30)	13 ac NRF reduced in HR for low RHS pine-oak restoration. 1% short-term NRF reduction in deficient HR; ~3% long-term NRF increase. ● No short-term change in CA % NRF; <1% long-term increase.
Sam Brown	1356 (**40**)	251 (**50**)	38 (54)	10	0	40	5	0	0	37	34	95	143	1346 (**40**)	251 (**50**)	10 ac NRF reduction in HR on low RHS ridgeline and pine oak restoration. <1% NRF reduction would maintain HR at threshold in the short-term; ~3% long-term HR NRF increase. ● No short-term change in CA % NRF. <1% long-term increase in CA NRF. ● Dispersal reduced for meadow restoration.
Secret Cr	1488 (**44**)	185 (37)	43 (61)	75	0	0	0	0	0	21	59	113	254	1413 (**41**)	185 (37)	75 ac NRF reduction would occur in low RHS ridgeline FMZ and for pine-oak restoration. These acres are spread out at the edges of the Home Range. 3% NRF reduction would maintain HR 1% above threshold in the short term; ~5% long-term increase in HR NRF. ● No short-term change in CA % NRF. ~12% long-term increase in CA NRF

HR = Home Range, Core (CA) = Core Area, NP = Nest Patch, T&M = Treat & Maintain.

EFFECTS TO OTHER WILDLIFE SPECIES

A comparison of effects for alternatives 2 and 3 to Region 6 sensitive species are summarized in Table 394. Percentages of area affected are derived from Table 35.

Table 394. Summary Comparison of Effects for Action Alternatives to Region 6 Sensitive Species.

Common Name	Alternative 2	Alternative 3
Pacific fisher	21% of Upper Briggs fisher habitat affected: DELSH/riparian treatment (9%) would have long-term enhancement, FMZ/pine oak (12%) would reduce canopy long-term, but would retain important hardwood habitat component in the watershed.	16% of fisher habitat affected: DELSH/riparian treatment (4%) would have long-term enhancement, FMZ/pine oak (12%) would reduce canopy long-term, but retain hardwood component.
Pacific marten (coastal)	Would benefit from 5% of Upper Briggs with long-term enhancement of stand complexity (DELSH). ● Long term FMZ maintenance would reduce understory complexity in 7% of watershed.	Would benefit from 2% of Upper Briggs with long-term enhancement of stand complexity (DELSH). ● Long term FMZ maintenance in 5% of watershed would reduce understory complexity.
Lewis' woodpecker **White-headed woodpecker**	Pine-oak and FMZ treatments would favor development of large pine and more open habitat in 7-10% of the watershed. ● DELSH treatments would increase late successional habitat structure for WHW (4%). ● Incidental loss of snags for danger tree mitigation.	Pine-oak and FMZ treatments would favor development of large pine and more open habitat in 4-7% of the watershed. ● DELSH treatments would increase late successional habitat structure for WHW (2%). ● Incidental loss of snags for danger tree mitigation would be less alt 2.
Purple martin	Would benefit from riparian and meadow restoration treatments that increase or maintain riparian and edge diversity in less than 2% of the watershed. ● Incidental loss of snags for danger tree mitigation.	Approx. 117 acres less riparian and meadow restoration than alt 2 in the watershed. ● Incidental loss of snags for danger tree mitigation would be less than alt 2.
Oregon shoulderband **Travelling sideband**	Oregon shoulderband unlikely, Travelling sideband common in watershed. ● Any treatments in moist, rocky habitat with mixed conifer-hardwood overstory could disturb or harm habitat or individuals, especially in warm, wet weather. ● Treatments to increase riparian habitat diversity and maintain hardwoods would benefit these species.	Same impacts as alt 2, however less extensive due to fewer acres treated. (11% vs 16% of watershed total)
Franklin's & Western bumble bees	Franklin's unlikely in watershed, Treatments that increase understory sunlight and flowering plant diversity would provide more nectar and pollen. Ground disturbing activities could harm individuals, nests or cause short-term loss of forage.	Similar impacts as Alt 2, however less extensive due to fewer acres treated (11% vs 16% of watershed total).
Coronis fritillary	Presence in watershed not well documented. Very small amount of potential larval habitat in watershed may be impacted by FMZ maintenance (underburning). Nectar sources (forage) may be enhanced by treatments that increase sunlight and understory diversity, short term loss of forage due to underburning.	Similar impacts as Alt 2 with less potential larval habitat in treatment units.

Common Name	Alternative 2	Alternative 3
Johnson's hairstreak	Treatments that increase development of DELSH (4% of watershed) and retain legacy pines would benefit this species and treatments that increase nectar sources. Short-term loss of nectar from underburning. Possible loss of eggs and larvae from disturbance or removal of suitable mistletoe host.	Similar impacts as alt 2 with less DELSH treatment (2%) and fewer acres of potential disturbance or loss of host mistletoe and nectar sources.
Pallid bat **Fringed myotis**	Incidental loss of snags or potential disturbance of individuals from project activities and danger tree mitigation. Retention and promotion of legacy trees in treatment units would promote future large snag habitat.	Similar impacts as alt 2, though less extensive (11% vs 16% of watershed).

Alternative 1, No Action

Taking no action would not directly affect terrestrial wildlife or their habitats. Tree growth and mid-canopy development would be suppressed until a natural event (wind throw, fire or disease) opened gaps in the canopy. There would be no increase in small openings from landing or temp road construction or gap creation. Self-thinning in managed and unmanaged stands would continue at current rates, including the accumulation of dead wood. Generally this dead wood would be smaller diameters (< 15-inch DBH) and would not persist over time to the same extent as larger wood or provide nesting cavities for wildlife that require larger snags or hollow logs, such as fishers, martens, bats, woodpeckers and secondary cavity nesters. Stands of shade-intolerant and fire adapted species such as black and white oak, ponderosa pine, sugar pine, Sophora, etc. would continue to compete with high tree densities and ingrowth of Douglas-fir. Riparian diversity would continue to diminish where conifer encroachment is shading out hardwoods and riparian shrubs. Prescribed fire would only occur in treated plantations and possibly Sam Brown and Horse Creek meadows. Ridgeline and roadside vegetation would not be treated for fuel accumulations and would receive standard fire-suppression treatments in the event of a wildland fire. Roads would not be decommissioned and would continue on their trajectory of closing naturally as vegetation grows.

Wildlife reliant on dense canopy and understory, such as marten and red tree voles, would continue to use these stands, along with birds associated with mature forest and dense vegetation (thrushes, several warblers and flycatchers).

Species which benefit from openings that provide grasses, forbs and flowering shrubs and riparian hardwoods (e.g. ungulates, birds associated with deciduous vegetation and nectar-producing plants, and pollinators), would continue to minimally use or avoid the area until natural processes create these habitats.

Alternative 2, Proposed Action

Effects of proposed road closure and decommissioning would benefit all species considered by reducing human disturbance and restoring natural habitat at those sites.

Pacific Fisher & Pacific (Coastal) Marten

Direct & Indirect Effects

DELSH, Riparian Restoration, Roadside FMZ

Fishers and martens are associated with late successional habitat with high canopy cover and decadence components (snags, large down wood). Martens are more associated with high densities of understory shrubs and large down wood which gives them a predatory advantage. Alternative 2 proposed treatments would occur in 9 percent of combined denning/resting and dispersal/foraging habitats for fishers and within 8 percent of the entire watershed. These treatments would maintain suitability of current fisher and marten habitat and increase development of denning/resting habitat in the long term. Proposed variable density thinning for accelerated development of a complex and resilient forest, with retention of legacy trees and large hardwoods in the DELSH and riparian restoration treatments would benefit fishers by increasing suitable denning/resting habitat and benefit martens by increasing understory complexity.

Roadside FMZ treatments would increase the rate of large tree growth by reducing ingrowth and stimulating understory shrubs and hardwoods. These treatments are designed to retain large hardwoods and increase sunlight in the stands to stimulate understory growth and diversity that would increase foraging opportunities for fishers and martens. Large snags and down wood would also be retained to the extent practicable however some incidental damage or destruction of these features may occur due to tree felling, yarding corridors, ground-based equipment and danger tree felling. The watershed is currently not deficit in down wood and is slightly below reference values for low snag densities per acre, but matches reference levels for high snag densities per acre. Vegetation simulation modeling of these treatments indicates that they would accelerate development of large trees that would become snags and down wood in the long term and pile burning and underburning may also create snags in some locations.

Pine-Oak / Rare Plant Restoration, Meadow Restoration & Strategic Ridgeline FMZ

These treatments would occur within 12 percent of combined denning/resting and dispersal/foraging habitats for fishers. Reduction of overstory canopy to 40 percent would make this habitat less suitable for fishers and martens though it may still serve as fisher foraging habitat. With retention of legacy trees, black oak and other large hardwoods, the pine-oak restoration units would likely provide long-term denning and foraging habitat that would benefit fishers. These treatments would also retain large snags and down wood to the extent practicable, however some loss is expected in strategic ridgeline FMZs where underburning may occur more frequently. Overall, these treatments would enhance habitat diversity and foraging opportunities for fishers, but may reduce habitat suitability for martens which prefer dense brush, within approximately 8 percent of the watershed.

Gaps, Danger Trees, Noise, Pile Burning & Underburning

Gaps and underburning would increase shrub and grass habitat in the project area which would benefit prey species and increase foraging opportunities especially at the forest edges of these openings. Danger tree felling would reduce snags which would be left for down wood where it is deficient. Pile and underburning may create snags in locations with heavy concentrations of fuels. Seasonal restrictions to avoid disturbance to spotted owls would also benefit fishers and martens during the breeding season, but they would likely avoid habitat directly involved with project activities during implementation.

Cumulative Effects

Proposed treatments that may occur concurrently with adjacent plantation treatments would be additive in that more acres would be avoided by fishers and martens during treatment activities. Additive long-term benefits include increased foraging opportunities and development of dispersal, denning and resting habitats for fishers and increased interior forest habitat for martens. Regeneration of brush and trees in the moderate and high severity portions of the Onion Mountain fir within the watershed would also provide a 2 percent increase in brushy habitat for martens in the long-term.

Implementation of Alternative 2 **May Impact Individuals and or Habitat, but not likely contribute towards a trend to federal listing or a loss of viability to the population or species** for **Pacific fisher** or **Pacific marten** (coastal population) due to potential disturbance to individuals and limited adverse effects to habitat from treatments. Adverse effects are limited to short-term effects where treatments will increase large tree development and understory complexity in 9 percent of suitable fisher habitat in the watershed, and long-term impacts where treatments result in canopy reduction below 60 percent in approximately 12 percent of fisher habitat the watershed, though they would create suitable fisher denning and foraging habitat in oak restoration units, they would not likely benefit martens.

Lewis' Woodpecker, White-Headed Woodpecker

Direct & Indirect Effects

DELSH, Riparian Restoration, Roadside FMZ

Treatments would benefit these woodpeckers by promoting development of large pine live trees and snags in the landscape over the long term. Roadside FMZs in particular include some areas comprising less than 3 percent of the watershed where open pine-oak habitat would be enhanced and maintained with treatment of Douglas-fir ingrowth and underburning.

Pine-Oak / Rare Plant Restoration, Meadow Restoration & Strategic Ridgeline FMZ

These Alternative 2 treatments to restore and maintain pine-oak habitat and open pine stands on ridgelines would increase nesting and foraging habitat in 7 percent of the watershed for these woodpeckers in the short and long term.

Gaps, Danger Trees, Noise, Pile Burning & Underburning

Gaps would provide some edge habitat, but probably wouldn't be large enough to provide a substantial increase in habitat for these woodpeckers. Felling of snags for danger tree mitigation may reduce snags in the short-term, but the overall proposal would increase the potential for higher numbers of large pine snags in the future. Disturbance restrictions for spotted owls would benefit these woodpeckers in the breeding season. Large snags would be retained to the extent possible during burning operations.

Cumulative Effects

The high and medium severity portions of the Oak Flat and Onion Mountain fires provide areas with high snag densities in approximately 9 percent of the watershed. Proposed treatments that may occur concurrently with adjacent plantation treatments would be additive in the scale (acres) of disturbance and habitat avoided during treatment activities. Additive long-term benefits include increased resilience of pine-oak habitat to fire and drought and large snag development.

Implementation of Alternative 2 **May Impact Individuals and or Habitat, but not likely contribute towards a trend to federal listing or a loss of viability to the population or species** for **Lewis's woodpecker or the white-headed woodpecker** due to potential disturbance to individuals during treatments and minimal adverse effects to habitat from loss of snags for danger tree mitigation.

Purple Martin

Direct & Indirect Effects

DELSH, Riparian Restoration, Roadside FMZ, Pine-Oak / Rare Plant Restoration, Meadow Restoration & Strategic Ridgeline FMZ

Proposed treatments for riparian restoration that would increase or maintain riparian habitat diversity or edge habitat complexity next to meadow openings and the restoration of meadow boundaries from conifer encroachment would most benefit purple martins. Riparian and meadow restoration activities are proposed in less than 2 percent of the watershed. Treatments that retain or promote development of large snags would potentially provide cavities large enough for colonies of martin. This includes all of the proposed treatments.

Gaps, Danger Trees, Noise, Pile Burning & Underburning

Gaps would provide some openings, but likely not in locations that would benefit martins. Noise and smoke and burning could cause short-term avoidance of suitable habitats. Seasonal restrictions to avoid disturbance to northern spotted owls would also benefit this species.

Cumulative Effects

Proposed treatments that may occur concurrently with adjacent plantation treatments would be additive in the scale (acres) of disturbance and habitat avoided during treatment activities.

Implementation of Alternative 2 **May Impact Individuals and or Habitat, but not likely contribute towards a trend to federal listing or a loss of viability to the population or species** for the **purple martin** due to potential disturbance to individuals during treatments and minimal adverse effects to habitat from loss of snags for danger tree mitigation.

Oregon Shoulderband, Travelling Sideband

Direct & Indirect Effects

DELSH, Riparian Restoration, Roadside FMZ

Potential impacts for these low-mobility species may include mortality from tree felling and equipment operation. Large down wood, large hardwoods and rocky areas would be retained and avoided to the extent possible, but some incidental loss or disturbance of these habitats may occur. No-treat protection buffers on riparian areas would protect some potential habitat and any individuals that may occur there. Treatments that increase hardwood growth and diversity and development of late successional habitat structure would benefit these species.

Pine-Oak / Rare Plant Restoration, Meadow Restoration & Strategic Ridgeline FMZ

Similar impacts would be expected as described in the previous paragraph and rocky areas, large hardwoods and large down wood would be avoided and retained to the extent possible. Riparian protection buffers and retention of legacy trees would be implemented in these units.

Gaps, Danger Trees, Noise, Pile Burning & Underburning

Gap creation could cause some areas to be drier and less suitable for these species, however the project is designed to retain moist microclimate locations within units. Incidental danger tree felling may provide down wood habitat where site conditions are suitable with cover and moisture. Direct mortality could occur from pile burning and underburning, however units with suitable habitat conditions for these species (DELSH, riparian restoration) would not be burned as aggressively or as frequently as pine-oak and FMZ units. Underburning to maintain FMZs and pine-oak habitat may result in more loss of down wood and possibly increased mortality of the travelling sideband since it is more prevalent in the project area particularly if burning is done in the spring. These animals have not been observed to be as active in the fall, therefore fall burning would be preferred where there is habitat for these species.

Cumulative Effects

Proposed treatments such as pile and underburning that may occur concurrently with adjacent plantation treatments would be minimally additive in the scale (acres) of potential habitat disturbance or loss of individuals because plantations usually do not provide suitable habitat for these species.

Implementation of Alternative 2 **May Impact Individuals and or Habitat, but not likely contribute towards a trend to federal listing or a loss of viability to the population or species** for the **Oregon Shoulderband or Travelling Sideband** due to potential loss of individuals during treatments and minimal adverse effects to habitat from loss down wood habitat. The travelling sideband is more likely to be affected because it is widely present in the project area, whereas the Oregon shoulderband is less likely to occur in project units.

Franklin's & Western Bumble Bees

Direct & Indirect Effects

DELSH, Riparian Restoration, Roadside FMZ, Pine-Oak / Rare Plant Restoration, Meadow Restoration & Strategic Ridgeline FMZ, Gaps, Danger Trees, Noise, Pile Burning & Underburning

There is a very low likelihood that these species are present in the project area based on the rarity of them in more suitable habitat where western bumble bees have been documented recently near Mt Ashland, however, proposed treatments that would create openings or maintain and restore meadows and riparian habitat diversity would most benefit these bumble bees. Restoration treatments that include planting and increasing the diversity of flowering plants throughout the year would increase pollen and nectar availability. Treatments that provide more sunlight to flowering hardwoods such as madrone and a variety of flowering shrubs can also provide more forage. However, ground disturbing activities such as equipment operation and high intensity burning during the spring, early summer or early fall could cause direct mortality of individuals or destroy bumble bee nests.

Cumulative Effects

Proposed treatments that may occur concurrently with adjacent plantation treatments would be additive in the scale (acres) of disturbance and potential loss of individuals or nest sites during treatment activities.

Implementation of Alternative 2 May Impact Individuals and or Habitat, but not likely contribute towards a trend to federal listing or a loss of viability to the population or species for the western

bumble bee or Franklin's bumble bee due to potential loss of individuals or nests during treatment activities, though they are rare throughout their range.

Coronis Fritillary

Direct & Indirect Effects

DELSH, Riparian Restoration, Roadside FMZ, Pine-Oak / Rare Plant Restoration, Meadow Restoration & Strategic Ridgeline FMZ

Roadside and Strategic Ridgeline FMZs may include some small amounts of suitable serpentine habitat for this species. Two observations of individual adults (1 unconfirmed) have been recorded in the project area, though a breeding population of this species has not been documented in the project area. There is a low possibility that direct mortality of eggs or larvae may result from burning activities in potential serpentine habitat. Disturbance or short-term reduction of nectar plants from ground disturbing activities may reduce available forage for adults. Adults of this species would likely avoid areas during activities. Treatments that favor pine and reduce shading in serpentine habitats would maintain or enhance habitat for *viola hallii* and nectar plants in the long-term.

Gaps, Danger Trees, Noise, Pile Burning & Underburning

Gap creation may disturb potential habitat next to roads, but areas where this habitat occurs within project units would likely be treated with non-commercial manual thinning and/or underburning. Danger tree felling and noise would not have measurable effects to this species. Pile burning and underburning may cause direct mortality of eggs or larvae which would occur in less than 1 percent of the watershed. Serpentine habitat occupies approximately 16 percent of the Upper Briggs watershed.

Cumulative Effects

Approximately 2 percent of the watershed burned with high severity and 7 percent with moderate severity in the Oak Flat and Onion Mountain fires which likely at least temporarily reduced suitable habitat for this species in some locations. Proposed underburning may have a small additive affect due to a very small amount of potential habitat within proposed units. These areas would likely have low burn intensity during underburning due to the lack of fuels in this habitat type. Plantations planned for treatment concurrently with proposed units do not contain suitable habitat for this species.

Implementation of Alternative 2 **May Impact Individuals and or Habitat, but not likely to cause a trend to federal listing or a loss of viability to the population or species** for the **Coronis fritillary butterfly** due to potential loss of individuals (primarily eggs, caterpillars or pupae) or habitat from burning activities which would occur in a very small percentage (< 1 percent) of the habitat available in the watershed.

Johnson's Hairstreak

Direct & Indirect Effects

DELSH, Riparian Restoration, Roadside FMZ

The presence of this species is strongly associated with the abundance of dwarf mistletoe which can occur in all age classes of forest, but is most abundant in mature stands and old-growth. Single-storied stands in stem exclusion phase usually have the poorest conditions for this mistletoe requires sunlight and multiple tree layers to provide optimal growing conditions. The stand age, structure and species composition of the units proposed for these treatments do not contain substantial dwarf mistletoe that would provide habitat for the caterpillars. Some of the older forest stands in the vicinity of these units that are not proposed for treatment may provide more suitable conditions for the mistletoe used by this

species. Trees greater than 120 years in age would be retained in these treatments and Douglas-fir is the primary species that would be cut for these treatments. Short-term effects would be limited to cutting of any younger pine that may be infected with mistletoe that may also cause direct mortality of eggs or caterpillars. This would occur in a small percentage of the pine available in the vicinity of the treatments that will not be disturbed.

These treatments intend to enhance and increase the development of late successional forest structure and composition including understory shrubs and forbs that would provide nectar plants for these butterflies.

Pine-Oak / Rare Plant Restoration, Meadow Restoration & Strategic Ridgeline FMZ

Legacy pines present in these treatment units may provide suitable conditions for dwarf mistletoe development. All trees greater than 120 years old would be retained. Cutting of younger pine may result in loss of some mistletoe and possibly eggs or caterpillars, but would be a small reduction of less optimal habitat than what would remain in the legacy overstory and adjacent stands not proposed for treatment.

Gaps, Danger Trees, Noise, Pile Burning & Underburning

Gap creation may include removal of young trees infected with mistletoe that may also host catepillars though it is not very prevalent in the units proposed for treatment. Gaps would stimulate growth of flowering plants that provide nectar for these butterflies. Danger tree felling and noise disturbance from activities would not measurably affect this species. Pile and underburning also would have minimal effects of possible short-term reductions in nectar producing shrubs immediately following burning. Maintenance burning of FMZs may result in a long-term reduction of nectar producing plants particularly on strategic ridgelines, however these treatments are intended to increase the potential for more optimal late successional habitat to remain in the watershed over the long-term.

Cumulative Effects

Plantations do not provide optimal habitat for dwarf mistletoe used by this species, but may be comprised of flowering shrubs that provide nectar. Proposed treatments (thinning and underburning) that may occur concurrently with adjacent plantation treatment would be additive in short-term reduction of nectar plants, however these would be localized reductions because not all of the burning treatments are expected to occur at the same time (less than 17% of the watershed) and abundant nectar habitat is available in brushy areas not proposed for treatment.

Implementation of Alternative 2 **May Impact Individuals and or Habitat, but not likely contribute towards a trend to federal listing or a loss of viability to the population or species** for the **Johnson's hairstreak butterfly** due to potential loss of individuals (primarily eggs, caterpillars or pupae) from cutting and burning activities. This loss is expected to be a small percentage of the population due to lack of optimal habitat in the treatment units compared to habitat available in areas that will not be treated.

Pallid Bat and Fringed myotis

Direct & Indirect Effects

DELSH, Riparian Restoration, Roadside FMZ, Pine-Oak / Rare Plant Restoration, Meadow Restoration & Strategic Ridgeline FMZ, Gaps, Danger Trees, Noise, Pile Burning &

Underburning

All treatments would retain large snags that may provide roost sites to the extent practicable, however incidental disturbance of individual bats during project activities and loss of snag roosts due to danger tree felling may occur during project activities.

Cumulative Effects

Danger tree felling for proposed project activities may be additive to danger tree felling that occurs for routine road maintenance or hazard tree felling in developed recreation sites. The analysis of snag densities in the watershed indicate that overall snag levels are near reference conditions and proposed activities intend to increase the development of large trees for future snags.

Implementation of Alternative 2 **May Impact Individuals and or Habitat, but not likely contribute towards a trend to federal listing or a loss of viability to the population or species** for the **pallid bat** or **fringed myotis** due to potential disturbance of individuals or loss of a small number of large snags from danger tree felling.

Alternative 3

Effects from Alternative 3 would generally be the same as Alternative 2, but less in amount and intensity of treatments (see Table 35 of this document, and Appendix F, Table 21 of the wildlife specialist's report). Fewer acres would be treated to achieve ecological objectives. Approximately 5 percent less of the watershed would be treated under Alternative 3 which means fewer acres of gap creation including landings and skyline corridors, less incidental loss of snags and down wood, and less pile and underburning activities. No temporary roads would be constructed and there would be fewer loads hauled under Alternative 3. Overall, duration and extent of noise disturbance and incidental direct mortality of wildlife would be less than Alternative 2.

Conversely, intended ecological benefits from proposed treatments would not be realized in as much of the watershed as Alternative 2 (11 percent compared to 16 percent). Only stands less than 80 years in age would be treated which would result in more isolated treatments that may not meet objectives. For example, roadside and ridgeline FMZs may not provide desired effectiveness due to higher tree density from retention of all trees greater than 80 years in age and the isolated arrangement of these treatments by not including entire ridgelines or continuous segments of roads. Furthermore, less riparian diversity including shrub and hardwood retention and development would occur with wider riparian no-treat buffers.

Proposed road closure and decommissioning would benefit all species by reducing human disturbance and restoring natural habitat at those sites.

The degree of potential effects to individuals and habitats compared to Alternative 2 are described below for each affected species.

Pacific Fisher & Pacific (Coastal) Marten

Direct & Indirect Effects

DELSH, Riparian Restoration, Roadside FMZ

These proposed treatments would occur in 4 percent of combined denning/resting and dispersal/foraging habitats mapped for fishers within the entire watershed compared to 9 percent of these habitats under Alternative 2. Fewer acres of these treatments would reduce opportunities to increase mature forest habitat for fisher and marten in a shorter time frame than no treatment.

Habitat enhancement such as stimulation of understory shrubs and multi-canopy layering, and development and retention of black oak in dense stands would occur in 6 percent compared to 8 percent of the entire watershed under Alternative 2.

Pine-Oak / Rare Plant Restoration, Meadow Restoration & Strategic Ridgeline FMZ

These treatments would occur within 12 percent of combined denning/resting and dispersal/foraging habitats for fishers which is the same amount of these habitats affected under Alternative 2. Less acres of ridgeline FMZ treatments would leave more stands with high levels of understory brush which is favorable to martens. Approximately 220 fewer acres of pine oak restoration would reduce opportunities to increase denning habitat for fisher.

Cumulative Effects

Effects of proposed treatments that may occur concurrently with adjacent plantation treatments would be additive in that more acres would be avoided by fishers and martens during treatment activities. Additive long-term benefits include increased foraging opportunities and development of dispersal, denning and resting habitats for fishers and increased interior forest habitat for martens.

Regeneration of brush and trees in the moderate and high severity portions of the Onion Mountain fir within the watershed would also provide a 2 percent increase in brushy habitat for martens in the long-term.

Implementation of Alternative 3 **May Impact Individuals and or Habitat, but not likely contribute towards a trend to federal listing or a loss of viability to the population or species** for **Pacific fisher** or **Pacific marten** (coastal population) due to potential disturbance to individuals and limited adverse effects to habitat from treatments. Adverse effects are limited to short-term effects where treatments will increase large tree development and understory complexity in 4 percent of suitable fisher habitat in the watershed, and long-term impacts where treatments result in canopy reduction below 60 percent in approximately 12 percent of fisher habitat the watershed, which would favor fisher denning and foraging habitat in oak restoration units, but not likely benefit martens.

Lewis' Woodpecker, White-Headed Woodpecker

Direct & Indirect Effects

DELSH, Riparian Restoration, Roadside FMZ

These treatments would benefit these woodpeckers by promoting development of large pine live trees and snags in approximately 6 percent of the landscape over the long term (compared to 8 percent under Alternative 2).

Pine-Oak / Rare Plant Restoration, Meadow Restoration & Strategic Ridgeline FMZ

These treatments to restore and maintain pine-oak habitat and open pine stands on ridgelines would increase nesting and foraging habitat for these woodpeckers in 5 percent of the watershed compared to 7 percent under Alternative 2.

Cumulative Effects

The high and medium severity portions of the Oak Flat and Onion Mountain fires provide areas with high snag densities in approximately 9 percent of the watershed. Proposed treatments that may occur concurrently with adjacent plantation treatments would be additive in the scale (acres) of disturbance

and habitat avoided during treatment activities. Additive long-term benefits include increased resilience of pine-oak habitat to fire and drought and large snag development.

Implementation of Alternative 3 **May Impact Individuals and or Habitat, but not likely contribute towards a trend to federal listing or a loss of viability to the population or species** for **Lewis's woodpecker or the white-headed woodpecker** due to potential disturbance to individuals during treatments and minimal adverse effects to habitat from loss of snags for danger tree mitigation.

Purple Martin

Direct & Indirect Effects

DELSH, Riparian Restoration, Roadside FMZ, Pine-Oak / Rare Plant Restoration, Meadow Restoration & Strategic Ridgeline FMZ

Alternative 3 proposes approximately 120 fewer treatment acres than Alternative 2 for riparian and meadow restoration that would benefit purple martins. These acres comprise less than 2 percent of the entire watershed.

Cumulative Effects

Proposed treatments that may occur concurrently with adjacent plantation treatments may be additive in the scale (acres) of disturbance and habitat avoided by martins during treatment activities.

Implementation of Alternative 2 **May Impact Individuals and or Habitat, but not likely contribute towards a trend to federal listing or a loss of viability to the population or species** for the **purple martin** due to potential disturbance to individuals during treatments and minimal adverse effects to habitat from loss of snags for danger tree mitigation.

Oregon Shoulderband, Travelling Sideband

Direct & Indirect Effects

DELSH, Riparian Restoration, Roadside FMZ

These activities may impact these species approximately 6 percent of the watershed compared to 8 percent under Alternative 2. Impacts include direct mortality or minimal disturbance of large down wood, hardwoods, and rocky habitats.

Pine-Oak / Rare Plant Restoration, Meadow Restoration & Strategic Ridgeline FMZ

Similar impacts would be expected as described in previous paragraph though more down wood may be lost due to more frequent maintenance burning in these areas. These activities may affect 5 percent of the watershed compared to 8 percent under Alternative 2.

Gaps, Danger Trees, Noise, Pile Burning & Underburning

Alternative 3 would have less gap creation than Alternative 2 reducing the potential for drier and less suitable habitat for these species. Direct mortality could occur from pile burning and underburning which would occur nearly half the acres of Alternative 2.

Implementation of Alternative 3 **May Impact Individuals and or Habitat, but not likely contribute towards a trend to federal listing or a loss of viability to the population or species** for the **Oregon Shoulderband or Travelling Sideband** due to potential loss of individuals during treatments and minimal adverse effects from disturbance or loss of suitable habitat. The travelling sideband is more

likely to be affected because it is widely present in the project area, whereas the Oregon shoulderband low likelihood of occurrence in the project units.

Franklin's & Western Bumble Bees

Direct & Indirect Effects

DELSH, Riparian Restoration, Roadside FMZ, Pine-Oak / Rare Plant Restoration, Meadow Restoration & Strategic Ridgeline FMZ, Gaps, Danger Trees, Noise, Pile Burning & Underburning

Alternative 3 would treat 5 percent less of the landscape and would and would result in less openings and riparian habitat diversity and less understory stimulation of flowering plants due to fewer acres treated than Alternative 2. However, fewer acres of ground disturbing activities such as equipment operation and burning during the spring, early summer or early fall would reduce potential direct mortality of bees or destruction bumble bee nests.

Cumulative Effects

Proposed treatments that may occur concurrently with adjacent plantation treatments would be additive in the scale (acres) of disturbance and potential loss of individuals or nest sites during treatment activities but would be less extensive than Alternative 2.

Implementation of Alternative 2 **May Impact Individuals and or Habitat, but not likely contribute towards a trend to federal listing or a loss of viability to the population or species** for the **western bumble bee or Franklin's bumble bee** due to potential loss of individuals or nests during treatment activities, though they are rare throughout their ranges.

Coronis Fritillary

Direct & Indirect Effects

DELSH, Riparian Restoration, Roadside FMZ, Pine-Oak / Rare Plant Restoration, Meadow Restoration & Strategic Ridgeline FMZ

Alternative 3 proposes less Strategic Ridgeline FMZ treatments which would reduce the amount of suitable serpentine habitat affected. There is a low possibility that direct mortality of eggs or larvae may result from burning activities in potential serpentine habitat remaining in this alternative. Disturbance or short-term reduction of nectar plants from ground disturbing activities may reduce available forage for adults. Adults of this species would likely avoid areas during activities. Treatments that favor pine and reduce shading in serpentine habitats would maintain or enhance habitat for viola hallii and nectar plants in the long-term.

Gaps, Danger Trees, Noise, Pile Burning & Underburning

Pile burning and underburning may cause direct mortality of eggs or larvae, though these activities would be less extensive than Alternative 2 and affect a very small portion of available serpentine habitat which occupies approximately 16 percent of the Upper Briggs watershed.

Cumulative Effects

Proposed underburning may have a small additive affect to previous fire in the watershed due to a very small amount of potential habitat within proposed units. These areas would likely have low burn

intensity during underburning due to the lack of fuels in this habitat type. Plantations planned for treatment concurrently with proposed units do not contain suitable habitat for this species.

Implementation of Alternative 3 **May Impact Individuals and or Habitat, but not likely to cause a trend to federal listing or a loss of viability to the population or species** for the **Coronis fritillary butterfly** due to potential loss of individuals (primarily eggs, caterpillars or pupae) or habitat from burning activities which would occur in a very small percentage (< 1 percent) of the habitat available in the watershed.

Johnson's Hairstreak

Direct & Indirect Effects

DELSH, Riparian Restoration, Roadside FMZ

Alternative 3 would treat stands less than 80 years in age across approximately 6 percent of the watershed which may have short-term effects limited to cutting of any younger pine that may be infected with mistletoe that may also cause direct mortality of eggs or caterpillars. This would occur in a small percentage of the pine available in the vicinity of the treatments that will not be disturbed. These treatments intend to enhance and increase the development of late successional forest structure and composition including understory shrubs and forbs that would provide nectar plants for these butterflies in a smaller portion of the watershed compared to Alternative 2.

Pine-Oak / Rare Plant Restoration, Meadow Restoration & Strategic Ridgeline FMZ

These treatments would occur in stands less than 80 years in age across 5 percent of the watershed compared to 8 percent under Alternative 2. Cutting of younger pine may result in loss of some mistletoe and possibly eggs or caterpillars, but would be a small reduction of less optimal habitat than what would remain in the adjacent stands not proposed for treatment. Treatments may increase understory flowering plants.

Gaps, Danger Trees, Noise, Pile Burning & Underburning

Gap creation may include removal of young trees infected with mistletoe that may also host catepillars and stimulate growth of flowering plants that provide nectar for these butterflies, but to a lesser degree than Alternative 2. Likewise, to a lesser degree than Alternative 2, pile and underburning may reduce nectar sources in the short-term and maintenance burning of FMZs may result in a more long-term reduction of nectar producing plants particularly on strategic ridgelines, however these treatments are intended to increase the potential for more optimal late successional habitat to remain in the watershed over the long-term.

Cumulative Effects

Plantations do not provide optimal habitat for dwarf mistletoe used by this species, but may be comprised of flowering shrubs that provide nectar. Proposed treatments (thinning and underburning) that may occur concurrently with adjacent plantation treatment would be additive in short-term reduction of nectar plants, however these would be localized reductions because not all of the burning treatments are expected to occur at the same time (less than 12% of the watershed) and abundant nectar habitat is available in brushy areas not proposed for treatment.

Implementation of Alternative 2 **May Impact Individuals and or Habitat, but not likely contribute towards a trend to federal listing or a loss of viability to the population or species** for the **Johnson's hairstreak butterfly** due to potential loss of individuals (primarily eggs, caterpillars or pupae) from cutting and burning activities. This loss is expected to be a small percentage of the

population due to lack of optimal habitat in treatment units compared to habitat available in areas that will not be treated.

Pallid Bat & Fringed Myotis

Direct & Indirect Effects

DELSH, Riparian Restoration, Roadside FMZ, Pine-Oak / Rare Plant Restoration, Meadow Restoration & Strategic Ridgeline FMZ, Gaps, Danger Trees, Noise, Pile Burning & Underburning

All treatments would retain large snags that may provide roost sites to the extent practicable, however incidental disturbance of individual bats and loss of snag roosts due to danger tree felling may occur during project activities. These activities would affect approximately 11 percent of the landscape compared to 16 percent under Alternative 3.

Cumulative Effects

Danger tree felling for proposed project activities may be additive to danger tree felling that occurs for routine road maintenance or hazard tree felling in developed recreation sites. Slightly fewer danger trees would be expected under this alternative due to fewer areas accessed, however haul routes would be similar for both alternatives.

Implementation of Alternative 2 **May Impact Individuals and or Habitat, but not likely contribute towards a trend to federal listing or a loss of viability to the population or species** for the **pallid bat** or fringed myotis due to potential disturbance of individuals or loss of a small number of large snags from danger tree felling.

Management Indicator Species–Comparison of Alternatives

The **no action** alternative would not change the existing availability of habitat for any management indicator species at the Forest level described earlier.

Table 405 displays the approximate amounts of MIS habitats affected by each action alternative. Though proposed treatments would affect habitat at the project level, neither alternative would considerably change available habitat for these species at the Forest scale. Proposed road closure and decommissioning would reduce human disturbance and restore habitat to some degree for the species that use habitat in those areas.

Table 405. Management Indicator Species Habitat Affected By Alternatives 2 & 3.

Size & Canopy Cover	Successional Stage	Age (Years)	Alt. 2 Affected Acres (%)	Alt. 3 Affected Acres (%)	Forest Total Habitat Acres (%) (2011)
	Road Surface		330	244	
Less than 9” DBH or less than 40% canopy cover	Cliffs, rock, balds, talus talusads		50 (<0.1%)	45(<0.1%)	11,000 (1%)
	Serpentine (scattered trees)	0-200+	28 (<0.1%)	20 (<0.1%)	150,000 (14%)
	Grass/forb	0-3	1,054 (0.3%)	739 (0.2%)	380,320 (35%)
	Low shrub	4-10			

	Tall shrub	11-20			
	Pole/sapling	21-40			
	Hardwoods – small	< 40			
9” – 20” DBH & 40%+ canopy cover	Hardwoods - >9” & 40% canopy cover	41-100	1,810 (1%)	1,022 (0.5%)	181,283 (17%)
	Young including hardwoods meeting DBH & canopy closure	41-100			
21” – 31” DBH & 40%+ canopy cover	Mature	101-200	700 (<0.1%)	343 (<0.1%)	368,427 (34%)
32” + DBH & 40%+canopy cover	Old growth	200+			

Implementation of Alternative 2 or 3 would not affect habitat associated with large creeks or rivers identified for management by the Siskiyou LRMP for **bald eagles** or **osprey**

Each action alternative is designed to increase and protect old-growth forest conditions in the watershed which would benefit old-growth dependent species such as the **northern spotted owl**. Alternative 2 would treat and maintain approximately 440 more acres in the DELSH, riparian restoration, and roadside FMZ treatments than Alternative 3. As discussed previously, treatments are not proposed in high value NRF habitat for northern spotted owls which includes old growth. However treatments are proposed in stands that are not currently high value NRF but have potential to support high value NRF based on abiotic features of the landscape. All treatments would retain legacy (old growth) trees. Habitat trends at the Forest level indicate a 6 percent decline in old growth habitat from 1989 to 2011 mostly due to wildland fire. Implementation of either alternative would not reduce the amount of mature and old growth habitat with 40% or canopy cover available at the Forest Level. Alternative 2 would result in more acres shifting from denser canopy cover to 40% canopy cover on ridgeline FMZs than Alternative 3, however each alternative would affect less than 0.1% of this habitat on the Siskiyou National Forest and would continue supporting viability of the spotted owl at the forest level.

The **pileated woodpecker** and **American marten** represent mature forest habitat per the Siskiyou NF LRMP which also has declined at the forest level largely due to fire. Both alternatives are designed to promote mature forest development and resilience in the watershed, with more acres treated under Alternative 2. Proposed treatments will retain legacy trees and maintain canopy cover above 40 percent where it exists. Treatments under both action alternatives are expected to increase availability of large snags and down wood over time, and support continued viability of pileated woodpeckers and American martens at the Forest level.

The **woodpeckers** include acorn, pileated, downy, hairy, and white-headed woodpeckers, as well as northern flickers and red-breasted sapsuckers. These species are generally associated with oak woodland, mixed forest, and/or grassland habitat types and represent snag habitat per the Siskiyou LRMP. Currently there is far more snag habitat available on the Forest for woodpeckers than was planned for in the original LRMP. It is very likely that the forest is providing habitat for far more woodpecker pairs than originally thought to be needed across the Forest to provide for long term viability for this species (USDA Forest Service 2012). As described earlier in this report, the watershed has slightly higher availability of large snags at high densities than reference conditions. Though some incidental loss of snags may occur for danger tree mitigation (more so under Alternative 2 due to more miles of road utilized), both action alternatives are designed to maintain and increase availability of large snags over time and provide opportunities to create snags where there are snag deficiencies (with

more opportunity under Alternative 2 due to more acres of treatment). For example, there are situations where it is desirable to remove Douglas-fir entwined in the canopy of an oak without damaging the oak, so girdling the fir removes the competition for the oak and creates a snag. In conclusion, continued viability of woodpeckers is expected at the Forest level with implementation of either action alternative.

Black-tailed deer and Roosevelt elk use all successional stages to meet their habitat needs for cover, forage and reproduction. Natural or created openings provide the majority of foraging habitat, which is assumed to be the most restrictive habitat component in this region (Forest Plan FEIS, III-106-107). Forage habitat is available within existing meadows, harvest units and burned areas less than 10 years old, and open canopy forested areas. Deer are frequently seen in the project area and elk or elk sign are occasionally seen. ODFW Roosevelt elk population survey data estimate a slight population increase in the Chetco unit since 2011.

ODFW has suggested a population objective of 32,600 deer for the Siskiyou National Forest. Forest Service and ODFW estimates of habitat capability vary however, both methods resulted in a proposed cover/forage ratio of 80:20 for the Siskiyou National Forest. Prior to implementation of the NWFP, regeneration harvests provided high-quality forage areas for big-game adjacent to both thermal and optimal thermal stands. Natural succession allowed for the forb and shrub layers to propagate at high-densities throughout the harvest unit for a period of 5-10 years or more until seedlings over-topped and shaded out the forage species. Currently, silvicultural prescriptions in young commercial stands typically reduce the canopy cover to near 40%, which maintains dispersal habitat for spotted owls. Reducing canopy cover to near 40% provides openings and allows sunlight to reach the forest floor which can stimulate growth of herbaceous and shrub layers. This can provide a short-term (5-10 year) increase in the forage base for both elk and deer until canopy of the remaining trees once again shade out the understory growth. The same prescription reduces thermal cover for big-game if the stand was at ≥70% canopy cover prior to harvest. It may also reduce hiding cover for a period of time until the shrub layer reaches 3-5 feet in height (USDA Forest Service 2012).

While fires have greatly contributed to an increased the amount of early seral habitat since the Siskiyou NF LRMP, most of that acreage in the 2002 Biscuit fire is closing in with brush and young trees. Most recent thinning activities in the Upper Briggs Creek watershed have occurred in young plantations. The Onion Mountain Fire and Oak Flat Fires have also provided some recent early seral habitat at the edges of the watershed. Both action alternatives include treatments that will result in short-term and long-term early seral or open canopy habitats compared to current conditions, primarily in areas proposed for meadow and pine-oak restoration and ridgeline FMZs. This would occur over roughly 1,000 more acres under Alternative 2 than Alternative 3 and would provide a small increase in foraging habitat for deer and elk. Future underburning would maintain the availability of forage in most of the treated units as well. Continued viability of black-tailed deer and Roosevelt elk is expected at the Forest level with implementation of either action alternative.

Other Species of Concern

Migratory Birds

Effects to migratory birds are considered by habitat attributes similar to MIS species but at a finer scale. Effects to these attributes based on treatment types and mechanisms of effects are described below. There would be no effects to migratory birds under the no action alternative. Current habitat distribution would remain and natural processes such as vegetation encroachment and wildland fire would alter habitat over time.

All treatments have potential to disturb active bird nests during the breeding season which could cause failed reproduction or mortality of young, though seasonal restrictions for spotted owls would also provide protection for other nesting birds. To the extent possible, any active bird nests encountered during project activities would be given a no-treat buffer adequate to avoid a stress response (e.g. flushing an adult from incubating eggs or nestlings, avoid feeding young, or defensive behavior) or mortality until young have fledged. Otherwise, adult birds and fledglings would likely avoid an area during activities until disturbances such as noise and smoke end. For all treatments, noise and smoke disturbance may cause short-term avoidance outside of habitat which may be cumulative with any concurrent treatment of adjacent plantations resulting in a larger area avoided. Proposed road closure and decommissioning would locally reduce impacts of human disturbance and benefit birds that use those areas.

Proposed treatments that reduce dense brush and understory vegetation may displace species that prefer this habitat. This may occur in up to 16 percent of the watershed under Alternative 2 and 11 percent under Alternative 3. These effects would be short-term in treatments such as DELSH and riparian restoration, but may be more frequent or long-term in treatments such as roadside and ridgeline FMZs, and pine-oak and rare plant restoration where occasional underburning may prevent development of dense understories. Nonetheless, a large proportion of the watershed (over 80 percent) would remain untreated and continue to provide this type of habitat.

DELSH

Species such as the pileated woodpecker, brown creeper, Pacific-slope flycatcher, varied thrush, northern goshawk, chestnut-backed chickadee, and pine-siskin would benefit from treatments that favor development of large trees and snags, large hardwoods and multiple-canopy layers that include conifer and hardwood components. Furthermore, species that used shrub understories and forest floor complexity such as winter wren, hermit thrush, varied thrush, Nashville warbler, and Wilson's warbler. Direct effects include disturbance of occupied from noise, smoke and removal of habitat components from vegetation removal. This treatment is proposed within 4 percent of the watershed under Alternative 2 and within 2 percent of the watershed under Alternative 3.

Riparian & Meadow Restoration

Riparian habitat diversity benefits a variety of wildlife and birds. Proposed riparian treatments would increase plant species diversity by reducing ingrowth of Douglas-fir and increasing sunlight for hardwoods, shrubs, and other riparian vegetation. Treatments would also enhance growth of remaining trees similar to DELSH treatments. Species such as evening grosbeak, Allen's hummingbird, willow flycatcher, and various warblers and thrushes would benefit from riparian treatments. Meadow restoration would benefit species that use open grassy habitats, forest edge, and areas of open dense shrubs such as mountain quail, fox sparrow, evening grosbeak, and willow flycatcher. These treatments would affect less than 2 percent of the watershed under both alternatives, and roughly 7 percent of riparian and meadow habitat in the watershed under Alternative 2 and 5 percent under Alternative 3.

Roadside FMZ

These treatments would occur in a diverse range of habitats along roads including mature and young forest, open and closed canopies and brushy areas. Effects would be mixed for a variety of bird species. Species preferring open understories or areas with young shrub and herbaceous vegetation, forest edge and mixed conifer-deciduous habitat would likely benefit the most due to the reduction of ladder fuels and Douglas-fir ingrowth. Species include western tanager, sooty grouse, Hammond's flycatcher, various warblers, hummingbirds and pine siskin. These treatments may reduce habitat for species that prefer more dense brush and understory vegetation in up to 3 percent of the watershed.

Pine-Oak - Rare Plants

Pure pine-oak habitat featuring black or white oak is not common in the watershed, often it is mixed with Douglas-fir and canyon live oak. Treatments proposed that would retain and restore pine-oak habitat and certain rare plants that require full sunlight would benefit species such as purple finch, hermit thrush, evening grosbeak, quail, grouse, and various warblers, hummingbirds and woodpeckers. These treatments would enhance production of mast (acorns), pollen and nectar and retain large pine and hardwoods that provide cavities for cavity nesting birds. These treatments would occur in less than 4 percent of the watershed under Alternative 2 and less than 3 percent under Alternative 3.

Ridgeline FMZ

These treatments are designed to enhance open canopy legacy pine and Douglas-fir stands while reducing ladder fuels and crown connectivity to lower fire intensity and allow opportunities to manage fire spread. Species that prefer open mature or young forest habitats would benefit from these treatments such as the white-headed woodpecker and flammulated owl (Lehmkuhl,et al. 2007). With retention of large legacy trees and interspersed riparian zones, these ridgeline FMZs would provide forest edge and a mosaic of cover and openings for species such as certain flycatchers, quail, western tanager and woodpeckers. These treatments are proposed within 4 percent of the watershed under Alternative 2 and 2 percent under Alternative 3.

Pollinators

There would be no effects to pollinators with the no action alternative. Existing habitat would remain undisturbed except for natural processes such as vegetation encroachment and wildland fire which would alter the availability and distribution of pollen and nectar sources.

All proposed treatments under both action alternatives could result in short-term loss of nectar and pollen due to ground and vegetation disturbance (e.g. brush cutting, burning) and long-term increases in nectar and pollen production with increased sunlight, reduced competition, and in some cases, rejuvenation from thinning and burning activities. Control and eradication of invasive plants and restoration of native plants would also benefit pollinators that require certain host plants and sources of pollen or nectar throughout the growing season. These activities would occur for each alternative, with Alternative 2 involving more acres than Alternative 3 (16 percent vs 11 percent of the watershed). Proposed road decommissioning under both alternatives would also provide opportunities to establish native plants that benefit pollinators on roadbeds.

3.2.3 Botanical & Associated Ecological Resources

This section summarizes the existing landscape condition and effect of the alternatives with regard to TES and/or survey and manage (SM) listed vascular plant, bryophyte and fungi species, invasive plants and ecosystem processes and habitats associated with downed wood and snags. The information provided in this EA is summarized from the botany report developed for the proposed project (Osbrack 2017) and is available here: http://www.fs.fed.us/nepa/nepa_project_exp.php?project=45593

3.2.3.1 EXISTING CONDITIONS

The following section briefly summarizes the habitats or plant communities that occur in the project area.

Within the project area there exist several types of habitats and plant communities. Plant communities differ within the project area depending on geology, aspect, slope, available moisture, percent canopy cover, and other ecological attributes.

The dominant plant community type is *Psuedotsuga menziesii* (Douglas-fir)-*Lithocarpus densifolius* (tanoak). Within the project footprint there exists an overstory of *Psuedotsuga menziesii* (Douglas-fir), *Quercus kelloggii* (black oak), *Pinus ponderosa* (ponderosa pine), *Arbustus menziesii* (pacific madrone), *Pinus lambertiana* (sugar pine), *Calocedrus decurrens* (incense cedar) and others. The shrub layer consists of *Lithocarpus densifolius* (tanoak), *Amelanchier* sp. (serviceberry), *Rhamnus purshiana* (cascara), *Corylus cornuta* (hazelnut), *Holodiscus discolor* (oceanspray), *Mahonia nervosa* (Oregon grape), *Salix* spp. (willow), *Ceanothus cuneatus* (buckbrush), and *Ceanothus cordulatus* (white thorn), *Ribes* spp. (current), *Arctostaphylos patula* (green leaf manzanita) *Rosa* spp. (rose), and others.

There is a diverse layer of forbs, graminoids, and non-vascular species distributed throughout the project area. There is mixed conifer and hardwood forest, shrub, riparian, meadow, roadside, other ecosystems within the project footprint. Forest areas vary in tree size and age, canopy closure, downed woody debris and decay class. The project footprint ranges from 2200- 4300 feet in elevation.

Within the footprint of the proposed project there is potential habitat for multiple RRSNF sensitive plant, lichen, and fungi species. Only *Cypripedium fasciculatum* (clustered lady's-slippers), *Iliamna lactibracteata* (California globe-mallow), *Pyrola dentata* (toothed wintergreen), and *Sophora leachiana* (western sophora) have occurrences within and adjacent to the units. See Table 416**.**

Table 416. Known Occurrences of RRSNF Sensitive Plant Species Within the Proposed Project Footprint

Species	Common Name	Unit Alt 2	Unit Alt 3
Cypripedium fasciculatum	clustered lady's-slippers	3, 21, 23A, , 63, 508, 509	3, 23A 63, 508, 509
Iliamna lactibracteata	California globe-mallow	3, 14	No Unit (70 feet from unit 3)
Sophora leachiana	western sophora	2, 3, 3S, 5, 9, 14,15, 16, 35, 48, 240, 262, 503, 504, 505, 506, 510, 652	2, 3, 3S, 5, 9,15, 35, 48, 240, 262, 503, 504, 505, 506, 510, 652
Pyrola dentata	toothed wintergreen	47	No unit (27 feet from unit 47)

See the botanical report for a summary of the habitat and distribution of the Threatened, Endangered, or Sensitive (TES) plant species with occupied habitat within the footprint of the proposed Briggs Valley Project. Definitions for species rankings can be found at: http://www.natureserve.org.

Botanical surveys conducted in proposed project areas focus on species with potential habitat; however, surveys are floristic in nature and attempts are made to identify all species encountered in the field. Many species have specific habitat preferences (such as wet meadows, fens, granite scree), and botanists search for these as well as their constituent species.

Intuitive controlled sensitve botanical surveys were conducted during June, July, August, September, October, November, and December of 2007, 2009, 2010, 2011, 2012, 2015, 2016, and 2017 for the Upper Briggs Restoration project area by WRRD Botanists. Intuitive controlled survey is the recommended survey method. This is when the surveyor has given the area a closer look by conducting a complete reconnaissance through a specific area of the project area and perimeter, or walking more than once through the area. As in this case, most of the project area is examined. Survey results can be found at the RRSNF Botany database files and RRSNF GIS corporate library.

There are occurrences of clustered lady's-slippers, California globe-mallow, toothed wintergreen, and western sophora within the project footprint. These occurrences were previously known from the project footprint or were found during project surveys.

3.2.3.2 ENVIRONMENTAL CONSEQUENCES

An effects analysis is required in cases where sensitive plants have been found within or near proposed project areas and/or when there is potential habitat for sensitive species and surveys *have not been conducted* in the intensity that is commensurate with the risk to species suspected in the project area.

ALTERNATIVE 1—NO ACTION

Direct Effects

Alternative 1 calls for "No Action" within the project footprint. There will be no implementation or activities within the project area therefore there will be no direct effects to sensitive species resulting from this alternative.

Indirect Effects

Sensitive species with potential habitat may experience indirect effects from Alternative 1.

Indirect Effects may occur as a result of "No Action" alternative within the proposed project area. There may be an increase in fuel loading across the landscape. This will be facilitated by a natural progression over time including increased growth of trees, additional dead trees, additional dead and downed fuels, and an increase of ladder fuels. There may be an increase of conifer encroachment into meadows and riparian ecosystems. The potential increase in tree and shrub density across the landscape may decrease available water for riparian plant species. Sensitive plants found within riparian and mesic meadow ecosystems may be impacted through habitat loss resulting from decreased soil moisture. The increased fuel loading and overstory growth will add to a shading of understory layers. This will alter the plant communities and structure. There may also be an increase in growth and density of the existing shrub layer across the landscape. All these combined factors can result in the loss of potential habitat for all listed sensitive species with suitable habitat within the project area by decreasing the amount of available suitable acreage especially species dependent on disturbance and open overstories. This may occur in forest, meadow, riparian, and shrub dominated areas.

Another indirect effect of the "No Action" alternative can be an increase in the risk to wildland fire and extreme fire behavior across the landscape. This is due to the excessive fuel loading that exists presently within the project area in addition to an estimated projected increase in fuel loading. If a wildland fire occurs then there may be adverse impacts to sensitive plant occurrences, suitable habitat, sensitive plant communities, and mycorrhizae dependent communities. This potential impact may result as a loss of suitable habitat, loss of occupied habitat, loss of individuals, and the introduction and spread of invasive plants and noxious weeds.

Sensitive plant occurrences and suitable habitat may be impacted by burning individuals or modifying suitable habitat into unsuitable habitat. Mycorrhizal mats existing in organic soils may be compromised impacting fungi and clustered lady's slippers habitat which are dependent on organic soils containing healthy mycorrhizae. However, California globe-mallow is dependent on fire to prompt its seed bank to germinate, fire may have a positive effect upon the species creating new habitat and allowing seed banks to colonize new areas. It is not known to what degree or level of fire intensity will be beneficial or detrimental to the species. The no action alternative may be beneficial to the species providing wildland fire intensity is not too extreme as to eliminate seed banks, individuals and render habitat as unsuitable. Sophora is also dependent on disturbance to colonize areas and the no action alternative may be beneficial to the species if there is a fire providing the fire intensity is not too extreme for the species.

The disturbance that wildland fire can create opens pathways and vectors for new noxious weed and invasive plant invasions and a spread of existing infestations. Noxious weed invasion can result in negative impacts to all ecosystems, although different habitats may be invaded by different noxious weed species. Noxious weed and invasive plant infestations can lead to changes in habitat characteristics that are detrimental to sensitive species. Once weeds have become established they can indirectly impact sensitive species through allelopathy (the production and release of chemical compounds that inhibit the growth of other plants), altering fire regimes, and competing for nutrients, light, and water. Because noxious weeds can be difficult to control or eradicate, weed control efforts that must be conducted on a regular basis, such as hand-pulling or digging, could also negatively impact sensitive plants and suitable habitat.

Evolving Conditions

Past, present, and future actions may have an effect on sensitive plant populations and habitat. Impacts from wildland fires or invading noxious weeds can be compounded when plants are already at risk from such activities as changing hydrologic regimes, impacts from miners, trampling by recreationists, or sedimentation buildup from eroding landscapes. See discussion for individual species under Action Alternatives.

ALTERNATIVE 2—PROPOSED ACTION & ALTERNATIVE 3

The following provides a discussion of the direct, indirect, and cumulative effects of the project on the sensitive species identified with known populations in the project area for the two action alternatives. The direct and indirect effects of project activities on the botanical resources are described first, followed by species-specific effects.

Direct Effects

Direct effects occur when sensitive plants or their potential habitat are physically impacted by activities associated with the proposed action. Direct impacts from the proposed project activities may include: physically breaking, crushing, or uprooting sensitive plants by felling of trees or trampling, covering them with slash, prescribed fire treatments, and compromising suitable sensitive plant habitat. Individuals may be displaced in other ways including changing the hydrology to sensitive plant communities.

Fuel Reduction & Thinning of Trees

No direct impacts are expected to occurrences of clustered lady's-slippers and California globe-mallow. Design features require that all populations will be buffered, flagged, and avoided. Project activities (except for underburning) will not occur within the buffered areas. Western sophora may receive direct impacts from thinning of trees. Individual plants may be killed, crushed, and disturbed from tree thinning operations.

Impacts to suitable sensitive plant habitat include: crushing, killing, or injuring herbaceous and non-vascular plants (which can reduce growth or seed production); felling and removing overstory trees; reducing the canopy cover and understory shading; reducing stand tree density; removing or killing understory shrubs reducing the shrub cover; removal of coarse woody debris; accumulation of slash and wood chips dispersed on the ground; the creation of wood piles; reduction of the ground litter layer; ground disturbance; soil disturbance; soil compaction; and the creation of disturbed areas.

Underburning

Direct effects are not expected to occur in occurrences of clustered lady's-slippers or toothed wintergreen from underburning. All occurrences will be buffered, flagged, and avoided. Direct effects are expected to occur in the one occurrence of California globe-mallow and western sophora occurrences. Underburning will be allowed in these sensitive plant species occurrences. Effects from underburning may include consuming, burning, or charring with fire above ground plants materials and burning below ground plant structure. These two species are disturbance loving. Although there may be an initial negative impact to the existing individuals there will be a long term beneficial effect to the populations. California globe-mallow needs fire to germinate seed that are in the seedbank. Without fire this occurrence is at risk to be unable to germinate seeds to produce new individuals and

may in time be extirpated. Fire will create habitat disturbance that is necessary to promote western sophora populations.

Construction of Landings & Temporary Roads

No direct impacts are expected to occurrences of clustered lady's-slippers, California globe-mallow, toothed wintergreen, and western sophora. Design features require that all populations will be avoided. Impacts to suitable sensitive plant habitat include: crushing, killing, or injuring herbaceous and non-vascular plants (which can reduce growth or seed production); felling and removing overstory trees; reducing the canopy cover and understory shading; reducing stand tree density; removing or killing understory shrubs reducing the shrub cover; removal of coarse woody debris; accumulation of slash and wood chips dispersed on the ground; the creation of wood piles; reduction of the ground litter layer; ground disturbance; soil disturbance; soil compaction; and the creation of disturbed areas.

Decommissioning of Roads

No direct impacts are expected to occurrences of clustered lady's-slippers, California globe-mallow, toothed wintergreen, and western sophora. Design features require that all populations will be avoided. Impacts to suitable sensitive plant habitat include: crushing, killing, or injuring native plants; soil and ground disturbance; and the creation of disturbed areas.

Indirect Effects

Indirect effects on sensitive species or their potential habitat are effects that are separated from an action in either time or space. Indirect effects resulting from project implementation may affect the quantity, quality, and distribution of habitats and may have positive or negative effects on sensitive plant, lichen, bryophyte, and fungi populations. These effects, which can be beneficial or detrimental to sensitive species, may include: changes in vegetation composition; changing local hydrologic patterns or soil characteristics in sensitive species habitats; noxious weed invasions; fire treatment response; and impacts to mycorrhizae associated with sensitive plant species.

Fuels Reduction & Thinning of Trees

Indirect effects within suitable sensitive plant habitat include altering plant communities, changing vegetation composition and successional pathways, impacts to soils and mycorrhizal soils of sensitive plants, and the potential for noxious weed invasion or spread. Suitable habitat may be directly altered initially however there may be long term beneficial indirect effects from the proposed project. The proposed project may enhance and increase available sensitive plant suitable habitat by changing the present condition to a more desirable condition. This may include an increase of available water to soils and riparian areas and the reduction of canopy cover of trees and shrubs. The proposed project will reduce undesirable conifer densities into select project area through thinning of trees followed up with prescribed fire. By decreasing the stand densities and opening up the canopy by reducing the percent cover sensitive plant communities will have the opportunity to increase individuals and the health of western sophora and California globe-mallow populations.

Years of fire suppression and the lack of fuel treatments within the proposed project area have increased the fuel loading across sections of the project area landscape to an undesirable level. The proposed project will reduce the risk of extreme wildland fire behavior through decreasing the fuel loading and reducing fuels within the project area.

Prescribed Fire & Underburning

Indirect effects within suitable sensitive plant habitat include altering plant communities, changing vegetation composition and successional pathways, negative impacts to soils and mycorrhizal soils of sensitive plants, and the potential for noxious weed invasion or spread.

Suitable habitat may be directly altered initially however there may be long term beneficial indirect effects from the proposed project. The proposed project may enhance and increase available sensitive plant suitable habitat by changing the present condition to a more desirable condition. Undesirable stand densities and canopy closure for western sophora and California globe-mallow will be reduced in through implementation, thinning and underburning. The proposed project, in addition, would reduce the risk of stand replacing wildland fire through decreasing the fuel loading within the project area.

Construction of Landings & Temporary Roads

Indirect effects within suitable sensitive plant habitat include altering plant communities, changing vegetation composition and successional pathways, impacts to soils and mycorrhizal soils of sensitive plants, and the potential for noxious weed invasion or spread. Suitable habitat may be directly altered initially however there may be long term beneficial indirect effects from the proposed project.

Decommissioning of Roads

Indirect effects within suitable sensitive plant habitat include altering plant communities, changing vegetation composition and successional pathways, impacts to soils and mycorrhizal soils of sensitive plants, and the potential for noxious weed invasion or spread. Suitable habitat may be directly altered initially however there may be long term beneficial indirect effects from the proposed project. By eliminating road prisms within the project area additional habitat could be available for native plant communities.

Indirect Effects to Wetlands, Meadows, Springs, & Riparian Areas

Indirect effects within suitable sensitive plant habitat include altering hydrology, flow patterns, and water regimes which affect sensitive plants, potential habitat, and sensitive plant communities. Reducing the overstory through fuel reduction and thinning also creates openings with less shading which can promote more evaporation of wetlands reducing water levels early in the growing season. Beneficial indirect effects to wetlands, meadows, springs, and riparian areas can result from fuel reduction and thinning which may enhance and increase suitable sensitive plant habitat and desirable riparian plant communities. Removing trees reduces the evapotranspiration rates around wetlands, wet meadows, springs, and riparian areas which can increase available ground and runoff water to the ecosystems.

Indirect Effects to Mycorrhizal Soils Associated With Sensitive Plant Species Within Suitable Sensitive Plant Habitat

Factors that regulate the health and productivity of forests include organic soils. Fuels reduction and tree thinning, prescribed burning, and wildfires can produce negative impacts which reduce the amount of soil surface organic matter. This potentially could reduce the mycorrhizae development altering both the growth of trees, plants, and fungi depending on this organic soil component. Several factors such as conifer thinning, fuels reduction, fire severity and burn timing will influence the type and degree of negative impacts to mycorrhizal soils. Mycorrhizae connect soils systems and plants that affect plant nutrition, nutrient cycling, and soil structure. Studies have correlated the removal of organic soil horizons and high levels of soil disturbance to tree growth and mycorrhizae reduction. The

impacts on soil health and productivity from the removal of large coarse woody debris through fuels reduction and thinning are unknown (Jurgensen, Harvey, et al 1997). Fire effects on ecosystems can range from the elimination or reduction of above ground plant parts to impacts to below ground plant structures and processes. Fire can produce either beneficial or negative effects to the ecosystem depending on the fire severity. Burning slash and fuel piles of harvested wood can regenerate fewer understory plant species than in unburned areas. Burning can also promote the growth of noxious weeds by creating disturbed areas and releasing unexpressed noxious weed seed banks.

Clustered lady's-slippers are dependent on soil mycorrhizae for establishment and growth. Reduction in mycorrhizae associated soils from high burn severity can cause negative indirect effects and the loss of potential habitat. The mycoheterotrophic toothed wintergreen is believed to receive nutrients from mycorrhiza in the soil as well as photosynthesis. Impacting the mycorrhiza may cause harm to individual's vigor and viability.

Invasive Plants

Indirect effects include impacts on sensitive plant species and their habitats by potential noxious weed invasions and changes in vegetation structure as a result of project implementation. There are noxious weeds known from within the project area, there is a potential for spread of existing infestations by releasing existing seed banks and also the introduction of new noxious weed seeds within the project area from project implementation.

Noxious weed invasion can result in negative impacts to all ecosystems, although different habitats may be invaded by different noxious weed species. Noxious weed infestations can lead to changes in habitat characteristics that are detrimental to sensitive plant species. Once weeds have become established they can indirectly impact sensitive species through allelopathy (the production and release of chemical compounds that inhibit the growth of other plants), altering fire regimes, and competing for nutrients, light, and water. Noxious weeds can cause indirect effects by reducing sensitive and native plant habitat and altering existing sensitive and native plant communities. Because noxious weeds can be difficult to control or eradicate, weed control efforts that must be conducted on a regular basis, such as hand-pulling or digging, could also negatively impact sensitive plants. If standard management requirements such as: inventory; avoiding noxious weed areas; using clean weed free equipment and vehicles; using weed free material; and avoiding spread are utilized; the threat from noxious weed establishment and infestation will be greatly minimized (see Upper Briggs Restoration Project Invasive Plant Risk Assessment).

Species-Specific Effects

Sensitive species that were not located during project surveys would have no negative direct, indirect, or cumulative effects. This includes reduction of fuels, thinning of trees, temporary road or landing construction, or prescribed fire and underburning.

The Following Species Will Not Be Analyzed Further.

Vascular Plants: Adiantum jordanii (California Maiden-hair), Allium peninsulare (peninsular onion), Cheilanthes covillei (Coville's lip-fern), Cryptantha simulans (pine woods cryptantha), Ericameria arborescens (golden fleece), Keckelia lemmonii (bush beardtongue), Lotus stipularis (stipuled trefoil), Pellea andromedifolia (coffee fern), Pellea mucronata ssp. californica (birds-foot fern), Rhamnus ilicifolia (redberry), Solanum parishii (Parish's horse-nettle)

Bryophytes: Entosthodon fascicularis, Porella bolanderi

Fungi: Chamonixia caespitosa, Phaeocollybia californica, Pseudorhizina californica, Rhizopogon ellipsosporus, Rhizopogon exiguous

The Following Species Have Occurrences Within the Project Footprint

Cypripedium fasciculatum (clustered lady's slipper)

Direct Effects

There will be no direct effects to clustered lady's slipper from the proposed project. Design features have been created to eliminate any direct effects to clustered lady's slipper from project implementation (see botany report, Section IX. Design Features, clustered lady's slipper). This includes fuels reduction, thinning of trees, prescribed fire, underburning, creation of temporary roads, the creation of landings, or the decommissioning of roads. There are seven populations of clustered lady's slipper found in units 3, 21, 23A, 63, 508, and 509 that were previously known from the project footprint or located during project surveys.

Indirect Effects

Due to years of fire suppression the natural fire regime and fire return interval across the Upper Briggs Restoration project area has been altered. This has promoted an increased fuel loading, increased tree density, and increased overstory shading. This has also provided for high percent canopy cover that is needed for clustered lady's slipper. The proposed project may yield beneficial indirect effects to populations of clustered lady's slipper and potential habitat. Fuel reductions from thinning of trees, prescribed fire, and underburning will reduce basal area, density, and overstory shading of conifers in adjacent areas of populations. Subsequent to the initial disturbance from project implementation, long term beneficial indirect effects may occur.

A healthier ecosystem may emerge after fuel treatments providing more available moisture for vegetation. Another beneficial effect from project implementation would be the decreased risk of high severity wildfires that potentially extirpate populations. However, negative indirect effects may occur if invasive plants are introduced or spread from project implementation. These non-native species may threaten clustered lady's slippers habitat by altering the existing native plant communities, compromising mycorrhizal soils and diminishing lady slipper's habitat.

Cumulative Effects

Past, present, and foreseeable future actions may have affected or may affect clustered lady's slipper in the Upper Briggs Restoration Project area. Past, present, and foreseeable future actions are bounded where clustered lady's slipper is found in the vicinity of the proposed project area. This bounding was chosen because these populations are isolated from the other Rouge River-Siskiyou NF populations of clustered lady's slipper due to the relationship with mycorrhizal soils needed for seed germination, development, and growth the species has.

There are 115 populations of clustered lady's slipper on the Wild Rivers Ranger District alone. The species is a perennial that can propagate by sexual and asexual reproduction. Rhizomes produce buds that can create clumps of ramets that occur very close within several centimeters of each other. Sexual reproduction is the species primary mechanism for maintaining genetic diversity and expanding populations. Seeds usually fall within 2 meters of the plant however may be dispersed by overland water flow and rain splash as well as animals such as ungulates. Monitoring of populations in Oregon and California revealed that one population can range from one individual to over 1,000 (Gray et al, 2012). Half of the populations have fewer than 10 individuals and 90% of the populations have fewer

than 100 individuals. Practically all the sites in Washington and Oregon have less than 100 individuals and most site less than 20. Population Viability Analysis data show that small populations with less than 10 individuals are at the greatest risk to extirpation (50% or greater) while populations with greater than 100 individuals were almost completely secure. Analysis imply that small populations with few individuals will blink out within a certain timeframe while the larger occurrences will persist into the future.

Management activities such as canopy removal and prescribed fire may alter the species habitat causing detrimental impacts to populations. If the orchid's new spring growth is damaged from frost, fire, browsing, or other reasons than the individual may not put on new growth till the following year and can possibly cause stress and extirpation of the individual. Past and present activities may have already altered the sensitive plant habitat and occurrences. Timber harvest may have crushed or killed individuals and negatively impacted suitable habitat by altering canopy cover, native plant communities, hydrologic function, and changing habitat areas that support clustered lady's slipper. Mycorrhizal soil, which the species depends on, may have been negatively impacted through timber harvest, brush disposal, fire, and fire suppression activities. The Oak Flat Fire of 2010 burned acres in/near the project footprint impacting populations of clustered lady's slipper there. Individuals were relocated after the fires disturbance. The individuals were characterized as compromised or extirpated.

Current management direction is designed to eliminate or reduce possible negative cumulative impacts by protecting known sensitive plants species from direct and indirect impacts. Because design features created would buffer and avoid the populations of clustered lady's slipper and their existing habitat, there would be no direct effects and limited negative indirect effects to these populations from invasive plants. As a result there may be minimal negative cumulative effects to clustered lady's slipper as a result of the proposed project from invasive plants. Invasive species can cause indirect effects by reducing sensitive habitat and altering existing sensitive plant communities. Mitigations have been created to reduce the risk of weed establishment or spread (refer to Upper Briggs Restoration Invasive Risk Assessment).

Iliamna lactibracteata (California globe mallow)

Direct Effects

There will be no negative direct effects to California globe mallow from the proposed project because of design criteria that have been created (see Section IX of the botany report: Design Features for California globe mallow). This includes fuels reduction, thinning of trees, prescribed fire, underburning, creation of temporary roads, or the creation of landings. There is one population of California globe mallow within the footprint of the proposed project located during project surveys. This small population exists in units 3 and 14.

Indirect Effects

There could be minimal indirect effects from the proposed project if invasive plants are introduced or spread into the population location. There are invasive plants near the population along a FS road which may be used during implementation. Design features have been created to prevent or minimize the spread of invasive plants. The design features can be located in the Upper Briggs Restoration Project Invasive Species Risk Assessment. Years of fire suppression has altered the fire regime and fire return intervals. This in turn allowed for an increase in stand density of conifer species into the project area. This is evident from comparing previous aerial photographs taken over 50 years ago from present day aerial photographs. The additional conifers present today are limiting the population size and

health of this species. California globe mallow is an early seral disturbance dependent species that needs somewhat open canopies to survive. Low to high burn severity fires are necessary for the species seeds to propagate. The optimum percent canopy cover necessary for the health of populations is site specific. Factors regulating populations vigor include slope, aspect, soil moisture, temperature, and others. The species is also dependent upon fire to germinate seeds within the populations seedbanks.

The proposed project may have very beneficial indirect effects upon the California globe mallow population and potential habitat. By eliminating conifers and other vegetation and decreasing conifer densities around the population a positive effect could be achieved. Design features for California globe mallow include excluding mechanical or skyline treatment within a 50 ft. foot buffered area surrounding the occurrence. Hand thinning around flagged individuals within the buffered areas will open up the canopy for the population by eliminating overstory. This will help increase available light exposure that is necessary for the species viability. No pile burning will be allowed within the buffer. However, lop and scatter fuels and prescribed fire will be allowed within the buffer enabling fire dependent seeds to germinate establishing additional individuals into the population. This will enhance the California globe mallow population and present habitat which at the present condition is at risk to becoming extirpated. Recently habitat enhancement was performed for California globe mallow in unit 3. Shrubs and trees up to 8 inches in diameter were removed, fuel piles were constructed away from the individuals then burned, and then underburning of the area. The habitat was opened up, however the most plants had been browsed for 2 years prior to the enhancement affecting annual above ground structures development, vigor, and seed production. Project implementation would continue habitat enhancement for individuals previously treated and for individuals in unit 14 that did not receive treatment.

Cumulative Effects

Occurrence records for California globe mallow implies that the species occurs in several metapopulations separated geographically. The isolated sites have groups of subpopulations within them. The metapopulations probably have limited connectivity and gene flow with each other. Past, present, and foreseeable future actions are bounded where California globe mallow is found in the vicinity of the proposed project area since there are no other populations in the watershed or adjacent watersheds.

Past and present activities may have already altered sensitive plant occurrences and their habitats. The exclusion of historic frequency of low intensity fire and the absence of disturbance in the area has prohibited California globe mallow to establish, maintain healthy populations, and remain in the ecosystem. Without disturbance and fire this adjunct population is at high risk of being lost. The extent of cumulative effects to sensitive plants depends on the management of potential direct and indirect effects, as well as the attributes of the sensitive plant species located within the project area, their distribution within the project area, and the ability to design future projects with sensitive plant attributes in mind. Current management direction is designed to eliminate or reduce possible negative cumulative impacts by protecting known sensitive plants species from direct and indirect impacts.

Project design features created would avoid negative direct impacts to California globe mallow while producing positive indirect effects to the species, existing habitat, and potential habitat. Removal of trees will create a positive response to the species by increasing light exposure. Fire would allow seed banks to germinate and benefit the species. However there would be minimal negative indirect effects from the risk of invasive plants. There would be no negative direct and minimal indirect effects to California globe mallow. There would be minimal cumulative effects to California globe mallow as a

result of the proposed Upper Briggs Restoration Project due to the risk of invasive species establishment and spread. Noxious weeds can cause cumulative effects by reducing sensitive plant habitat and altering existing sensitive plant communities. Mitigations have been created to reduce the risk of weed establishment or spread (refer to Upper Briggs Restoration Invasive Risk Assessment). There will be positive cumulative effects to the occurrence by enhancing and extending potential habitat while providing the methods that are needed to increase individuals within the population.

Sophora leachiana (western sophora)

There will be limited negative direct or negative indirect effects to western sophora from the proposed project because of design criteria that have been created (see Section IX. Design Features for western sophora). This includes fuels reduction, thinning of trees, prescribed fire, and underburning.

Direct Effects

An extensive occurrence of western sophora within the footprint of the proposed project was located during project surveys. Populations are found in units 2, 3, 3S, 5, 9, 14, 15, 16, 35, 48, 240, 262, 503, 504, 505, 506, 510, and 652. Populations are dispersed over many acres. Years of fire suppression has altered the fire regime and fire return intervals. This in turn allowed for an increase in stand density of conifer species into the project area. This is evident from comparing previous aerial photographs taken over 50 years ago from present day aerial photographs. The additional conifers present today are limiting the population's health. Western sophora is a disturbance dependent species that needs somewhat open canopies and disturbance to survive. Without natural disturbances (including fire) western sophora suitable habitat can be diminished or ultimately disappear. Individuals may receive direct impacts from crushing, burning, and killing individuals by skyline logging, felling trees, and prescribed fire. However, the projects short term direct impacts will be outweighed by the projects long-term beneficial effects.

Indirect Effects

The proposed project may have very beneficial indirect effects upon the western sophora population and potential habitat. By eliminating conifers and other vegetation and decreasing conifer densities around the populations a positive effect will be realized. Design features for western sophora include excluding mechanical ground treatment within populations and around individuals. No landings or temporary roads would be constructed within populations. Treatments will provide the canopy opening and disturbance the species needs without excessive adverse effects to the populations. This will be achieved by limiting soil compaction that otherwise would occur with ground based mechanical treatments. Pile burning will be prohibited on or immediately near individuals within population areas, however, lop and scatter fuels and prescribed fire will be allowed. This would create the disturbance that is necessary for the species to regenerate and thrive enhancing the western sophora populations and its habitat. It will also create additional potential habitat for the species in the project area. In addition, design features recommend the creation of opening ½ to ¾ acres near individuals (not on individuals) allowing the species additional optimum habitat that potentially can be colonized.

Cumulative Effects

Western sophora is a tight endemic rare plant that occupies a small geographic range. It has a very restricted known range. All populations are within an 11 mile radius from the project footprint and exist between the Illinois and Rouge Rivers in Josephine County, Oregon. Past, present, and foreseeable future actions are bounded where western sophora is found in the vicinity of the proposed project. This is because the endemic western sophora has a very restricted area and is not found any other locations. Past and present activities may have already altered sensitive plant occurrences and their habitats. The exclusion of historic frequency of low intensity fire and the absence of disturbance

in the area can prohibit western sophora to establish, maintain healthy populations, and remain in the ecosystem. Individuals simply persist clonally in the understory but do not produce viable seeds for regeneration and dispersal slowly decreasing in size and viability.

The extent of cumulative effects to sensitive plants depends on the management of potential direct and indirect effects, as well as the attributes of the sensitive plant species located within the project area, their distribution within the project area, and the ability to design future projects with sensitive plant attributes in mind. Current management direction is designed to eliminate or reduce possible negative cumulative impacts by protecting known sensitive plants species from direct and indirect impacts. Project design features created would limit adverse short-term direct impacts to western sophora while producing positive long-term indirect effects to the species, existing habitat, and potential habitat. There would be some negative direct effects to western sophora however, design features minimize the impacts. Beneficial indirect effects to western sophora as a result of project implementation include the reduction in canopy closure and the necessary required disturbance that is essential for maintaining the health of the species. Therefore, would be minimal short-term negative cumulative effects, including noxious weed spread as a result of the proposed Upper Briggs Restoration Project. Noxious weeds can cause cumulative effects by reducing sensitive plant habitat and altering existing sensitive plant communities; mitigations have been created to reduce the risk of weed establishment or spread (refer to Upper Briggs Restoration Invasive Risk Assessment). However, there will be many positive long-term cumulative effects to western sophora by the proposed project. Long term effects include enhancing and extending the species potential habitat while providing the methods that are needed to increase the population. Without disturbance this species is at risk of disappearing from the landscape within the proposed units

Pyrola dentata (toothed wintergreen)

Direct & Indirect Effects

There will be no negative direct effects to toothed wintergreen from the proposed project because of design criteria that have been created (see Section IX. Design Features for toothed wintergreen). This includes fuels reduction, thinning of trees, prescribed fire, underburning, creation of temporary roads, or the creation of landings. There is one population of toothed wintergreen within the footprint of the proposed project located during project surveys. This small population exists in unit 47. There could however be minimal indirect effects from the proposed project if invasive plants are introduced or spread into the population location.

Cumulative Effects

Past, present, and foreseeable future actions may have affected or may affect toothed wintergreen in the Upper Briggs Restoration project area. The species is known form British Columbia to Baja Mexico. Toothed wintergreen has been documented on throughout the Wild Rivers Ranger District in different habitats, elevations, and soils. It has been found above on both serpentine and non-serpentine soils. The species appears to have a wide range ecosystems that it can persist on rather than specific to one niche or habitat type. Past, present, and foreseeable future actions are bounded where toothed wintergreen is found in the vicinity of the proposed project area. This bounding was chosen because these populations are isolated from the other known Rogue River-Siskiyou NF populations of toothed wintergreen. There would be no negative direct and minimal indirect effects to toothed wintergreen. Therefore, would be minimal cumulative effects to toothed wintergreen as a result of the proposed Upper Briggs Restoration Project due to the risk of invasive species establishment. Invasive plants

have the potential to alter associated native plant communities, diminish potential habitat, and compromise soil mycorrhiza. Mitigations have been created to reduce the risk of weed establishment or spread (refer to Upper Briggs Restoration Invasive Risk Assessment).

Sensitive Fungi

Field surveys were conducted for fungi. However, due to the unreliable above-ground presence of fruiting bodies from year to year, additional analysis is presented below. The mycelium (the non-fruiting portion of the fungus) is generally underground and remains undetected until it develops visible reproductive structures (fruiting bodies such as mushrooms, truffles, corals, puffballs, cups), or the substrate is disturbed, exposing the usually white mycelial mats (Cushman and Huff 2007). Even with above-ground fruiting bodies present, their correlation with the extent and abundance of the fungal organisms underground is unknown.

Fungal colonies can range in size from microscopic to many acres and can persist for years or decades. No Sensitive fungi are known to occur within the planning area, but habitat is present. The species suspected to occur are associated with forest floor litter, down woody material, host tree/shrub species, or a combination thereof. While these associations are known, details about the requirements for forest floor litter or down woody material for most fungal species are not well understood, and host specificity is not often known beyond the broad categories of conifers, hardwoods, or plant families within these categories (Cushman and Huff 2007). Hence, for the purpose of this B.E., the entire Douglas-fir mixed hardwood vegetation type is considered habitat for each fungal species suspected to occur within the area.

Table 427 lists the effects to Sensitive fungi within the Upper Briggs Restoration project footprint. “Potential Impacts” from the ISSSSP website found under the Conservation Planning Tools section was used as a reference to determine potential effects to fungi (Interagency Special Status/Sensitive Species Program website). The “Potential Impacts” document cites primary literature which supports these effects determinations.

Table 427. Direct & Indirect Effects to Sensitive Fungi.

Activity	Potential Direct Effects	Potential Indirect Effects
Tree Thinning Using Aerial & Ground-Based Methods	Potential impacts include damage to the mycelial network, damage to host plants and changes in species diversity following treatment. Degree of impact depends on the method used and spatial extent of impact.	Soil compaction typically results in reduced host root growth, reduced root tip availability for mycorrhizal fungi, and reduced organics needed by saprobic fungi. Fungal biomass decreases with decreased canopy cover and less downed woody debris. ● Increase in solar radiation and modification of forest floor conditions. ● Over the long-term resulting in reduced moisture retention and reduced likelihood of colonization by non-weedy fungi.
Broadcast Burning	Low intensity fire likely only affects the upper 5 cm of litter and its inhabitants. The majority of fungal species diversity resides in the mineral soil. Potential impacts include damage to the mycelial network, damage to host plants and changes in species diversity following fire. Degree of impact depends on the fire intensity and spatial extent of impact.	The more intensely a fire burns, the greater the indirect impacts to overstory shade and quantity of litter, organic matter and large woody debris. Specific requirements for shade, litter, organic matter and woody debris aren’t known for each sensitive fungal species. High levels are probably more important to saprobic vs. mycorrhizal fungi. Loss of organics

Activity	Potential Direct Effects	Potential Indirect Effects
		likely limits moisture retention capability for most fungal species.
Pile Burning	Concentrated burning can result in high burn intensity and greater changes in fungal diversity. Direct impacts include damage to the mycelial network occurring in the litter to depths w/in the mineral soil. Because the majority of fungal diversity resides in the mineral soil, more species have the potential to be negatively affected by pile burning than broadcast burn, however effects of piles are more localized.	Loss of litter, organic matter and overstory shade will impact site, over the long-term resulting in reduced moisture retention and reduced likelihood of recolonization by non-weedy fungi. May reduce fungi species diversity.
Road & Landing Construction	Extent of impact typically localized. Direct impacts include damage to mycelial network, loss of host plants and loss of organic materials needed by fungi.	Soil compaction typically results in reduced host root growth, reduced root tip availability for mycorrhizal fungi, and reduced organics needed by saprobic fungi. Over the long-term resulting in reduced moisture retention and reduced likelihood of colonization by non-weedy fungi.
Machine Chipping/ Mastication	May damage mycelial networks.	May damage or destroy duff and substrate layers on which fungi depend. Deposition of chipped material may result in an excessive increase in organic matter potentially altering duff and substrate chemistry (Cushman and Huff 2007).

A number of project design criteria inherent to the proposed action will minimize the above mentioned direct and indirect impacts to sensitive fungi (if present). Chipping and mastication will occur in early to mid-seral forest stands which probably do not provide prime habitat for Sensitive fungi. Proposed thinning prescriptions retain old and large trees and promote tree and shrub species diversity. Maintaining a diverse array of host species of varying size and age classes will tend to promote fungal diversity. Additionally, acres of the planning area will be treated non-commercially and acres of the planning area will not be treated. For the most part, a portion of the non-commercial and untreated areas tend to be composed of mature forest habitat and represent the highest potential for Sensitive fungi occurrence. Thus the proposed action will retain refugia for sensitive fungi throughout the project area. In sum, although some level of negative impacts and cumulative effects may occur to Forest Service sensitive fungal species (if present) one of the goals of the project is to promote old forest habitat (for RR & LSR, see Siskiyou National Forest Land and Resources Management Plan, 1989) and return fire as a natural agent of disturbance to the landscape. In the long-term, return of fire to the landscape may reduce the probability of a large-scale, high intensity stand replacing fire event. A large-scale, high intensity, stand-replacing fire would likely have a longer-lasting detrimental impact upon the fungal community than the proposed action.

Hence, although the proposed action may impact individuals or habitat, it will not likely contribute to a trend towards federal listing or, cause a loss of viability to any sensitive fungal species.

ESA EFFECT DETERMINATION

The effects determination is based on professional judgment, existing information, including the existing condition of the project area, and the potential impacts of the proposed project. The effects determination is based on an evaluation of all past and potential direct, indirect, and cumulative effects. Even if the potential direct effects are considered negligible, it is possible that the indirect or cumulative effects may affect (to some degree) the viability of the species.

There would be **no effect** to *Fritillaria gentneri* (Gentner's fritillaria), *Arabis macdonaldiana* (Maccdonald's rock cress), or *Lomatium cookii* (Cook's lomatium), or any other plant species listed as threatened, endangered, proposed for listing, or candidates under the Endangered Species Act of 1973, as amended (ESA), administered by the U.S. Fish and Wildlife Service (USFWS) from the proposed Briggs Valley Project. This determination is based on the absence of suitable habitat within the project area and the absence of individuals known or expected to occur within the project area.

FOREST SERVICE REGION 6 SENSITIVE SPECIES IMPACTS

A list of the Rogue River-Siskiyou National Forest sensitive species for which there would be **no impact** is provided in the Botanical report; this determination is based on the absence of suitable habitat within the project area and the absence of individuals known or expected to occur within the project area.

The proposed Upper Briggs Restoration Project may impact individuals or habitat, but will not likely contribute to a trend toward federal listing or loss of viability to the population or species has been determined for the following Rogue River Siskiyou National Forest sensitive species; No individuals or populations are known from the project footprint and none were located during project surveys. This determination is based on the presence of suitable habitat within the project footprint. These species may be impacted during project implementation if undetected individuals or populations are present within the project area where suitable habitat occurs:

Vascular Plants: *Adiantum jordanii (California Maiden-hair), Allium peninsulare (peninsular onion), Cheilanthes covillei* (Coville's lip-fern), *Cryptantha simulans* (pine woods cryptantha), *Ericameria arborescens* (goldenfleece), *Keckelia lemmonii* (bush beardtongue), *Lotus stipularis* (stipuled trefoil), *Pellea andromedifolia (coffee fern), Pellea mucronata ssp. californica (birds-foot fern), Rhamnus ilicifolia* (redberry), *Solanum parishii* (Parish's horse-nettle)

Bryophytes: *Entosthodon fascicularis, Porella bolanderi*

Fungi: *Chamonixia caespitosa, Phaeocollybia californica, Pseudorhizina californica*, *Rhizopogon ellipsosporus*, *Rhizopogon exiguous*

The proposed Upper Briggs Restoration Project may impact individuals or habitat, but will not likely contribute to a trend toward federal listing or loss of viability to the population or species for *Cypripedium fasciculatum* (clustered lady's-slippers). This species is known from 7 locations in the project footprint. There are occurrences in units 3, 21,23A, 24, 63, 508, and 509. Design features have been created to eliminate any direct effects to these populations. However, this species may be negatively impacted during project implementation if undetected individuals or populations are present but were not detected within the project area where suitable habitat occurs.

The proposed Upper Briggs Restoration Project may impact individuals or habitat, but will not likely contribute to a trend toward federal listing or loss of viability to the population or species for *Iliamna lactibracteata* (California globe-mallow). This species is known from one location in the project

footprint. The occurrence is in units 3 and 14. Design features have been created to eliminate any direct effects to this population. However, this species may be negatively impacted during project implementation if undetected individuals or populations are present but were not detected within the project footprint where suitable habitat occurs. Long term beneficial effects are anticipated from project implementation. The species depends on disturbance specifically fire and open canopies and to regenerate, propagate, and maintain viable populations.

The proposed Upper Briggs Restoration Project may impact individuals or habitat, but will not likely contribute to a trend toward federal listing or loss of viability to the population or species for *Pyrola dentata (toothed wintergreen)*. This species is known from one location in the project footprint. The occurrence is in unit 47. Design features have been created to eliminate any direct effects to this population. However, this species may be negatively impacted during project implementation if undetected individuals or populations are present but were not detected within the project footprint where suitable habitat occurs. Long term beneficial effects are anticipated from project implementation. The species depends on disturbance specifically fire and open canopies and to regenerate, propagate, and maintain viable populations.

The proposed Upper Briggs Restoration Project may impact individuals or habitat, but will not likely contribute to a trend toward federal listing or loss of viability to the population or species for *Sophora leachiana* (western sophora). This species is known from many locations within the project footprint. There are occurrences in units 2, 3, 3S, 5, 9, 14, 15, 16, 35, 48, 240, 262, 503, 504, 505, 506, 510, and 652. Design features have been created to minimize adverse impacts to these populations. Short term impacts and direct effects may occur during project implementation. However, this species needs disturbance and open canopies to survive, propagate, and thrive. Long term impacts will beneficial to the species and occurrences. There may be additional adverse impacts during project implementation if undetected individuals or populations are present but were not detected within the project footprint where suitable habitat occurs.

SURVEY & MANAGE SPECIES

Table 438. Known Strategic and Survey & Manage Species in the Project Footprint.

Species	Unit–Alt 2	Unit–Alt 3	Status
Otidea leporina (fungi) (category D)	12, 14, 48	12, 14, 48	survey and manage
Ramaria rubripermanens (fungi) (category D)	510	510	survey and manage
Sparassis crispa (fungi) (category D)	Big Pine campground road loop meadow	Big Pine campground road loop meadow	survey and manage
Spathularia flavida (fungi) (category B)	57	57	survey and manage
Tylopilus porphyrosporus (fungi) (category D)	8, 505, road decommissioning	8, 505, road decommissioning	survey and manage

Based on Survey and Manage Standards and Guidelines and Category Assignment (December 2003)

The project is consistent with the January 2001 Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines.

This project utilizes the December 2003 species list. This list incorporates species changes and removals made as a result of the 2001, 2002, and 2003 Annual Species Reviews with the exception of the red tree vole, *Arborimus longicaudus*.

The project was surveyed for survey and mange species during 2007, 2009, 2010, 2011, 2012, 2015, 2016, and 2017. There are previously known sites of survey and manage species within the project location. All known of survey and manage species within the project will receive protection buffers. The buffers would maintain litter and duff layers, current and micro-climate conditions, host species, and associated mycorrhizae.

INVASIVE PLANTS

Table 449. Proposed Project Invasive Plant Infestations and FS Roads.

SPECIES CODE	NAME	INFESTATION ID	RTE NUMBER	UNIT NUMBER
CIVU	*Cirsium vulgare* (bull thistle)	061122_CIVU_0102	2509000; 049	10; 517
CIVU	*Cirsium vulgare* (bull thistle)	061122_CIVU_0099	2509015; 025;021;032 ; 630; 631; 632; 633	10; 20; 517
CIVU	*Cirsium vulgare* (bull thistle)	061122_CIVU_0118	2500100; 609	2; 262; 9; 505; 12
CIVU	*Cirsium vulgare* (bull thistle)	061122_CIVU_0001	2500138	10; 64; 69; 23A
CIVU	*Cirsium vulgare* (bull thistle)	061122_CIVU_0013	2512040	5
CIVU	*Cirsium vulgare* (bull thistle)	061122_CIVU_0016	2500141	510; 513
CIVU	*Cirsium vulgare* (bull thistle)	061122_CIVU_0095	2500643	31B
CIVU	*Cirsium vulgare* (bull thistle)	061122_CIVU_0119	2500640	63
CIAR4	*Cirsium arvense* (Canada thistle)	061122_CIAR4_0138	2500643	31B
CIAR4	Cirsium arvense (Canada thistle)	061122_CIAR4_0012	2500128	63
CEDE5	*Centaurea debeauxii* (meadow knapweed)	061122_CEDE5_0164	2500000	39
CEDE5	*Centaurea debeauxii* (meadow knapweed)	061122_CEDE5_0165	2500000	513
CEDE5	*Centaurea debeauxii* (meadow knapweed)	061122_CEDE5_0166	2500121	3
CEDE5	*Centaurea debeauxii* (meadow knapweed)	061122_CEDE5_0172	2500617	48; 55
CEDE5	*Centaurea debeauxii* (meadow knapweed)	061122_CEDE5_0174	2512000; 013	50
CEDE5	*Centaurea debeauxii* (meadow knapweed)	061122_CEDE5_0175	2512635	50
CEDE5	*Centaurea debeauxii* (meadow knapweed)	061122_CEDE5_0176	2512000	50
CEDE5	*Centaurea debeauxii* (meadow knapweed)	061122_CEDE5_0177	2512000	50
CEDE5	*Centaurea debeauxii* (meadow knapweed)	061122_CEDE5_0264	2500000	500; 501
CEDE5	*Centaurea debeauxii* (meadow knapweed)	061122_CEDE5_0270	2512013	50

SPECIES CODE	NAME	INFESTATION ID	RTE NUMBER	UNIT NUMBER
CEDE5	*Centaurea debeauxii* (meadow knapweed)	061122_CEDE5_0356	2500000	513
CSTM	*Centaurea stoebe var. micranthos* (spotted knapweed)	061122_CESTM_0064	2500000	Haul Route to North
CSTM	*Centaurea stoebe var. micranthos* (spotted knapweed)	061122_CYSC4_0117	2500603	9; 262
CYSC4	*Cytisus scoparius* (Scotch broom)	061122_CYSC4_0065	2510000	500
CYSC4	*Cytisus scoparius* (Scotch broom)	061122_CYSC4_0106	2512040	5
CYSC4	*Cytisus scoparius* (Scotch broom)	061122_CYSC4_0108	2512017	4; 165
CYSC4	*Cytisus scoparius* (Scotch broom)	061122_CYSC4_0168	2512635	50
MEOF	*Melilotus oficinial* (sweet clover)	061122_MEOF_0014	2509; 2500	500; 501
MEAL	*Melilotus oficinial* (sweet clover)	061122_MEAL_0007	2500	500; 501
PORE5	*Potentilla recta* (sulfur cinquefoil)	061122_PORE5_0002	2500110	19; 505
TACA8	*Taeniatherum (Elymus) caput-medusae* (medusahead grass)	061122_TACA8_0003	2500121	3
TACA8	*Taeniatherum (Elymus) caput-medusae* (medusahead grass)	061122_TACA8_0001	2500121	48
TACA8	*Taeniatherum (Elymus) caput-medusae* (medusahead grass)	061122_TACA8_0004	2500000	50
TACA8	*Taeniatherum (Elymus) caput-medusae* (medusahead grass)	061122_TACA8_0025	2512013	50

Anticipated Weed Response to Proposed Action

Most documented infestations are currently restricted to the roadsides and similarly disturbed habitats such as old landings; minimal invasive plant infestations are documented within the interior of the proposed units. Well enforced and well implemented mitigations including equipment washing to avoid the spread and introduction of invasive plants will greatly minimize the risk of invasive plant introduction and establishment within currently habitats with no infestations.

Overall, implementation of the proposed activities will result in a net increase in highly disturbed areas, such as new temporary roads, skid trails, landings, and burned areas. The result of creating more highly disturbed habitats is a measurable increase in vulnerability to invasion and establishment by invasive plant species. However, monitoring is the activity most critical to preventing the establishment of invasions. Monitoring allows workers to identify and remove infestations while they are small and easily treated. If infestations are left undetected and untreated it is likely they will become established, build a seed bank in the soil and become increasingly difficult to control. Establishment of invasive plants across an increasingly large area may disrupt herbivore/plant ecological relationships, alter mychorrhizal fungi/plant interactions, alter fire behavior, create cascading effects on plant and wildlife, and damage ecosystem function through alteration of soil and hydrologic properties (USDA Chapter 3 FEIS 2005).

Risk

The overall risk of invasive plant establishment as a result of the project is moderate. This determination is based on the following factors:

1. There are existing RRSNF target invasive species and Oregon State listed noxious weed infestations within the project treatment area
2. There will large areas of ground disturbance throughout the project analysis area
3. There will large areas soil compaction throughout the project analysis area
4. The will be the creation of newly disturbed areas
5. There will be disturbance from fire
6. Canopy cover and litter layer would be affected
7. Equipment used in the proposed project treatment area may be exposed to and contaminated with invasive plant material
8. There will be the decommissioning of infested roads in the proposed treatment area
9. Mitigations to prevent the spread or establishment of any new noxious weed or invasive plant infestations or spread of existing infestations will be followed

The proposed project area has many RRSNF target invasive plant species. Invasive plants could be established and spread in many ways. Project activities would remove and burn native vegetation and reduce overstory canopy. Contaminated equipment and vehicles could introduce invasive plants into the project area. Vegetation treatments, decommissioning roads, and project implementation can create disturbed and compacted areas where invasive plants can spread and establish. The removal of canopy layers and the creation of open, disturbed, and bare soil areas could directly and indirectly adversely affect adjacent native plant communities. This could occur when introduced aggressive invasive species out-compete them. Project mitigations created would minimize the introduction and spread of invasive plants.

3.2.4 Vegetation

The Upper Briggs vegetation report (2017 Barnhart) shows the current stand condition and provides a full explanation of measurements and metric used in evaluating the information for the no action and action alternatives. Effects from thinning are evaluated along with response to natural disturbance mechanisms that occur on this landscape. The information provided in this EA is summarized from the silvicultural diagnosis developed for the proposed project and is available here: http://www.fs.fed.us/nepa/nepa_project_exp.php?project=45593.

3.2.4.1 EXISTING CONDITIONS

The Upper Briggs planning area is a landscape of great vegetative diversity. Much of the terrain is covered by mixed forests of conifers and broadleaf trees. Land type, soil type, and available water play key roles in the species composition of a given stand. Those that fall areas of low water availability are highly susceptible to insect and disease mortality. Many of the units proposed for treatment are located such areas (see Figure 14 on page 64).

At lower elevations, the typical stand is composed of a mid-story and understory dominated by Douglas-fir (*Pseudotsuga menziesii*) mixed with tanoak and Pacific madrone. The overstory of the stands are dominated by Douglas-fir and ponderosa pine as well as other warm-site conifers and hardwoods. In shallow soils, ponderosa pine, California black oak, Oregon white oak and canyon live oak occur.

At upper elevations, Douglas-fir is likely to grow in moderate numbers. White fir (*Abies concolor*) and/or grand fir (*Abies grandis*) typically comprise the understory.

Ultramafic soils dominate the western portion of the planning area, and are found in a few inclusions in the southeast. Stands that occur on ultramafic soils trend to have more open, late-seral characteristics and are dominated by Jeffery pine and/or western white pine.

Throughout the analysis area, and scattered among forest stands at both low and high elevations, are open areas that sustain a remarkable number of locally endemic plants. Each plant community growing within the analysis area (whether human-shaped or natural) is segregated along gradients of elevation, aspect, soils and topography and is directly affected by vital plant growth determinants such as temperature, effective precipitation and hydrologic regime.

Within the planning area, four major cover types were identified using attributes such as plant size, dominant vegetative form (grass, shrub, small tree, etc.), plant species composition, and/or environmental trait. Together they convey a generalized picture of the key plant communities. The four cover types in the Upper Briggs planning area are: 1), young (immature) forests, 2), intermediate-age/closed canopy forests, 3), mature and old-age forests, and 4), meadow, barren, talus, alpine or other open areas.

YOUNG (IMMATURE) FOREST

This cover type includes all forest stands where the average age of the dominant trees is 1 to 35 years. They are primarily conifer plantations established following clearcut harvesting; and stands that regenerated naturally in the wake of recent, large wildfires. Nearly all are relatively uniform, even-aged trees with a single main canopy layer. Figure 35shows a plantation stand in this cover type.

This cover type is typically comprised of saplings (stems 0.5 to 3.9 inches diameter at breast height {DBH} and 10 to 25 feet tall) and poles (stems 4 to 8.9 inches DBH and 25 to 55 feet tall). Seedlings (trees less than 0.5 inch DBH) are common or abundant in the youngest stands, but nearly all stands in the analysis area have grown beyond the seedling stage. Remnant large or very large live trees or snags are either absent, or present in low numbers, and coarse woody debris is seldom abundant. Douglas-fir usually predominates, and typically composes 60 percent or more of all trees.

At lower elevations (below 3,500 feet), one or a few other conifers typically grow in association with Douglas-fir. These include ponderosa pine, sugar pine (*Pinus lambertiana*), Port-Orford-cedar (*Chamaecyparis lawsoniana*) and incense-cedar (*Calocedrus decurrens*). At upper elevations (above 3,500 feet), and in cooler soils at lower elevations, conifer variety is greater, and young forests are composed of more conifer species. Douglas-fir may still comprise a substantial proportion of all trees in a stand, but numerous other tree species are likely to be present. These mixed stands typically have four to seven conifers present and this diversity of species may include white fir/grand fir, Shasta red fir (*Abies magnifica* var. *shastensis*), noble fir (*Abies procera*), mountain hemlock (*Tsuga mertensiana*), Brewer spurce (*Picea breweriana*), western white pine (*Pinus monticola*) and knobcone pine (*Pinus attenuata*) as well as the sugar pine, Port-Orford-cedar or incense-cedar that grows also at lower elevations.

Figure 35. Young Stand of Primarily Douglas-Fir Located Within the Upper Briggs Restoration Project Analysis Area.

Broadleaf trees and shrubs are frequently found in this cover type, often in abundance at lower elevations. These trees include California black oak (*Quercus kelloggii*), Oregon white oak (*Quercus garryana*), tanoak (*Lithocarpus densiflorus*), Pacific madrone (*Arbutus menziesii*) and canyon live oak (*Quercus chrysolepis*), as well as shrubs such as manzanita (*Arctostaphylos* spp.), Oregon grape (*Mahonia aquifolium*) and poison oak (*Toxicodendron diversilobum*). At higher elevations, this cover type includes fewer broadleaf tree and shrub species, however golden chinquapin (*Chrysolepis chrysophylla*), snowbrush (*Ceanothus velutinus*) and currant (*Ribes* spp.) persist.

INTERMEDIATE-AGE/CLOSED-CANOPY FOREST

This cover type includes all forest stands where the average age of the oldest trees is 35 to 120 years. They are primarily plantations that were planted following clearcut harvesting. Nearly all are less than 60 years old. Some stands in this cover type naturally reestablished after wildfires or hydraulic mining operations. For those stands younger than 60 years old, most were revegetated, at least in part, by planting one or a few species of conifer seedlings. Reforested stands older than 60 years generally had their genesis from naturally dispersed seed and are more likely to contain remnant trees from the

former forest. Figure 36 shows a young stand of predominantly Douglas-fir trees that is representative of the oldest stands in this cover type.

While stands in this cover type differ in their genesis (that is, stands vary as to whether they were regenerated mostly by planting, natural seeding or by a combination of both planting and natural means), the crowns of the dominant conifers are now tightly interlaced (that is, 'closed') and therefore little light penetrates to the ground through the overhead canopy. The close association of crowns owes to the generally excessive density of trees. In most stands of this cover type, particularly where either a thin has never occurred or a thin occurred more than 20 years ago, the average diameter of existing conifers exceeds 10 inches and the numbers of existing stems range from approximately 150 to nearly 400 trees per acre. The total live tree cross-sectional basal area per acre in most stands is 200 to 300 square feet.

Figure 36. Intermediate-Age/Closed Canopy Stand of Primarily Douglas-Fir Located Within Upper Briggs Restoration Project Analysis Unit 10.

Small-sized trees (boles 9 to 15.9 inches DBH and 55 to 90 feet tall) and medium-sized trees (boles 16 to 23.9 inches DBH and 90 to 125 feet tall) predominate in managed stands under 60 years of age. However, large-sized trees (boles 24 to 31.9 inches DBH and 125 to 150 feet tall) are occasional members of stands that are close to 60 years old and large-sized trees are increasingly common in stands aged 80 years and older. Across the entire age range of stands in this cover type, remnant large, very large (boles 32 to 44.9 inches DBH and 150 to 200 feet tall) or giant live trees or snags (boles 45+ inches DBH and 200+ feet tall) are seldom present in large numbers within the interior of the stand.

The species composition of forest stands within this cover type is similar to the tree compositions described above for young, immature stands. Nevertheless, there are modest but widespread differences attributable to three factors:

1. Natural differentiation in height growth among tree species.
2. Pre-commercial thinnings that were applied to many stands during early development.
3. Planting of some sites almost entirely with ponderosa pine.

The first two factors have contributed to stand compositions that, on average, include an increased proportion of Douglas-firs when compared to stands less than 35 years old. Douglas-fir often comprises 70 percent or more of the dominant and codominant trees in the overstory. The intrinsic height growth capacity of Douglas-fir, as well as the tendency to favor this species during thinning, tends to increase the proportion of Douglas-fir in the overstory.

The third factor, planting ponderosa pine almost exclusively on a site, has created a number of managed stands where the overstory is composed of 70 percent or more ponderosa pine. Most of these stands are roughly 40 to 50 years old. The pines planted to reforest these stands are now growing poorly. The trees are not the progeny of local seed and appear to be mal-adapted to the sites and elevations where they were planted. The ponderosa pine plantations (at middle elevations) are exceptional in that they represent a compositional anomaly not repeated in younger or older forests in the analysis area.

Within all stands in this cover type, firs, pines or cedars are intermingled with the predominant Douglas-firs. Even when conifers other than Douglas-fir make up a sizeable percentage of the stand, they seldom predominate the overstory (except in the just-described pine plantations or at elevations above 3,500 feet).

As is characteristic for mid-seral but maturing forests, most trees that comprise a stand have few trunk or crown defects. The most prevalent defect seen in the trunks of trees is top breakage caused by snow and ice buildup in the upper crown. Where the breakage occurred 25 years or more in the past, the deformity that is frequently recorded is an upper trunk that has a forked or “bayonet” top.

Generally, trunks are separated somewhat from the stems of neighboring trees. Stem diameters among dominant and codominant trees in the overstory frequently vary within a relatively narrow diameter range of three to six inches.

Stands having two distinct age-classes and two canopy layers are rarely present. However, where two-story stands exist they are, almost without exception, the result of previous partial cutting. The exceptions are those stands where older trees (120 years and older) persist as individuals or in small groups among younger trees because they survived the last stand-replacing event (wildfire, logging, etc.).

There is the general lack of hard and soft snags. “Hard” snags with diameters larger than 16 inches are almost completely absent within the closed canopy stands. (Hard snags are those dead trees with most limbs attached where the heartwood is mostly sound but the sapwood may have evident decay or deterioration). On occasion, particularly in low elevation stands, a few recently-killed trees 16 inches DBH and larger may be present (perhaps as a consequence of drought combined with high stand density). Large standing-dead trees in an advanced state of decomposition, usually described as “soft (rotten)” snags, are irregular enough in this cover type to be considered rare. The explanation for the general lack of hard and soft snags in intermediate-age stands is related to the mid-seral development, previous harvest, relative vigor and comparative youth of forests in this cover type. Nonetheless, in some stands, especially stands that are currently 45 to 60 years old, coarse woody debris is substantially more abundant than is usual for this cover type generally. Where a large quantity of intact coarse wood persists, the debris is typically (cull) material that was left during logging and many of the logs present are very large or giant cedars (which decompose slowly).

A number of forest tree pathogens are ubiquitous throughout the analysis area and their injurious effects to a few trees are regularly discernible in intermediate-age stands. On the other hand, substantial mortality of overstory trees associated with these pathogens is seldom in evidence at this stage of forest growth and development, with the exception of tree killing caused by root diseases. Two root diseases in particular, Port-Orford-cedar root disease (*Phytophthora lateralis*) and laminated root rot (*Phellinus weirii*), are persistent in the analysis area. These two root diseases are lethal to their primary hosts and can kill a sizeable number of susceptible trees within a limited area. Indeed, isolated pockets of host trees killed by these two root parasites are found across all stand types across the Upper Briggs Analysis area. Figure 37 displays a group of Port-Orford-cedar infected with *Phytophthora lateralis* within a road prism.

Figure 37. Port-Orford-Cedar Tree Group Infested With *Phytophthora lateralis*.

Three additional root decay organisms, shoe string root rot (*Armillaria ostoyae*), Annosus root disease (*Heterobasidion annosum*) and black stain root disease (*Leptographium wageneri*), are also present and widespread in the analysis area but their influence is subdued in most intermediate-age stands. Another group of tree parasites, dwarf mistletoes (*Arceuthobium* spp.), commonly infest Douglas-fir, ponderosa pine and true firs (*Abies* spp.) in the analysis area. While dwarf mistletoes are present in many stands, infestations are only irregularly prevalent in trees growing in this cover type. Occasional stem decays have been identified in many tree species, during stand examinations, but the extent of heart rots in trees of this cover type is quite limited.

MATURE & OLD-AGE FOREST

This cover type includes all forest stands in the planning area where the average age of the dominant trees is more than 120 years old. Some stands have an average age exceeding 300 years (for example, trees within Big Pine Campground). It is distributed throughout the planning area, but is more

frequently encountered on northern to easterly slopes and/or in highly productive soils (i.e., soils with high water storage potential).

In general, it has greater structural complexity and tree species variety than is found in the younger forest cover types. The tree species are the same as those described above within younger stands. However, the composition of species in any specific stand is far more variable as a consequence of overstory tree mortality and understory in-growth of more recently established trees. Shade-tolerant trees, including grand/white fir, tanoak, and mountain hemlock (high elevation), are likely to compose at least 25 percent of the basal area within mature and late seral stands.

Mature Forest

In the youngest stands within this cover type, a mid-level canopy layer may be just emerging as a noticeable stand feature. Stands in this cover type will start to display moss and lichen, have trees that range from approximatley14”DBH-40 “DBH. Little to no understory vegetation is present. Low levels of large snags are found in the stands. These stands have a high amount of canopy cover >80%.

Late Seral Forest

A well-developed middle canopy is nearly always present in stands over 200 years old. Stands in the oldest age classes (with trees over 300 years old) typically contain multiple canopy layers beneath the dominant crowns, and they have a complex vertical structure consisting of trees ranging in size from small to giant.

Stands in this cover type usually contain trees having a higher incidence of crown deformities, trunk defects and decaying wood, when compared to trees in younger stands. Lop-sided crowns, crooked trunks, bark scrapes, seams and burls are malformations readily encountered. Trees of any species may have dead tops, broken tops or multiple-stem tops. In many stands, at least a few of the largest overstory trees have died, which in turn creates occasional and dispersed large snags (both hard and soft). A large accumulation of logs on the ground is common in stands older than 200 years, but is uncommon in stands close to 120 years old.

Stem decays, limb cankers, butt rots, root rots and dwarf mistletoe infestations are often prevalent in this cover type. These tree pathogens provide hollows, loosened bark, soft heartwood, witch’s brooms and large limbs that are vital habitat elements for wildlife nesting/denning, foraging and roosting/sheltering. Numerous species of birds and mammals associated with late-successional forest make their homes in stands of this cover type. (See the wildlife section of this analysis).

MEADOW, BARREN, TALUS, SERPENTINE OR OTHER OPEN AREAS

This cover type includes sparsely treed and non-forested areas of shrub, forb and grass dominated plant communities, as well as rocky areas. It is scattered throughout the planning area, from relatively low elevations to the uppermost ridges. These savanna or non-forest areas are scattered throughout the analysis area, from relatively low elevation (for example, Horse Creek meadow) to open areas on the uppermost ridges. For the most part, these natural openings are limited in area and extent Figure 38 depicts the low elevation meadow at Horse Creek. Figure 39 depicts a rock outcrop in the area of Onion Mountain.

Within these non-forested openings, a concentration of interesting, unusual, and rare plants can often be found. A sizeable number of these plant species are Siskiyou Mountain endemics that have limited geographic ranges and are not found elsewhere.

Figure 39. Serpentine Rock Outcrop (credit oregonencyclopedia.org 3/2017)

A combination of distinctive geology and a wet winter/dry summer maritime climate, is responsible for the exceptionally diverse assemblages of plants living in these open areas. Many (perhaps most) of the open habitats are associated with ultramafic serpentine soils, which are prevalent in the west to northwestern portion of the watershed, but also are situated on high exposures on ridges the east side of the analysis area.

Figure 38. Meadow system Horse Creek Meadow (Credit audubonportland.org 2017).

Other Abiotic & Biotic Factors

Stands that reside in high occupancy (≥55% percent of maximum Stand Density Index [SDI]) tend to be at risk for insect and disease agents. Insect and diseases naturally attack weakened trees that have lost the ability to resist attacks due to mechanical, competition based or abiotic stress (Schaupp 2016). These high occupancy stand conditions are exacerbated by long duration drought, leading to increased mortality. Stands that are at the highest risk for insect and disease occur in areas that have very-low to low available water storage within soils. Stands that are located in areas of low water availability are mapped and displayed in Figure 14 of the Soils & Geology section.

The Southern Oregon Forest Insect and Disease Service Center conducted a service trip to the Briggs Valley area on May 5, 2014 and found flatheaded fir borer Phaenops drummondi, Armillaria ostoyae, Phellinus weirii and evidence of past Dendrotonus brevicomis activity in the area. They noted that "the basal area threshold for elevated risk of pine bark beetle infestation in southwest Oregon on a highly productive site is 120 to 150 Ft2/ac" (See the vegetation report for letter). Figure 40 and Figure 41 show flatheaded fir borer habitat suitability for the project area. The red areas on the maps display habitat for fir borer and the green dots are aerial detection survey completed in 2016.

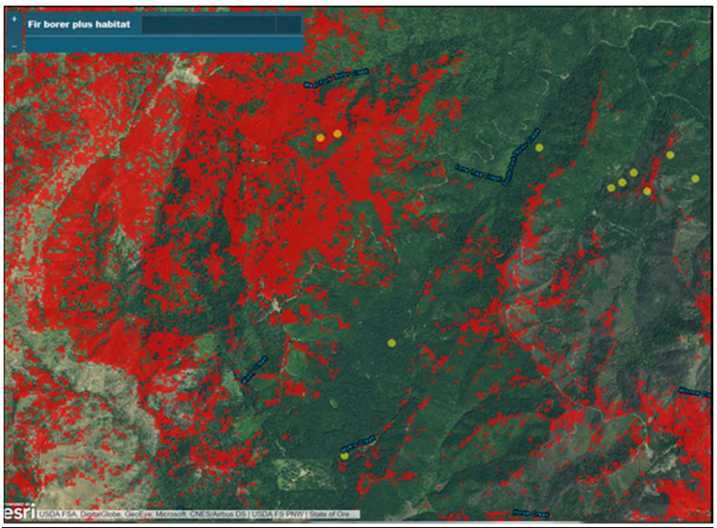


Figure 40. Flatheaded Fir Borer Habitat in Northern Half of Project Area.

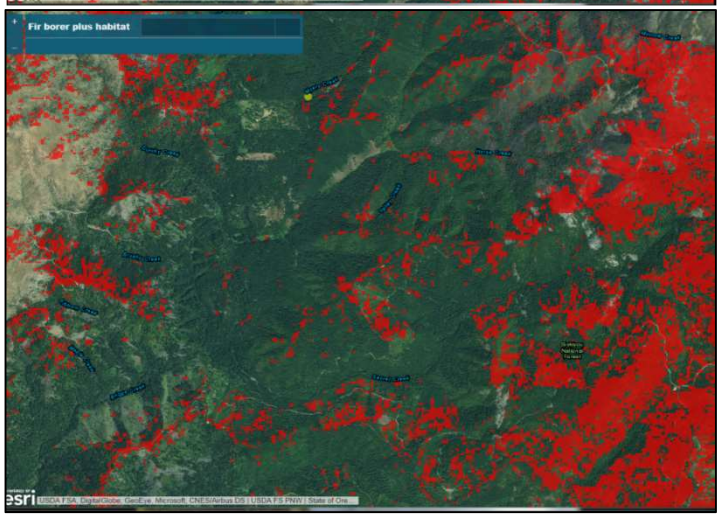


Figure 41. Flatheaded Fir Borer Habitat in Southern Half of Project Area.

3.2.4.2 ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1, NO ACTION

Immature Forest

Landscape-Scale & Stand-Scale Effects

Direct & Indirect

There would be no direct or indirect effects.

Evolving Conditions

Thinning and hazardous fuels reduction prescribed in *Plantation Thinning and Hazardous Fuels Reduction EA (2002)* would treat stands in this cover type, if implemented.

Intermediate Forest

Landscape-Scale & Stand-Scale Effects

Direct & Indirect

There would be no direct effects. Over time this cover type would be at a higher risk of flat head fir borer activity and other insects and disease, especially in soils with low water holding capacity. Tree height to diameter ratios would increase, leading to higher risk of snow and or wind breakage. High tree densities would cause subdominant trees to die due to competition for resources. The canopy would continue to remain in a single story.

Change in stand structure would occur where insect or disease agents cause localized mortality. This would create a hole in the canopy layer and allow light to the forest floor. This light would be limited in scope as surrounding vegetation would actively compete for resources and grow towards the light. Large disturbance (i.e. fire) could also reset the stand to the immature forest type. Stand is this type would grow into mature/late forest beyond the analysis timeframe of this document.

Evolving Conditions

If implemented, the thinning and hazardous fuels reduction prescribed in the 2002 *Plantation Thinning and Hazardous Fuels Reduction EA* would treat this cover type where stands have a diameter less than 20” DBH. However, stands in this cover type are generally greater than 20” DBH, therefore the effect of such treatment at the landscape- and stand-scale would be minimal.

Mature/Late Forest

Landscape-Scale & Stand-Scale Effects

Direct & Indirect

There would be no direct effects. Over time, as fuels continue to accumulate, stands in this cover type would be at increased risk for stand-replacing fires and insect outbreaks.

Open

Landscape-Scale & Stand-Scale Effects

Direct & Indirect

There would be no direct effects. Over time trees will continue to encroach on meadow systems, thereby reducing the availability of resources needed for shade intolerant plants.

Evolving Conditions

The 2002 *Meadow Enhancement CE*, does not treat trees greater than 8" DBH, therefore, these trees will continue to grow and further reduce availability to resources needed for shade intolerant plants.

EFFECTS COMMON TO ALTERNATIVE 2 (PROPOSED ACTION) & ALTERNATIVE 3 (REDUCED TREATMENT)

The following table compares acres by primary vegetation treatment objective for Alternative 2, Proposed Action and Alternative 3, Reduced Treatment.

Table 60. Acres by Primary Treatment Objective.

Primary Treatment Objective of Unit	Alternative 2 Acres	Alternative 2 % Watershed	Alternative 3 Acres	Alternative 3 % Watershed
DELSH	1053	4%	556	2%
Riparian Restoration	183	<1%	128	<1%
Roadside FMZ	713	3%	794	3%
Pine Oak	706	3%	479	2%
Rare Plants	42	<1%	42	<1%
Meadow Restoration	188	<1%	126	<1%
Ridgeline FMZ	1132	4%	503	2%
Total Acres	**4017**	**16%**	**2628**	**11%**

Note: this table displays the total number of acres for which each objective is the primary objective. However, many units are designed to meet multiple objectives. Refer to Table for the total number of acres to be treated for each objective.

Immature Forest

Landscape-Scale Effects

Direct

The direct effects to the Immature Forest type will occur in stands with Meadow restoration objectives. The stands have encroached into the meadow systems and would be classified as an Immature Forest type and are displayed as acres treated in Table 60. These acres after treated will no longer qualify as an Immature Forest type. These acres will provide increase in grass and forb production and offer opportunities for grazing (see wildlife report for more information).

Indirect

This cover type will see an increase in vegetation response to thinning and burning. Stands with the FMZ treatments will also see the higher amount of grass and forb production due to the lower canopy cover than stands with objectives to maintain 60% canopy cover. Treated meadow systems will see an increase in grass and forb production; this will have the indirect effect of providing light flashy fuels to maintain low intensity under burning for stands in the FMZ objective.

Cumulative

The immature forest will continue to receive treatment in the *Plantation Thinning and Hazardous Fuels Reduction EA* (2002). These cover types will be part of fuels reduction projects associated with some of the units are adjacent treatment units of the proposed Upper Briggs project. The cover types will receive thinning piling and burning.

Stand-Scale Effects

Direct & Indirect

Treated stands would receive vegetation and/or fuels treatment. After the disturbance, vegetation would take advantage of recent openings and seed or re-sprout. This would have a beneficial effect of increasing the diversity of vegetation and accelerating the development of later seral forest structure. Management of fuel loading would have the beneficial effect of reducing the potential for large stand-replacing fires.

Cumulative

If implemented, the thinning and hazardous fuels reduction described in the 2002 *Plantation Thinning and Hazardous Fuels Reduction EA* would treat stands in this cover type. Additional management of fuel loading would further reduce the potential for large stand-replacing fires.

Intermediate Forest

Landscape-Scale Effects

Direct & Indirect

Approximately 70% of the stands in the proposed action include this cover type. The treatments proposed would accelerate growth by opening growing space and reducing competition for resources. This would have a beneficial effect of increasing the diversity of vegetation, reducing the risk of insect and disease issues, and accelerating the development of late seral forest structure.

Mid-seral stands exist on approximately 27% of the watershed. This is well above the historic range of 10% -15% for mid-seral stands in this watershed. The proposed treatments would favor the development of the desired mature / late seral cover type, thereby reducing the percentage of mid-seral cover type in the watershed to 15%.

This would have a beneficial effect of increasing the diversity of vegetation and accelerating the development of later seral forest structure Indirect effects to stands in this cover type include a reduction of risk of insect and disease issues as described in the existing environment section.

Cumulative

When considering past and foreseeable future activities, the proportion of mature/ late seral forest would remain relatively stable and would begin to increase over the next 40 years as old fires and clearcuts develop back into mature/late seral forest structure. Stands with a Fuel management zones objective would maintain these stands in a late open seral type. This would reduce the risk of wildfire to other nearby stands.

Stand-Scale Effects

Direct

Thinning would reduce tree density and create more open stands in order to accelerate individual tree growth. This seral stage would be maintained or advanced over time. In 40 years the stands in the DELSH objectives would develop into mature and late seral forests with two or more canopy layers and higher densities of large trees in the overstory. Ponderosa pine would be more prominent, but Douglas-fir would still dominate much of the stands composition.

Indirect

Thinning would produce a short-term increase in grass/forb/shrubs that decrease over time, as tree crowns close in the units with the DELSH objective. The indirect effects would be the gradual canopy closure that would occur 5–7 years post treatment. Some these effects would be epicormic branching, increase in diameter growth over the stand and increased individual tree vigor. These stands would also have an establishment of understory between under burn cycles. Stands that are proposed to meet FMZ objectives will also have the direct effect of thinning to meet fuels management objectives. These stands will be more open grown to provide for these objectives. These stands will see the most overstory growth through low densities than stands in other objectives. Stands in with the FMZ objectives will also see the higher amount of grass and forb production due to the reduced canopy cover. Stands that receive FMZ treatments will have a higher percentage of fire resistant pine and hardwoods.

Cumulative

The cumulative effects for the intermediate stand type would be a movement into a mature / late seral stand structure. The stands would develop a second canopy layer and see an increase of standing snags and coarse wood development. Stands in this cover type will vary by objective of the proposed action. Stands that fall within FMZ objectives will continue to be managed through fire. These stands will continue to support light fuels to include grasses and forbs.

In addition, the Forest Service has another approved NEPA decision called *Plantation Thinning and Hazardous Fuel Reduction* (2002). This project has no current funding to implement and it is anticipated that such funding will not be available in near future. Within the Briggs Watershed, there are 7,461 acres of such thinning treatment that could be implemented.

Mature Forest

Landscape-Scale Effects

Direct

The mature/late seral forest cover type is currently 18% of the watershed. Alternative 2 would move the stands in this cover type on a trajectory towards the mature/late seral faster than Alternative 1, and would treat more acreage than Alternative 3.

Indirect

The mature/late seral cover type would be less susceptible to insect and disease influences, fire and density related mortality. This would be due to fuels clean up in FMZ locations and under-burning to reduce fuel loadings (see fuels report). Units treated in this cover type would be in a late open condition in the pine oak restoration.

Cumulative

The cumulative effects of the mature/ late seral forest type would include an increase of this cover type across the landscape. The reduction of closed late seral to open late seral would be seen in the FMZ on strategic ridgelines. The mature/late seral would see increases from the treatments of the intermediate cover type growing into the mature/late seral cover type. Under Alternative 2 this increase of cover type would be 30%. This would occur faster than Alternative 1, and more acreage would be treated than Alternative 3.

Stand-Scale Effects

Direct

At the stand scale the mature/late seral structure will be impacted by fuels treatments that occur in roadside and strategic ridgelines. However, many of the stands had a more open canopy structure in the past (prior to fire suppression) in the high elevation ridgelines. The simplification of these canopies was the result of fire suppression that led to the ingrowth of species not adapted to the fire regime. This simplification that currently shape these stands in both species composition and vertical canopy structure would be modified to higher species and canopy diversity. More acreage would be treated in Alternative 2 than Alternative 3. Unit 42 is an example of one of these stands, and vegetation effects can be seen in Table 462. Alternative 2 would focus on the ingrowth that has resulted in excess trees and fuels.

Indirect

The indirect effects on stands in this cover type will be an increase in overall forest health due to reduction of density in these stands. Table 462 displays modeling data that shows an increase of the mean diameter of trees, and a reduction of stand density in a representative stand. This reduction is due to the removal of smaller trees and a focus on leaving larger trees with fire adapted characteristics.

Cumulative

Treated stands in this class would have a decreased risk of loss.

Open

Landscape-Scale Effects

Direct

The open cover type would have an increase in acreage as a result of the proposed action. This effect would be immediate as trees and slash that are encroaching into the meadow systems are removed. This would increase sunlight to the ground for an increase of grasses and forb production. The surrounding vegetation would be thinned to feather densities approaching the meadow system to also allow light to reach the ground from the transition zone from meadow systems to forest woodlands. This increase in acreage would not increase the open cover type more than 1% across the scale of the watershed.

Indirect

The open cover type would receive frequent broadcast burning (3-7 years). Any conifer encroachment would be minimized through this activity.

Cumulative

The open cover type would continue to receive fuel treatments to maintain the meadow systems and keep the meadow systems in an early seral state. The continued maintenance would manage the encroachment of conifers.

Stand-Scale Effects

Direct

The direct effects on the open stands structure would only apply to meadows systems where the proposed action is to remove encroaching conifers. These stands would remain in an open condition due to broadcast burns.

Indirect

The indirect effects would be increased grass and forb production due to the lack of conifers competing for light resources in the meadow treatment areas.

Cumulative

Stands would continue to receive fuel treatments to maintain the meadow systems and keep the meadow systems in an early seral state. The continued maintenance would manage the encroachment of conifers.

The *Meadow Restoration CE 2007* would not be a cumulative effect because the document discusses removal of trees less than 8" DBH.

PORT-ORFORD CEDAR ROOT DISEASE (P. LATERALIS)

Alternative 1, No Action

Direct & Indirect

The no action alternative will have an effect on the existing vegetation by leaving the majority of area in a risk state for insect and disease, fire (both human and natural) and density related mortality. The stands that are displayed in the map that are in the very low soil moisture availability will continue to have individual and group tree mortality due to insect and disease, competition of limited resources and increased mortality due to fire.

There would be no additional risk of spread of *P. lateralis* under Alternative 1 because no project activities would occur within the Upper Briggs Restoration Project Analysis area. *P. lateralis* infestation would continue to increase over time because of the presence of *P. lateralis* outside of the proposed action.

Evolving Conditions

The vast majority of recreational traffic occurs during dry weather conditions, when the spread of *P. lateralis* is less likely.

Other projects considered in cumulative effects analysis are vegetation activities as part of the *Plantation and Hazardous Fuels Treatment Environmental Analysis* ROD 2002 and *Meadow Restoration and Enhancement* 2005. All projects utilize an integrated approach to management practices regarding reduction of risk of spread of *P. lateralis*. Each projects the risk of spread was zero to two percent. Including this project, the total risk of spread of *P. lateralis* is zero to eight percent.

Over the next 5 to 20 years, four to five new acres of root disease would be estimated to occur along streams that flow through areas of measurably contributing POC. Less than one new acre of root disease is expected annually where *P. lateralis* areas and healthy POC are adjacent to each other.

Effects Common to Alternative 2 (Proposed Action) & Alternative 3 (Reduced Treatment)

Direct

There would be a very low probability of additional risk of spread of *P. lateralis* (0 to 2 percent probability of occurring). See Table 451.

Table 451. Risk of Spread of *P. lateralis.*

	Length (Miles) of Road Treatment	Acres of Measurably Contributing POC
Alternative 2	22.91	2.18
Alternative 3	22.91	0.63

Both alternatives would utilize an integrated management approach to mitigate the spread of P. lateralis. The combination of Project Scheduling, Unit Scheduling, and Control of access, Washing, Utilizing Uninfested Water or treated water for operations, Planting resistant POC, Routing Recreation use, and applying restrictions during summer rain events incorporates key recommendations to reduce the risk of P. lateralis spread or introduction of new infestations. This integrated management approach would reduce the risk of spread of P. lateralis to 0 to 2%. Without mitigation, the relative probability would be very high (50.1 to 100 percent probability of occurring).

Both Alternatives would reduce the risk of *P. lateralis* by reducing road densities with the Upper Briggs Restoration Project 6th field watershed. Most importantly the reduction of road densities in the fifteen 7th field uninfested watersheds would be reduced by 6.6 miles. 7.5 miles of roads that are put into the storage will also provide at least ten years of reduced risk of new infestations of *P. lateralis* in the 7th field uninfected watersheds. Total reduction of access through decommissioning and storage would be 40% of roads in the 7th field uninfested watersheds.

Indirect

The reduction of road densities will have indirect effect that will reduce risk of new *P. lateralis* infestations. This reduction of risk would help to preserve the POC cores in the watersheds.

Cumulative

The effects of management prior to the 2004 POC Record of Decision are described in the Final Supplemental Environmental Impact Statement Management of Port-Orford-cedar in Southwest Oregon and are incorporated by reference.

The vast majority of recreational traffic is during dry weather conditions, when the spread of *P. lateralis* is less likely (as discussed in detail in the POC FSEIS).

Other projects considered in cumulative effects analysis are vegetation activities as part of the *Plantation and Hazardous Fuels Treatment Environmental Analysis* ROD 2002 and *Meadow Restoration and Enhancemen*t 2005. All projects utilize an integrated approach to management

practices regarding reduction of risk of spread of *P lateralis*. Each projects risk of spread was zero to two percent risk of spread therefore the total risk of spread of *P. lateralis* including this project is zero to eight percent.

COMPARISON OF ALTERNATIVES USING FOREST VEGETATION SIMULATOR (FVS)

The Forest Vegetation Simulator (FVS) is a family of forest growth simulation models that simulate a wide range of silvicultural treatments for most major forest tree species, forest types, and stand conditions. FVS answers questions about how forest vegetation will change in response to natural succession, disturbances, and proposed management actions. For more information about FVS, visit https://www.fs.fed.us/fvs/whatis/index.shtml.

Comparison of Effects on Representative Treatment Units

Stand-level data was used to model the vegetation effects of treatment in representative units; the results are shown in Table 462. Effects measured were: trees per acre (TPA), quadratic mean diameter (QMD), basal are (BA), stand density index (SDI), and relative density index (RDI). The stands selected for modeling represent the average across different vegetation types within the unit. For unit locations see Figure 3 and Figure 4.

Table 46. Comparison of Effects on Representative Treatment Units.

	Alternative 1 No Action					Alternative 2 Proposed Action					Alternative 3 Reduced Treatment				
UNIT 2: Develop & Enhance Late Seral Habitat (DELSH)															
Year	**TPA**	**QMD**	**BA**	**SDI**	**RDI**	**TPA**	**QMD**	**BA**	**SDI**	**RDI**	**TPA**	**QMD**	**BA**	**SDI**	**RDI**
2017	249	16.9	311	486	.44	249	16.9	311	486	.44	247	16.9	311	486	.44
2022	248	17.3	325	502	.45	136	22.5	254	366	.33	243	17.4	321	495	.45
2057	234	17.8	409	596	.54	52	32.2	290	336	.31	201	18.6	377	543	.49
UNIT 3: Restore Pine-Oak Communities															
Year	**TPA**	**QMD**	**BA**	**SDI**	**RDI**	**TPA**	**QMD**	**BA**	**SDI**	**RDI**	**TPA**	**QMD**	**BA**	**SDI**	**RDI**
2017	1150	9.6	399	801	.98*	1150	9.6	399	801	.98*	1150	9.6	399	801	.98*
2022	1060	10	404	796	.98	399	9.7	158	309	.38	447	10.3	208	393	.48
2057	567	11.7	430	739	.91	88	18.9	159	230	.28	75	22.9	217	286	.35
UNIT 48: Restore Meadow Systems															
Year	**TPA**	**QMD**	**BA**	**SDI**	**RDI**	**TPA**	**QMD**	**BA**	**SDI**	**RDI**	**TPA**	**QMD**	**BA**	**SDI**	**RDI**
2017	198	6.4	307	590	.72	198	6.4	307	590	.72	198	6.4	307	590	.72
2022	187	6.8	312	588	.72	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2057	172	9.9	369	590	.72	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
UNIT 63: Restore Riparian Reserves															
Year	**TPA**	**QMD**	**BA**	**SDI**	**RDI**	**TPA**	**QMD**	**BA**	**SDI**	**RDI**	**TPA**	**QMD**	**BA**	**SDI**	**RDI**
2017	232	9.6	176	311	.38	232	9.6	176	311	.38	232	9.6	176	311	.38
2022	231	10.4	205	351	.43	88	11.0	84	141	.17	179	13.4	177	289	.35
2057	258	14.3	367	559	.68	57	21.9	151	202	.25	112	21.2	275	375	.46
UNIT 42: Create & Maintain Strategically Located Fuel Management Zones (FMZ)															
Year	**TPA**	**QMD**	**BA**	**SDI**	**RDI**	**TPA**	**QMD**	**BA**	**SDI**	**RDI**	**TPA**	**QMD**	**BA**	**SDI**	**RDI**
2017	556	9.8	221	431	.53	556	9.8	221	431	.53	556	9.8	221	431	.53
2022	544	10.4	243	463	.57	109	13.4	97	162	.20	109	13.4	97	162	.20
2057**	412	12.7	364	607	.74	47	23.4	140	184	.23	47	23.4	140	184	.23

*Maximum SDI computed at 815 for the site in the model. The current stand data is above the threshold of maximum density. These areas will have a high risk of mortality

**The stand used in this example does not display differences between Alternative 2 and Alternative 3. Trees >80 years of age would not be removed in Alternative 3.

Comparison of Effects on Tree Structure in Riparian Treatment Units

Additional modeling was conducted on data from all riparian treatment units. The results of this modeling are shown in Table 473.

Table 473. Comparison of Effects on Tree Structure in Riparian Treatment Units.

	Trees Per Acre (>8" DBH)			Tree Height (ft.)			Mean Diameter (QMD*) (in.)		
	Alt. 1 No Action	Alt .2 Proposed Action	Alt. 3 Reduced Treatment	Alt. 1 No Action	Alt .2 Proposed Action	Alt. 3 Reduced Treatment	Alt. 1 No Action	Alt .2 Proposed Action	Alt. 3 Reduced Treatment
2017	130.5	130.5	130.5	107.8	107.8	107.8	7.8	7.8	7.8
2022	134.9	109.6	120.3	110.5	107.0	110.2	8.4	9.1	9.0
2057	133.4	110.7	124.0	141.0	136.7	139.3	11.8	15.0	13.8

**Quadratic Mean Diameter (QMD) is the measure of the mean weighted towards the larger diameter trees.*

Alternative 1, No Treatment: Riparian units would retain more trees per acre and those trees would be smaller in diameter in comparison to the other treatment alternatives. As time progressed there would be fewer trees in the understory due to shading; and trees would be very tall in comparison to their diameter, increasing the risk for stand collapse from breakage due to snow and wind events.

Alternative 2, Proposed Action: Riparian units would have fewer trees per acre than the other alternatives.

Alternative 3, Reduced Treatment: Alternative 3 would leave a larger buffer of untreated areas in riparian units in comparison to Alternative 2. As a result, riparian treatment units would have more trees per acre and those trees would be smaller in diameter in comparison to Alternative 2. As time progressed in the buffer zone, there would be fewer trees in the understory due to shading; and trees would be very tall in comparison to their diameter, increasing the risk for stand collapse from breakage due to snow and wind events.

3.3 Socio-Economic Resources

3.3.1 Heritage

The Upper Briggs heritage resource report (Julien 2017) assess heritage resources potentially present within the project area provides a full explanation of measurements and metric used in evaluating the information for the no action and action alternatives. The information provided in this EA is summarized from the heritage report and is available here: http://www.fs.fed.us/nepa/nepa_project_exp.php?project=45593.

Cultural resource identification efforts in the vicinity of the planning area have focused on two primary types of resources: Native American archaeological sites and historic archaeological sites. These can include areas of stone tool manufacture, vision quest sites, historic homesteads, historic mining features, and Forest Service administrative features (i.e. trails, roads, telephone lines). Places that may support resources of contemporary tribal interest, (i.e. culturally important plant locations), were also considered.

3.3.1.1 EXISTING CONDITIONS

Cultural resources represent the tangible and intangible evidence of human behavior and past human occupation. Remnants of past and current human activities and events can be found throughout the area that reflect the exploration, settlement, mining and management by Euro-American cultures.They may consist of the archaeological sites, historic-age buildings and structures, and traditional use areas and cultural places (TCP) that are important to a group's traditional beliefs, religion or cultural practices. These types of resources are finite and non- renewable.

Protection and management of cultural resources is mandated by federal laws and regulations. The primary legislation governing cultural resource management is the National Historic Preservation Act (NHPA) of 1966 as amended. Section 106 of NHPA requires that federal agencies take into consideration the effects of their undertakings on historic properties. The term “historic properties” refers to cultural resources, both prehistoric and historic, that are listed or eligible for listing in the National Register of Historic Places (NRHP). The Pacific Northwest Region has a programmatic agreement (PA) with the Advisory Council on Historic Preservation (ACHP) and the Oregon State Historic Preservation Officer (SHPO) that stipulates the Forest Service’s responsibilities for complying with NHPA. The Rogue River-Siskiyou National Forest is complying with the legal requirements for the identification, evaluation, and treatment of historic properties under the programmatic agreement in lieu of standard consultation procedures in Council’s regulations (36 CFR 800).

Past and current cultural resource inventory surveys of the planning analysis area identified 62 previously recorded cultural resource sites dating to the historic period. Within the analysis area the maximum acreage proposed for actions and treatments is approximately 3,972 acres. This area was determined as the Area of Potential of Effect (APE) for cultural resources. Thirty one sites are within or directly adjacent to the APE. Those resources include two roads, eight trails, six mining ditches, three refuse dumps, four habitation sites, three mining sites, a gravesite, a Forest Service guard station, a fire lookout, remains of telephone lines, and a dam.

Traditional Cultural Properties (TCP) are places associated “with cultural practices or beliefs of a living community that (a) are rooted in that community’s history, and (b) are important in maintaining

the continuing cultural identity of the community" (National Park Service, 1998). TCPs range from mountains and other landforms to plant gathering locations to communities..

Traditionally used vegetation located in the analysis area includes mixed conifer and hardwoods, including Douglas-fir, white fir, ponderosa pine, sugar pine, incense cedar, tan oak, madrone, canyon live oak and black oak. Edible and other traditionally used plant products within the area include blackberries, manzanita berries, bulbs (such as onion or lily) bear grass, hazelnuts, and acorns. Elk, Black-tailed deer, black bear, grouse, quail, and other animals inhabit the general area. Native fish, are present in many of the streams in this area but have been impacted by past mining and natural geological processes.

The APE is within the ceded lands of the Confederated Tribes of the Siletz, Confederated Tribes of the Grand Ronde, and the Cow Creek Band of Umpqua Tribe of Indians. The Forest consulted the following Federally Recognized Tribes concerning the proposed action: The Confederated Tribes of Siletz Indians, Confederated Tribes of the Grand Ronde, the Cow Creek Band of the Umpqua Indian Tribe, Quartz Valley Indian Reservation, Elk Valley Rancheria, and the Tolowa Dee-ni Nation. Review of existing literature did not identify any known TCPs in the APE. At present, consulted tribes have not identified any specific traditional cultural properties that could be affected by project activities. The Confederated Tribes of the Siletz have commented to the Forest that they use timber, plants, and wildlife resources for traditional practices

Of the 31 identified cultural resource sites within the APE, the Forest previously evaluated and determined 15 sites as not eligible and one site is eligible for nomination to the National Register of Historic Places (NRHP) with SHPO concurrence. The National Register status of 15 sites remains unevaluated. These sites will be treated and managed as eligible until a formal determination is made. The most recent listings of the National Register of Historic Places were consulted for nominated and listed properties. No listed properties are located within the APE.

3.3.1.2 ENVIRONMENTAL CONSEQUENCES

Under the regulations an adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a cultural resource that qualify the property for inclusion in the National Register. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative. Specific examples of adverse effects cited in statute include (36 CFR 800.5):

- Physical destruction of or damage to all or part of the property.
- Removal of the property from its historic location.
- Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance.[7]
- Introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant[8] historic features.

[7] Significance" as defined by the National Register Bulletin #15 (USDI 1990).

[8] Significant" as defined by the National Register Bulletin #15 (USDI 1990).

Impacts to cultural resources, especially archeological sites, can be generally defined as anything that results in the removal of, displacement of, or damage to artifacts, features, and/or stratigraphic deposits of cultural material. In the case of traditional cultural properties and sacred places, additional considerations may include alterations that would affect the character and use of the location, and/or presence and availability of a specific traditionally used natural resource

ALTERNATIVE 1—NO ACTION

Direct & Indirect Effects

The "No Action" alternative will not involve any direct project impacts to cultural resources within the analysis area; cultural resources will likely remain in the condition in which they currently exist. The sites will remain as they are, exposed to the customary and natural threats posed to archaeological sites by weathering, erosion, and exposure to the elements.

ALTERNATIVE 2—PROPOSED ACTION & ALTERNATIVE 3

Direct & Indirect Effects

All of these proposed activities have the potential to alter, damage or destroy eligible and unevaluated cultural resources that are located within the proposed treatment areas. No impacts to cultural resources are anticipated from road maintenance activities. Proposed temporary roads have the potential to adversely impact cultural resource but will be avoided. Proposed haul routes have the potential to directly adversely impact cultural resources but will be avoided and monitored. Decommissioning the following Forest System Roads 100, 152, 160, 660, 610, 650, 665, and 658 has the potential to directly impact cultural resources that parallel, intersect the FSR prism but will be avoided and monitored. The proposed stream crossing improvements will have no effect to cultural resources.

Indirect impacts to all sites within the proposed treatments areas may occur from increased site visibility and erosion caused by removal of overstory vegetation and surface vegetation by mechanized removal and harvest and fire treatments. Increased visibility can substantially increase inadvertent or advertent looting activities. Direct and indirect impacts from prescribed fire to non-combustible sites and materials are mostly caused by increased erosion from loss of ground cover. Direct impacts from fire to historic combustible or fire sensitive sites is caused by the permanent damage or destruction of cultural materials and objects by burning, melting, or consuming the material. All cultural resources will be avoided from ground disturbing activities. Prescribed fire treatments will avoid combustible features of sites.

Cumulative Effects

When discussing the cumulative effects of the Upper Briggs Integrated Project on cultural resources, the previous and future projects and natural events within the current analysis area must be taken into consideration. Previous projects which have occurred within the APE have included timber sales, salvage sales, wildlife improvement projects, mining operations, and recreation improvements. Each of these projects had the potential to adversely affect cultural resources. These projects were required to follow regulations and procedures in regard to protecting cultural resources; and generally resulted in no effect to eligible and unevaluated cultural resource sites within the project area.

Numerous projects that are within or near the analysis area will continue or be initiated during the life of the Upper Briggs project. These include regular ongoing RRSNF management activities (including permitted use), such as trail maintenance, livestock grazing, utility corridor maintenance, road maintenance, recreation site maintenance, and current mining operations. Each of these activities has the potential to affect cultural resources, though those effects cannot be predicted or measured unless the nature of the activity and specific location are known. Each of these activities requires examination on a case-by-case basis to determine their potential to affect cultural resources. In addition, normal and expected forest-use activities will occur within the analysis area, such as camping, hiking, fuelwood cutting, winter sports, hunting, and fishing. These activities are not expected to have an adverse effect on cultural resources.

Several positive cumulative effects on cultural resources under the proposed action alternative will be cultural resources are monitored, inventoried and evaluated. This will increase the knowledge of mining and historic use patterns of the Rogue River-Siskiyou National Forest. The Forest will continue to provide timber and forest products (first foods and materials for traditional practices) used by Tribes for traditional purposes.

Regardless of the alternative selected, the effects associated with the Upper Briggs project combined with the effects from past, present, and reasonably foreseeable future actions will not have a measurable cumulative effect on eligible or unevaluated cultural resources located within the APE if standard mitigation measures are followed.

MITIGATION MEASURES

Cultural resources in the APE are vulnerable to impacts from mechanical treatments and restoration activities, road construction and decommissioning, prescribed broadcast and pile burning, and from associated activities with these undertakings. All proposed treatments will be managed for having “no effect” to cultural resources. This means that all sites will be avoided by the proposed activities. Upper Briggs project managers will work with the Forest Archaeologist or Zone Archaeologist to assure there is adequate notification and time to implement the required protection measures in Table 99.

DETERMINATION OF EFFECT

Adequate inventories have been completed of the APE to identify cultural resources. Cultural resources will be identified for avoidance. Appropriate protection measures will be implemented to assure sites are avoided during all phases of the project. The Upper Briggs Integrated Project is expected to have a **No Effect** to historic properties as defined under 36 CFR 800 if the protection and mitigation measures are implemented. This project is in compliance with the NHPA of 1966 as amended, EO 11593, and EO 13007. Monitoring of historic properties during and after project implementation will be completed.

If these measures are followed the undertaking meets a finding of “Historic Properties Avoided” Stipulation III B. (II) of the Oregon Programmatic Agreement between the Pacific Northwest Region, the Advisory Council on Historic Preservation (ACHP) and the Oregon State Historic Preservation Officer (SHPO). Under the Stipulation, the Forest may proceed with the undertaking provided that avoidance of all properties is achieved and documentation is provided to the SHPO.

3.3.2 Recreation & Visuals

Information for recreation is incorporated entirely in this EA and assesses potential effects to recreation resources within the project area and provides a full explanation of measurements and metric used in evaluating the information for the no action and action alternatives.

3.3.2.1 EXISTING CONDITIONS

Briggs Valley is the closest Forest Service recreation area to Grants Pass and offers a diverse mix of recreational opportunities including developed campgrounds, motorized and non-motorized trails, fishing, hunting, berry and mushroom picking and dispersed camping. Recreation use occurs in this area all year long and ranges from a low level of use in the winter to a moderate level of recreational use in the spring, summer and fall. However, winter use is dependent on snow levels since access to Briggs Valley can be blocked by snow.

The Recreation Opportunity Spectrum (ROS) is the method used by the Forest Service to inventory and manage outdoor recreation settings and to insure that a broad mix of these settings remain available to provide the recreating public with experiences ranging from high challenge and remoteness (Primitive) to highly developed and managed settings found in some Forest Service recreation areas (Urban).

The Briggs Valley area has been assigned an ROS of Roaded Natural (Modified). A Roaded Natural ROS class is defined as an area that is characterized by predominantly natural-appearing environment with moderate to heavy evidence of the sights and sounds of man. Forest is accessible by foot, horse, mountain bike, and motor vehicle. A well-developed system of roads (generally gravel surfaced) provides access to much of the Forest, although some roads may be closed to specific vehicles. Recreation experiences include both opportunities for group interaction, and isolation from others in different settings and locales.

CAMPGROUNDS

There are two (2) operating developed campgrounds and one (1) closed developed campground located in the Upper Briggs Project planning area. Sam Brown Horse Camp has seven (7) campsites suitable for equestrian use and a trailhead to the Dutchy Creek trail #1146. Sam Brown Campground has 17 campsites, a group use area, a day use area, two pavilions and a trailhead for the Briggs Creek trail #1132. Big Pine Campground has been closed since 2014 due to hazard trees. All of these campgrounds are accessed from Forest Road 25.

TRAILS

There are all of or portions of nine (9) trails located in the Upper Briggs Project planning area:

- Taylor Creek trail #1142
- Taylor Camp trail # 1138
- Dutchy Creek trail # 1146
- Secret Way trail # 1282
- Secret Way Spur trail #1282A
- Onion Way trail # 1157
- Big Pine Interpretive Loop # 1155 & 1155A

- Briggs Creek trail # 1132
- Big Pine Access Spur # 1142A

The Taylor Creek trail #1142, Taylor Camp trail #1138, Dutchy Creek trail #1146, Secret Way trail #1282, Onion Way trail #1157, Briggs Creek trail #1132 and the Big Pine Access Spur #1142A all have an assigned Trail Class of TC-4 Highly Developed and are open to equestrian use, hikers, bicycles and motorcycles. A Trail Class is defined as the "prescribed scale of development for a trail" and a Highly Developed trail has a tread width of 24" to 96" and is relatively smooth with few irregularities.

The Big Pine Interpretive Loop trails #1155 and 1155A have an assigned Trail Class of TC-5 Fully Developed and are only open to hikers. A Fully Developed trail often has a tread of imported materials with a tread width of 36" to 72" that is uniform, firm, and stable. (U.S. Forest Service Trail Design Parameters).

DISPERSED RECREATION

The primary dispersed recreation activities within the Upper Briggs Project planning area include: vehicle camping, viewing scenery, hunting, berry picking, mushroom picking, and off-highway vehicle use. There are no monitored dispersed camping sites in the project area; however, Meyer's Camp and Secret Creek are popular dispersed camping areas. Meyer's Camp has a dilapidated toilet which is slated for removal, one picnic table and a fire ring, while Secret Creek has no amenities. Other dispersed camping sites can be found in the planning area and are generally located at the end of roads often near water.

RECREATION SPECIAL USE PERMITS

There is one ongoing commercial recreation special use permit (Return on the Jedi Mountain Bike Festival) and one new (2017) commercial recreation special use permit (Sasquatch 50K Run) that utilizes roads and trails in the Upper Briggs Project planning area. The Return on the Jedi Mountain Bike Festival has 3 races, a short track race, Super D race and a cross country race that utilizes Forest Road 25, Forest Road 138, Forest Road 121, Forest Road 2509 and the Onion Way trail, Secret Way trail, Taylor Creek trail, and the Briggs Creek trail. For the last two years the event has occurred on the first weekend in June and over 150 racers participated in the event. The Sasquatch 50K Run is schedule for May 20 and uses trails in the Taylor Creek and Briggs Creek areas with the start and finish at Sam Brown Campground.

Annually there are several permitted non-commercial group use events that occur in the Upper Briggs Project planning area. The number of permitted non-commercial events varies from year to year from one (1) to six (6) events. Some events that have occurred annually in the past in Sam Brown campground include a Boy Scouts of America campout/ work party during the third week of June, a Civil Air Patrol training during the first week of April, a National Guard training the second weekend in February, and the North Middle School two day educational event the third week of May. Several weddings also occur throughout the summer at Sam Brown Campground.

CONGRESSIONALLY DESIGNATED AREAS

There are no congressionally designated areas (Wilderness, Wild and Scenic Rivers, Wilderness Study Areas or National Recreation Areas) in the Upper Briggs Project planning area.

INVENTORIED ROADLESS AREAS OR POTENTIAL WILDERNESS AREAS

Over half of the Briggs Inventoried Roadless Area (IRA) is in the Upper Briggs Project planning area (Figure 42). The Briggs IRA was first inventoried in the 1970s for study as a potential Wilderness under the Roadless Area Review and Evaluation (RARE II). At that time it contained 5,762 acres and was allocated to non-Wilderness use by the RARE II decision in 1979. Under the Siskiyou National Forest LRMP the Briggs IRA was re-inventoried to contain 5,544 acres, this change is acreage was due to several timbers sales between 1984 and 1988. Most recently, in 2001 the Briggs IRA was added to the Roadless Area Conservation Rule and was identified as containing 5,919.75 acres, this change in acreage could potentially be due to improved mapping methods.

Acreage in the Briggs IRA is assigned to five Management Areas under the LRMP: MA8- Designated Wildlife Habitat (810 acres); MA9- Special Wildlife Site (321 acres); MA11- Riparian (797 acres); MA13- Partial Retention Visual (41 acres); and MA14- General Forest (3,575 acres). These allocation decisions were made during the development of the LRMP and are documented in the Record of Decision for that plan (USDA Forest Service 1989).

Roadless areas often provide outstanding dispersed recreation opportunities, such as hiking, camping, picnicking, wildlife viewing, hunting, fishing and botanizing. While they may have many wilderness-like attributes, unlike Wilderness areas, the use of mechanized and motorized travel is often allowed. These areas can also take pressure off heavily used Wilderness areas by providing additional solitude, quiet, and dispersed recreation opportunities.

The portion of the Briggs IRA that is located in the Upper Briggs Project planning area contains the Briggs Creek trail #1132; and the 2512040 Elk Horn Mine road. The Briggs Creek trail is open to motorcycles and has several creek crosses and receives a low amount of use. The Elk Horn Mine road historically provided access to the Elk Horn Mine and is a very rugged high clearance 4-Wheel Drive road that also receives a low amount of use.

Other than some small dredging and gold panning along Briggs creek and several tributaries, the remainder of the Briggs IRA receives very light use.

Areas of potential Wilderness identified using inventory procedures found in FSH 1909.12, Chapter 71, are called *Potential Wilderness Areas* (PWA). Potential wilderness areas do not reflect a land designation decision, do not imply or impart any particular level of management direction or protection, are not an evaluation of potential wilderness (FSH 1909.12, Chapter 72), and are not preliminary administrative recommendations for wilderness designation (FSH 1909.12, Chapter 73). The inventory of PWAs does not change the administrative boundary of any IRA or any congressionally designated Wilderness areas.

PWA inventories typically occur during a forest plan revision. When the Rogue River-Siskiyou National forest conducts a plan revision, an inventory of PWA will likely be conducted at that time. Currently, there are no known identified PWAs.

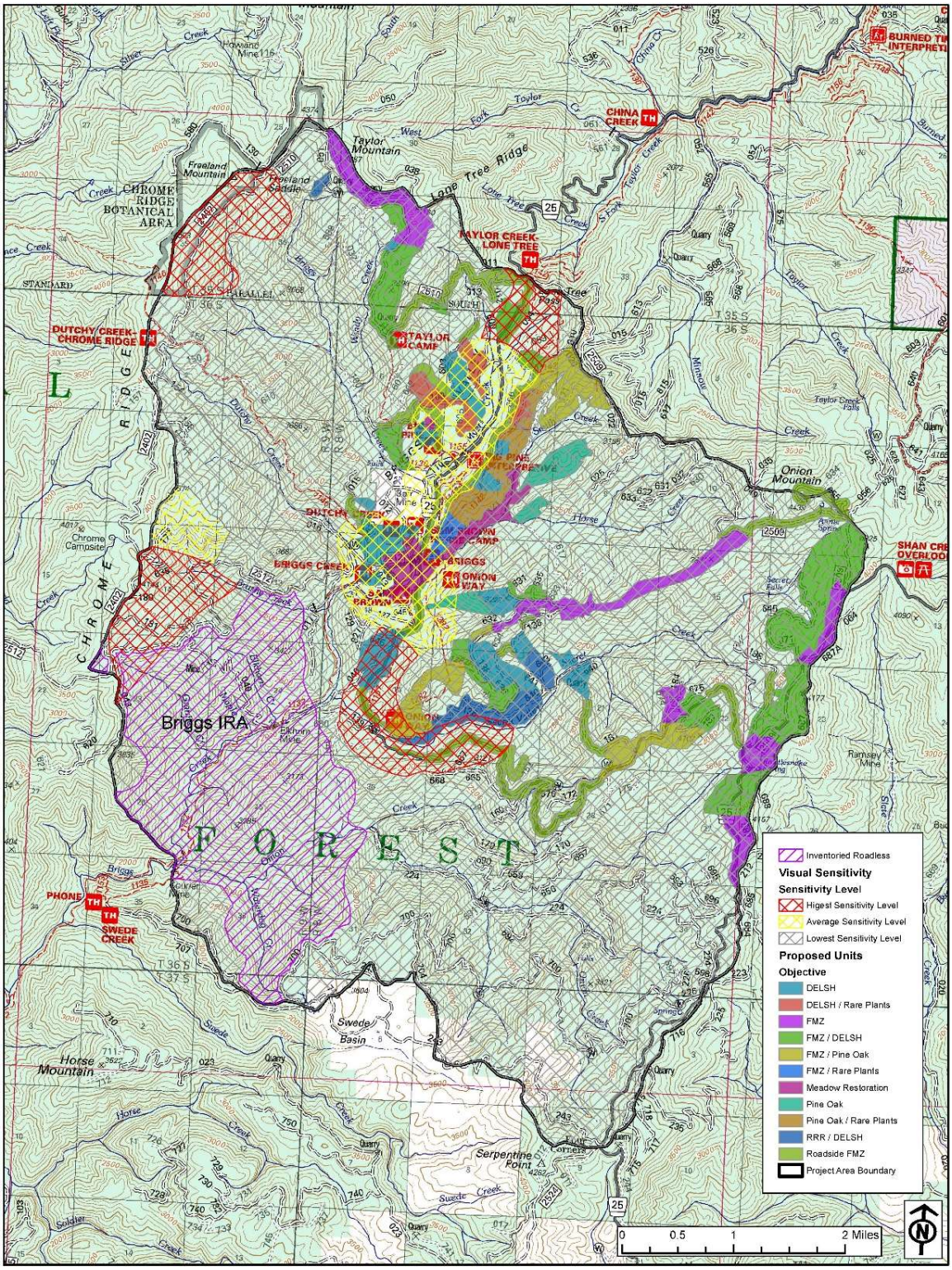


Figure 42. Inventoried Roadless Areas and Scenic Quality (Alternative 2)

SCENIC QUALITY

Background and Management Direction

Under the Siskiyou National Forest LRMP each Management Prescription has an assigned Visual Quality Objectives (VQOs) in order to maintain a sense of a natural system and meet the public's scenic expectations in the National Forest.

Visual quality objectives are based on two components:

Variety Class: A measure of the visual variety or diversity of landscape character. The three variety classes are A (Distinctive), B (Common), and C (Minimal).

A Distinctive Variety Class is defined as "those areas where features of landform, vegetative patterns, water forms and rock formations are of unusual or outstanding visual quality.

A Common Variety Class is defined as "those areas where features contain variety in form, line, color, and texture or combinations thereof but which tend to be common throughout the character type and are not outstanding in visual quality".

A Minimal Variety Class is defined as "those areas whose features have little change in form, line, color, or texture. Includes all areas not found under the Distinctive and Common Variety Classes" (The Visual Management System of the Forest Service, USDA).

Sensitivity Levels and Distance Zones: Sensitivity levels are a measure of the viewer interest in scenic qualities of a landscape. The three levels are 1 (Highest), 2 (Average), and 3 (Lowest). Distance zones include foreground (up to 1/2 mile), middleground (1/2 mile to 5 miles), and background (over 5 miles).

Level 1 – for primary travel routes and recreation use areas, where visitors are anticipated to have a high concern for the visual quality.

Levels 2 and 3 – for areas that are not heavily used, and where users have a moderate or low concern for the visual quality due to a commodity orientation to the landscape.

In the immediate foreground (0-300 ft.) distance zone visitors "can distinguish individual leaves, flowers, twigs, bark texture and small animals an can notice movement of leaves and grasses in light winds". (Landscape Aesthetics - A Handbook for Scenery Management, USDA Forest Service, Agriculture Handbook Number 701).

Visitors in the foreground distance zone "can distinguish small boughs of leaf clusters, tree trunks and large branches, individual shrubs, clumps of wildflowers, medium-size animals and medium-to-large sized birds". (Landscape Aesthetics - A Handbook for Scenery Management, USDA Forest Service, Agriculture Handbook Number 701).

In the middleground distance zone visitors "can distinguish individual treeforms, large boulders, flower fields, small openings in the forest and small outcrops". (Landscape Aesthetics - A Handbook for Scenery Management, USDA Forest Service, Agriculture Handbook Number 701).

Finally, at the background distance zone visitors "can distinguish groves or stands of trees, large openings in the forest, and large rock outcrops". (Landscape Aesthetics - A Handbook for Scenery Management, USDA Forest Service, Agriculture Handbook Number 701).

Overall the Briggs Valley area has a "common" landscape character. Though the Briggs Valley area is quite scenic with steep, heavily forested mountains, there are no features that are outstanding in quality

or that are known nationally for their scenic importance. However, a case could be made that the candidate trees for the World's tallest Ponderosa Pine tree could be a distinctive vegetative pattern.

The majority of the Upper Briggs Project planning area has been designated a low (level 3) visual sensitivity level (Figure 1) under the Siskiyou LRMP. Areas of average (level 2) visual sensitivity level have been designated along Forest Road 25 and in the campgrounds. Areas with the highest visual sensitivity level (level 1) are found at locations where visitors can see for long distances at Lone Tree Pass and along the Chrome Ridge Road (Forest Road 2402).

The General Forest Management Prescription 14 area has an assigned VQO of Modification and Maximum Modification. A Modification VQO is defined as an area where "human activity may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in the foreground or middleground." (Visual Quality Objectives in Douglas-fir Forests, Pg. 3).

A maximum modification VQO is defined as an area where "management activities of vegetative and landform alterations may dominate the characteristic landscape. However, when viewed as background, the visual characteristics must be those of natural occurrences within the surrounding area or character type. When viewed as foreground or middle ground, they may not appear to completely borrow from naturally established form, line, color, or texture. Alterations may also be out of scale or contain detail which is incongruent with natural occurrences as seen in foreground or middle ground." (Landscape Aesthetics - A Handbook for Scenery Management, USDA Forest Service, Agriculture Handbook Number 701).

In these locations, "activities of vegetative and landform alteration must borrow from naturally established form, line, color, and texture so completely, and at such a scale that its visual characteristics are those of natural occurrences within the surrounding character type. Impacts should be mitigated within five years after project completion". (Siskiyou LRMP, Ch. IV, Pg. 140).

In these areas timber management is the primarily goal and it is expected to be evident from foreground (up to 1/2 mile) and middleground (up to 5 miles) view points in the form of roads, log landings, tree stumps, slash and silvicultural treatments.

Visual impacts to areas of Modification VQO should be reduced or eliminated within a year. In locations that are assigned a Maximum Modification VQO visual impacts should be reduced or eliminated within 5 years.

A Partial Retention VQO is defined as an area where "management activities are visually evident but subordinate to the characteristic landscape. Activities may repeat form, line, color, or texture common to the characteristic landscape but changes in their qualities of size, amount, intensity, direction, pattern, etc., remain visually subordinate to the characteristic landscape". (Landscape Aesthetics - A Handbook for Scenery Management, USDA Forest Service, Agriculture Handbook Number 701).

The primary management goal of Partial Retention Visual areas is to "provide a level of attractive scenery by maintaining the area in a near natural condition". (Siskiyou LRMP, Ch. IV, Pg. 135). Visual impacts to resources that are assigned a Partial Retention VQO should be eliminated as soon as the project is completed or at a minimum within the first year.

3.3.2.2 ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1—NO ACTION

Alternative 1 would neither alter nor enhance current dispersed recreation opportunities, trail opportunities, special use permit opportunities, congressionally designated areas, inventoried roadless areas or potential wilderness areas, and scenic quality.

ALTERNATIVE 2- PROPOSED ACTION & ALTERNATIVE 3

Campgrounds

Direct & Indirect Effects

Under the Proposed Action and Alternative 3 meadow restoration treatment is proposed in the Sam Brown Campground and the Sam Brown Horse Camp and Pine/Oak restoration treatment is proposed in Big Pine Campground.

Meadow restoration treatment would remove conifers that are encroaching on the meadows in the Sam Brown Campground and the Sam Brown Horse Camp, then piling and burning the debris, with under burning occurring 4 to 5 years post treatment. The Pine/ Oak restoration in the Big Pine Campground would thin trees from below and then pile and burn the debris.

The developed recreation sites in the Upper Briggs Project planning area are accessed by roads (FR 25 and FR 2512) which are the haul routes for commercial timber removal. Forest Road 25 is the main access route for recreationists into the Briggs Valley area and is a narrow paved two lane road with steep grades and blind corners.

A short- term indirect impact to develop recreation sites is the combining of commercial vehicle traffic and public vehicle traffic which increases the chance of accidents.

Another short-term indirect impact to developed recreation sites as a result of this project is noise from management activities. Noise from management activities can impact recreationists experience depending on the location of the activities and amount of screening (trees and topography) between the locations.

Similar to noise, burning piles and under burning could have a short-term Indirect Impact to developed recreation sites with smoke impacting the recreational experience.

Cumulative Impacts to Developed Recreation Sites

Cumulative Impacts to developed recreation sites include the present, including ongoing activities and activities in the foreseeable future (10 years).

None of the action alternatives considered in detail would change the long-term developed recreation opportunities described in the planning area. Recreation and vegetation management activities have co-existed in this area previously, as evidenced by the use of landings and clearcuts as scenic vistas and the use of roads constructed for timber removal as trails. Short term effects from noise and traffic associated with all activities from the Upper Briggs Project would end once the project are completed.

Dispersed Recreation

Direct & Indirect Effects

Impacts as a result of this project to dispersed recreation activities are similar to developed recreation sites except for there will be a Direct Impact to certain dispersed recreation activities during management activities.

When management activities are occurring recreationist will not be able to access some dispersed campsites that are in the project area and access to some dispersed campsites will be lost due to the decommissioning of roads. Other activities such as hunting, berry picking and mushroom hunting will not be able to occur in the project area that have active work occurring.

Cumulative Impacts to Dispersed Recreation Activities

The only long-term Impact to dispersed recreation activities is the loss of access to dispersed campsite locations with the road decommissioning. Otherwise, none of the action alternatives considered in detail would change the long-term dispersed recreation opportunities described in the project planning area.

Trails

There are approximately 28 miles of trails in the Upper Briggs Project planning area. However, not all of these trails are in areas that are proposed for treatment. Under Alternative 2 approximately 7.1 miles of trails are in proposed treatment areas and under Alternative 3 approximately 4.5 miles are in proposed treatment areas.

Direct & Indirect Effects

Table 484 shows the trails in the proposed treatment areas. The proposed activities identified in the action alternatives would have a short term direct impact to trail users if trails are to be closed during management activities due to safety concerns. Alternative 3 would have less of a short term Direct impact to trail users since less mileage of trail are located in treatment areas.

Table 48. Trails in the Upper Briggs Project Treatment Areas.

Trails in Upper Briggs Project Treatment Areas	Alt. 2 Trail Miles	Alt 3 Trail Miles
Secret Way #1282	0.5	0.0
Secret Way Spur #1182A	0.6	0.0
Onion Way # 1157	1.0	1.0
Taylor Camp #1138	0.5	0.25
Dutchy Creek #1146	0.5	0.0
Taylor Creek #1142	4.0	3.25
Total Miles	**7.1**	**4.5**

The Taylor Creek trail is the most popular trail in the Briggs Valley and recreationists often make a loop utilizing FR 2509 with the Taylor Creek Trail. The large trees and thick vegetation have earned it the nickname of the “The Jedi” trail since it reminds users of a scene in the Return of the Jedi movie. In both action alternatives the majority of the Taylor Creek trail is included in treatment areas. Some direct impacts to the trail tread is expected with skid trails and temporary roads crossing trails, however evidence of the temporary road and skid trails crossing trails is expected to fade due to natural vegetation regeneration within a few years after its use.

Forest Roads 2402150, 2402149 and 2402610, which provide access to the Dutchy Creek trail, are proposed to be decommissioned under the action alternatives. The decommissioning activities would include installing gates at the Forest Road 2402 junction with the 2402150 and 2402149 roads and installing a trailhead sign or bulletin board. There is already a large cleared area at this junction that would provide ample parking for visitors using the Dutchy Creek trail. Decommissioning Forest Roads 2402149 and 2402150 would have a direct long term impact to visitors using the Dutchy Creek trail since it would require an additional .5 mile of road to access the trail.

Other indirect impacts would primarily include noise associated with management activities including timber harvest and hauling.

Cumulative Impacts to Trails

Overall, cumulative effects on trails would be low because the number of trails affected is small compared to the number of trail opportunities available in the Briggs Creek Watershed area. In addition, harvest activities would likely occur in one general area at a time, leaving other nearby trails unaffected. No new projects are planned in the foreseeable future within the Briggs Creek Watershed area, so there would be no future activities that would have an effect on trails.

Special Use Permits

Direct & Indirect Effects

Both Alternative 2 and Alternative 3 would have a short- term indirect impact to recreation Special Use Permits in some instances if commercial vehicle traffic from the management activities are using Forest Roads that Special Use Permittees are utilizing. Another short-term indirect impact to recreation Special Use Permits would be noise from management activities.

The only direct impact to recreation Special Use Permits would be the closing of trails and roads during management activities.

Cumulative Impacts to Special Use Permits

With the proposed mitigation measures none of the action alternatives considered in detail would have a cumulative impact to special use permits in the project planning area.

Congressionally Designated Areas

Direct & Indirect Effects

Since there are no congressionally designated areas in the project area there are no short- term, long-term, direct or indirect impacts.

Cumulative Impacts to Congressionally Designated Areas

Since there are no direct or indirect impacts to Congressionally Designated Areas there are no cumulative impacts.

Inventoried Roadless Areas & Potential Wilderness Areas

Direct, Indirect & Cumulative Effects

Alternative 2 and Alternative 3 have been designed in accordance with the Roadless Area Conservation Rule and direction provided by the Chief of the Forest Service on the review process for roadless activities. Neither alternative proposes to cut, sell, or remove timber or to construct roads

within the Briggs IRA; therefore there are no direct, indirect or cumulative effects to Inventoried Roadless Areas under the Upper Briggs Project.

Alternative 2 and Alternative 3 do not include actions that would preclude consideration of a PWA for wilderness designation in the future (e.g. construction of roads, permanent structures), therefore there are no direct, indirect or cumulative effects to Potential Wilderness Areas under the Upper Briggs Project.

Scenic Quality

Direct & Indirect Effects

In the Upper Briggs Project planning area, overall, visual quality objectives and guidelines associated with Modification and Maximum Modification VQOs would be met with both action alternatives in General Forest Management Prescription areas. In Alternative 2- Proposed Action and Alternative 3- Reduced Treatment these areas will be radial thinned, thinned from below and pruned which will create openings in the forest less than ¾ acre. These openings will create a more park like appearance that is characteristic of old growth forests and the naturally established form of the landscape will be maintained.

A short-term impact to scenic quality in the immediate foreground (< 300 ft.) in the Partial Retention VQO areas would occur with ground and vegetation disturbance, slash piles, and tree marking.

Immediate foreground views from portions of some trails, roads, campgrounds and distant views from certain viewpoints on trails would change following harvest. Harvest units adjacent trails are prescribed for partial harvest, such as radial thinning, group selection, thinning from below and fuel hazard reduction. These activities will create some ground and vegetation disturbance and slash that visitors will be able to see along road and trails and from the campgrounds.

The resulting change in forest appearance or views along trails, with nearby harvest units, would not be dramatically different than current conditions. Several previous timber sales have occurred in this area in the past, and the current forest landscape is varied, including evidence of even and uneven aged vegetation management. Views currently include a mix of vegetation textures and color, tree sizes, and natural openings.

The visual impacts from partial harvesting in the both the short-term and long-term would be minimal to undetectable depending on the user due to the following mitigation measures. Slash from cutting trees would be removed from a 50 foot buffer along the trails to mitigate adverse visual impacts and stumps in the immediate foreground (within 300 ft.) along Forest Road 25, campgrounds and trails will be flush cut. In the long-term removing the thick vegetation by thinning would produce a more open, park like appearance with large trees characteristic of old growth stands and immediate foreground views from trails, roads and campgrounds would blend into the landscape within a few years as vegetation returns. The clearings and thinning work would repeat the form, line and texture from the surrounding vegetative pattern to achieve the partial retention objective.

Cumulative Impacts to Scenic Quality

Past actions in the project area include the construction of existing roads and trails, which are used as viewing platforms and, therefore, are generally not considered negative visual elements. Recreation sites (such as campgrounds and picnic areas) have not resulted in substantial impacts to visual resources. Most visitors to the area travel on Forest Road 25 and some past vegetation management activities can be observed from the road. Past wildfires and insect infestations have affected visual quality in some areas in Briggs Valley; these are natural disturbances in the landscape and, therefore, generally not considered in effects analyses.

Since the actions described above do not contribute substantial effects to visual quality, the proposed project, when added to past, present, and reasonably foreseeable future actions, is not expected to cause cumulative effects beyond those described in the analysis of the alternatives.

3.3.3 Economics

The Upper Briggs Project economics resource report (Crum 2017) provides a full description of the economic analysis. The information provided in this EA is summarized from this report and is available here: http://www.fs.fed.us/nepa/nepa_project_exp.php?project=45593

3.3.3.1 TIMBER MARKETS

Current timber markets have a relatively high value for Douglas-fir saw grade material. While the timber market fluctuates regularly based on global markets, local supply, and domestic demand, timber values have been relatively high following recovery after the 2008 recession. The State of Oregon summarizes pond values for all the regions of Oregon. Pond value is the price per unit (thousand board feet - Mbf) that a mill will pay for a particular grade of timber delivered to the mill. The average log prices by species and grade from 2015-2000 pond value for Douglas-fir is approximately $530 per Mbf (https://data.oregon.gov/Natural-Resources/Log-Prices/4v4m-wr5p/data). The Forest Service estimates MBF using east-side Scribner rules, therefore the volume as shown, is higher than if west-side, long log Scribner rules would be applied. This is due to the differences in scaling rules. This value is relatively high compared to previous years following the lows in the market following the 2008 recession.

Federal timber sales in 2015 and 2016 have been selling for high prices and attracting many bidders to each sale in these local markets. The bid rates have ranged from $230 per Mbf to $282 per Mbf. Variables that affected these bid rates include logging systems, haul distance to mills, quality of timber grades, and restrictions on operations. Upper Briggs treatment units have large areas of skyline with a lesser amount of ground based logging, and a portion of helicopter yarding. The proposed sale areas have quality timber grades, which will likely be appealing to local timber markets. These market conditions should result in good value for this project, resulting in revenue available for more restoration and enhancement.

3.3.3.2 METHODS FOR ANALYSIS

An economic efficiency analysis is used to compare alternatives based on expected revenues and expenses. This compares expected revenues from timber harvest to expected costs to the Forest Service to implement the project. No planning or NEPA costs are considered. This analysis only considers short term costs and revenues and doesn't consider future, long term costs or revenues.

Project revenue is calculated by subtracting all costs required by the contract from the value of the timber delivered to the mill. The current pond value of $530/MBF east side scale and adjusted for product type and grade, and applied for southwest Oregon for the timber value delivered to the mill. The costs of getting the wood to the mill include logging and haul costs, road reconstruction and maintenance, and work required by the timber sale contract or stewardship contract. See Attachment B of the economics specialist's report for tables of projected costs by stand. Averages from recent timber sale appraisals were used for the costs in the analysis. See Table 495 for costs used. Costs are listed by dollars per Mbf (thousand board feet). For the proposed action, the total costs of $13,599,429 are subtracted from the timber value of $15,588,648 resulting in total revenue of $1,989,219. The expected bid rate under the analysis scenario for the proposed action would be $250 per Mbf. Volumes per acre were projected from potential treatment scenarios developed in Forest Vegetation Simulator software. Predicted volume (Mbf) per acre removed for the proposed action is averaging 18 Mbf/acre.

Table 495. Costs for Figuring Project Revenue.

Zone Averages Costs per Mbf	$/Mbf

Tractor Logging - Stump to Truck	$188.00
Skyline Logging - Stump to Truck	$246.00
Helicopter Logging – Stump to Truck	$700.00
Haul Costs	$86.00
Road Maintenance	$47.00
Road Reconstruction	$45.00
Brush Disposal	$7.84
Other Contract Costs	$12.00

To calculate economic efficiency, we subtract the costs (incurred by the Forest Service to implement the project) from the project revenue. This can be displayed as a ratio, which is the revenue to cost ratio (benefit/cost). A revenue to cost ratio value of 1 would mean that revenue would equal the costs to implement the project. The economic efficiency ratio tends to increase for the Forest Service with larger volumes and projects because such projects usually generate higher revenues vs. cost.

The financial costs not considered but incurred by the Forest Service include agency costs for contract administration, contract preparation, specialist time, engineering, and any mitigation measures that might be needed as a result of the project. The numbers used for this analysis are from previous projects and comparison of projects of similar complexity and size. The numbers should be used for relative comparison purposes only.

3.3.3.3 ECONOMIC EFFECTS

Alternative 2, Proposed Action would have the highest economic efficiency for the Forest Service, while Alternative 3, Reduced Treatment would have a relatively low economic efficiency. Alternative 1, No Action would have only road maintenance costs. See Table 506 for a comparison of the economic efficiency of the project alternatives.

Table 506. Present Net Value and Benefit/Cost Ratio Comparison of Alternatives

	Volume in MBF	Estimated Benefit or Revenue from Sale of Timber	Estimated Cost	Present Net Value	Benefit-Cost Ratio (B/C)
Alt. 1, No Action	0	0	$25,000	$(25,000)	0.00
Alt. 2, Proposed Action					
Helicopter	29,413	$15,588,648	$13,599,429	$1,989,219	1.15
w/o Helicopter	27,025	$14,323,080	$11,456,574	$2,866,506	1.25
Alt. 3, Reduced Treatment					
Helicopter	17,090	$9,057,884	$8,732,032	$325,852	1.04
w/o Helicopter	13,987	$7,412,984	$5,946,893	$1,466,091	1.25

Note: - Values are meant to be used for the comparison of alternatives only and do not represent an expected selling value.

DIRECT EFFECTS

Alternative 1, No Action

The no action alternative would have no direct effects.

Alternative 2, Proposed Action, & Alternative 3, Reduced Treatment

Alternative 2, Proposed Action would have an economic efficiency (benefit/cost) ratio of 1.15, and a present net value of $1,989,219. If implementation of Alternative 2 did not include helicopter yarding, the economic efficiency ratio would go up to 1.25, and the present net value would increase to $2,866,506.

Alternative 3 would an economic efficiency (benefit/cost) ratio of 1.04, and a present net value of $325,852. If implementation did not include helicopter yarding, the economic efficiency ratio would increase to 1.25, and the present net value would increase to $1,466,091.

The different economic effects of the two alternatives are primarily a result of their different timber harvest volumes (and thereby their different revenues); vs. their nearly equivalent costs (i.e. the same amount of road work, and other agency expenses would be incurred).

INDIRECT EFFECTS

Alternative 1, No Action

Under Alternative 1 there would be no timber harvest, and thus no sawtimber or other forest products would be provided to regional mills. Therefore, no economic value would be derived from the sale of forest products. Current levels of employment in the wood products sector would not be affected.

In addition, no revenue would be generated in the form of retained receipts for the Forest Service to use to pay for additional restoration projects elsewhere on the forest.

Alternative 1, would not support direct, indirect, and induced employment. It would not result in increased income to the regional or local economy (including counties).

Alternative 2, Proposed Action, & Alternative 3, Reduced Treatment

There would be a positive economic impact from either Alternative 2 or Alternative 3. However, Alternative 2 would provide higher net value than Alternative 3.

Under both Alternative 2 and Alternative 3 there would be timber harvest, and thus sawtimber or other forest products would be provided to regional mills. Therefore, economic value would be derived from the sale of forest products. This would have a positive effect on current levels of employment in the wood products sector.

In addition, revenue would be generated in the form of retained receipts for the Forest Service to use to pay for additional restoration projects elsewhere on the forest.

Alternatives 2 and 3 would support direct, indirect, and induced employment. They would result in increased income to the regional or local economy (including counties). They would have a localized beneficial effect on the socio-economic environment of southwestern Oregon.

CUMULATIVE EFFECTS

In an economically depressed area such as southwestern Oregon, the work provided by this and other land management projects is substantial. The silvicultural prescriptions for this project are generally an intermediate treatment. Roads constructed, reconstructed or otherwise used and maintained by the Forest service or cooperators would not only provide feasible treatments to meet the Purpose and Need for this project, but would provide benefit to future land management projects.

3.4 Climate Change

Alternatives 2 and 3 action's direct and indirect contribution to greenhouse gasses and climate change would be negligible. Because the direct and indirect effects would be negligible, the action's contribution to cumulative effects would also be negligible. The Upper Briggs project includes appropriate management approaches in the face of potential increases in temperature and decreases in precipitation and snowpack accumulation, such as maintaining the full range of biodiversity, managing forest densities for reduced susceptibility to drought stress and using prescribed fire to reduce susceptibility to high-intensity, large disturbances.

The planning area consists of approximately 24,645 acres. Actions are anticipated on approximately 2,414 (Alternative 3) – 3,972 (Alternative 2) acres within the planning area; these actions are anticipated to occur across approximately 10-16% of planning area. The planning area is fully encompassed within the Wild Rivers Ranger District, approximately 4.8% of the approximately 509,499-acre Wild Rivers Ranger District and about 1.3% of the 1,852,042 million acre Rogue River-Siskiyou National Forest. The proposed action (Alternative 2) would occur on 0.2% of the Forest and Alternative 3 would occur on 0.1% of the Forest.

Climate change is a global phenomenon because major greenhouse gasses (GHG) mix well throughout the planet's lower atmosphere (IPCC 2013). Considering emissions of GHG in 2010 was estimated at 49 ± 4.5 gigatonnes globally (IPCC 2014) and 6.9 gigatonnes nationally (US EPA, 2015), a project of this magnitude makes an infinitesimal contribution to overall emissions. Therefore, at the global and national scales, this proposed action's direct and indirect contribution to greenhouse gasses and climate change would be negligible. In addition, because the direct and indirect effects would be negligible, the proposed action's contribution to cumulative effects on global greenhouse gasses and climate change would also be negligible.

The Intergovernmental Panel on Climate Change has summarized the contributions to climate change of global human activity sectors in its Fifth Assessment Report (IPCC 2014). In 2010, anthropogenic (human-caused) contributors to greenhouse gas emissions came from several sectors:

- Industry, transportation, and building – 41%
- Energy production – 35%
- Agriculture – 12%
- Forestry and other land uses – 12%

There is agreement that the forestry sector contribution has declined over the last decade (IPCC, 2014; Smith et al., 2014; FAOSTAT, 2013). The main activity in this sector associated with GHG emissions is deforestation, which is defined as removal of all trees, most notably the conversion of forest and grassland into agricultural land or developed landscapes (IPCC 2000).

The project does not fall within any of these main contributors of greenhouse gas emissions. Forested land will not be converted into a developed or agricultural condition. Forest stands are being retained and thinned to maintain a vigorous condition that supports trees, and sequesters carbon long-term. US forests sequestered 757.1 megatonnes of carbon dioxide after accounting for emissions from fires and soils in 2010 (US EPA, 2015). However there is growing concern over the impacts of climate change on US forests and their current status as a carbon sink. There is strong evidence of a relationship between increasing temperatures and large tree mortality events in forests of the western US. There is widespread recognition that climate change is increasing the size and frequency of droughts, fires, and insect/disease outbreaks, which will have major effect on these forests' role in the carbon cycle (Joyce et al. 2014).

The project is in line with the suggested practice of reducing forest disturbance effects found in the National Climate Assessment for public and private forests (Joyce et al. 2014). The actions that are proposed in the project Area would, to some extent, preserve plant communities since less dense and diversified second-growth stands would be more resilient in the face of insect and disease infestation and wildfire that could increase in frequency due to a changing climate. The release of carbon associated with this project is justified given the overall change in condition increases forest resistance to release of much greater quantities of carbon from wildfire, drought, insects/disease, or a combination of these disturbance types (Millar et al. 2007). This project falls within the types of options presented by the IPCC for minimizing the impacts of climate change on forest carbon, and represents a potential synergy between adaptation measures and mitigation. Actions aimed at enhancing forest resilience to climate change by reducing the potential for large-scale, catastrophic disturbances such as wildfire also prevents release of GHG and enhances carbon stocks (Smith et al. 2014). The proposed action reflects the rationale behind these recommendations because it aims to reduce the likelihood of stand-replacing wildfire. Thinning around western white pine and sugar pine will help maintain structural and species diversity by reducing the likelihood of mortality from insects and white pine blister rust. According to Mote, et al. (1999) successful forest management approaches in the face of potential increases in temperature and decreases in precipitation and snowpack accumulation include maintaining the full range of biodiversity, managing forest densities for reduced susceptibility to drought stress, and using prescribed fire to reduce susceptibility to high-intensity, large disturbances. All these management approaches are included in the actions that have been developed for the project.

Timber management projects can influence carbon dioxide sequestration in four main ways: (1) by increasing new forests (afforestation), (2) by avoiding their damage or destruction (avoided deforestation), (3) by manipulating existing forest cover (managed forests), and (4) through transferring carbon from the live biomass to the harvested wood product carbon pool. Land-use changes, specifically deforestation and regrowth, are by far the biggest factors on a global scale in forests' role as sources or sinks of carbon dioxide, respectively (IPCC, Intergovernmental Panel on Climate Change, 2000). Projects like the Upper Briggs Project, which create forests or improve forest conditions and capacity to grow trees, are positive factors in carbon sequestration.

4 Public Involvement, Consultation and Coordination

4.1 Public Involvement

4.1.1 Scoping

Early and continuing coordination with the public and appropriate agencies is an essential part of the NEPA process. Early coordination determines the scope of environmental documentation, the level of analysis, potential impacts and avoidance, minimization or mitigation of impacts.

The Upper Briggs project proposal was first introduced to the public through the Forest Service's schedule of proposed action (SOPA) on January 1, 2015. One 30-day public scoping period occurred for the Upper Briggs project; a legal notice to initiate scoping was published on May 20, 2016 in the Grants Pass Daily Courier. The proposed action and a map were made available on the project website at: https://www.fs.usda.gov/project/?project=45593. Letters summarizing the proposed action were sent to over 40 individuals or organizations (Table 51) that included directions to the Forest's website for more information and an open invitation for an informational field trip.

Table 517. Scoping Notification List.

Federal, State and Local Agencies (scoping)		
Bureau of Land Management	Natural Resources Conservation Service	Oregon Natural Resources Office
Illinois Valley Soil & Water Conservation District	Oregon Department of Environmental Quality	USDA Natural Resource Conservation Service
Josephine County Commissioners	Oregon Department of Fish & Wildlife	US Fish & Wildlife Service
Josephine County Library	Oregon Caves National Monument	American Forest Resource Council
Josephine Soil & Water Conservation District	Oregon Department of Forestry	
Others (scoping)		
Associated Oregon Loggers	Oregon Hunter's Association	Siskiyou Audubon Society
Friends of the Kalmiopsis	Oregon Wild	Siskiyou Chapter - Oregon Native Plant Society
Illinois Valley Watershed Council	Rocky Mountain Elk Foundation	Southern Oregon Forest Restoration Collaborative
Kalmiopsis Audubon Society	Rogue Basin Partnership	The Nature Conservancy
Klamath-Siskiyou Wildlands Center	Rogue Riverkeeper	The Wilderness Society
Klamath Bird Observatory	Rogue Valley Audubon Society	Trout Unlimited
Lomakatsi Restoration Project	Private citizens requesting information	
Added to notification list since scoping		
American Forest Resources Council	Private land owners within planning area	

We received two letters (see Table 52) containing comments on the proposed Upper Briggs project during the scoping period. A field trip was held with the two commenters on July 28, 2016; additional individuals were invited but declined to participate. The interdisciplinary team reviewed the comments received via the letters and made during the field trip. Any responses or issues from these parties were

considered and used to refine the proposed action, develop action alternatives and to analyze the environmental effects of the alternatives.

Table 528. Comments Received During the Scoping Period.

Date received during scoping period	Name and Organization
June 2, 2016	Andy Geissler (American Forest Resource Council)
June 17, 2016	Rich Nawa (KSWild)

All scoping comments are in the project administrative record at Wild Rivers Ranger District.

4.2 Tribal Coordination

Government-to-government contact was initiated with the tribes listed in Table 53. Letters (dated May 20, 2016) presenting the proposed action and a map of the planning area were sent to the Tribal Chairs/Council leaders, and if available, the cultural resource managers and natural resource managers for the six tribes.

Table 539. Tribes Contacted.

Tribes (ongoing throughout project)		
Confederated Tribes of the Siletz	Cow Creek Band of Umpqua Tribe of Indians	Elk Valley Rancheria
Confederated Tribes of the Grand Ronde	Quartz Valley Indian Community	Tolowa Dee-ni' Nation (formerly Smith River Rancheria)

No responses were received.

5 Consistency Review

Agency consultation and coordination to comply with related environmental laws and regulations has been accomplished through a variety of formal and informal methods. When considering the overall environmental impacts of the no action and action alternatives, it is important to remember that the actions undertaken by the Forest Service must be evaluated and in compliance with, to the greatest extent possible, applicable environmental laws and executive orders. Table 70 provides an abbreviated review of relevant laws and regulations evaluated and the findings determination. For a more in-depth description of all the laws and regulations reviewed, please refer to the specialist reports.

Table 70. Consideration of Applicable Laws and Findings Determination.

Consideration	Findings
Aquatic Conservation Strategy objectives of the Northwest Forest Plan	The hydrology and fisheries specialist reports address compliance with the Aquatic Conservation Strategy objectives. All alternatives are consistent with the ACS objectives.
Clean Air Act - 42 USC 7401 et seq. (1970)	The air quality section addresses air quality concerns. The proposed action would not violate air quality standards.
Clean Water Act - 33 USC 1251 et seq. (1972)	The hydrology and fisheries section addresses water quality concerns. The proposed action would conform to state water quality standards.
Consultation and Coordination with Indian Tribal Governments - Executive Order 13175	Government-to-government contact was initiated with the tribes listed in Table 53. Letters (dated May 20, 2016) presenting the proposed action and a map of the planning area were sent to the Tribal Chairs/Council leaders, and if available, the cultural resource managers and natural resource managers for the six tribes. No replies were received.
Cultural and Heritage resources • Antiquities Act of 1906, 16 U.S.C. 431, 432, 433. • Archeological and Historical Preservation Act of 1960, 16 U.S.C. 469-469c. • National Historic Preservation Act of 1966, 16 U.S.C. 470 et seq. (NHPA)	All of the alternatives would comply with federal laws. The Siskiyou National Forest Plan tiers to these laws, therefore the proposed action would meet Forest Plan Standards. With the completion of the Heritage inventory under the terms of the 2004 Programmatic Agreement with Oregon State Historic Preservation Office, and by providing the interdisciplinary team with appropriate input as per NEPA, all relevant laws and regulations have been met.
Human Environment - Environmental Justice and Civil Rights (Executive Order 12898)	Evaluation of the human environment is incorporated in its entirety within this section; there is no stand-alone specialist report. A demographics review of the project area shows that there are no identified groups of people within or immediately adjacent to the project area that would be disproportionately affected by the no action or action alternatives. It is assumed that these population of people as well as the general population would continue to use or enjoy Federal forest lands for diverse purposes.
Invasive Species - Executive Order 13112	While analysis in the specialist reports document the potential for the introduction and spread of invasive species, employing best management practices and mitigation measures would ensure

Consideration	Findings
	that the resources would not be inordinately exposed to increased invasive species encroachment.
Floodplains and Wetlands - Executive Order 11988 and 11990	The hydrology section addresses these concerns. There are no actions that would disturb or effect wetlands or floodplain areas.
Short-term uses and long-term productivity • Organic Act of 1897 • Multiple Use Sustained Yield Act of 1960 • National Forest Management Act of 1976	The geology section addresses these concerns. While analysis in the specialist reports document the potential for the degradation of soil resources, employing best management practices and mitigation measures would ensure that the resources would not be irreversibly damaged.
Threatened, Endangered and Sensitive Species - Endangered Species Act of 1973	Threatened, endangered and agency sensitive species (wildlife, aquatic and botanical species) are addressed in the specialist reports and wildlife, fisheries and botanical resources section of this EA. The following determination has been made for aquatic species: Both the Alternatives 2 and 3 would result in a short term negative and long-term beneficial effect from Stream Enhancement activities. As a result, project activities **May Impact Individuals or Habitat, But Will Not Likely Contribute to a Trend Toward Federal Listing or Cause a Loss of Viability to the Population or Species** for **KMP steelhead trout** and **Pacific lamprey** due to the potential to injure individuals directly from Stream Enhancement activities, while providing a long-term benefit of improved instream habitat conditions. These Alternatives would have **No Impact** to **California floater**, **Western ridged mussel**, **highcap lanx**, **scale lanx**, **rotund lanx**, **robust walker**, **Pacific walker**, **Haddock's Rhyacophilan caddisfly**, and **SONCC Chinook salmon** because these species are not known to occur or have suitable habitat within proximity to any of the proposed activities. These Alternatives would have **No Effect** to **SONCC coho salmon**, **SONCC coho CH**, **Pacific eulachon**, **North American green sturgeon**, and Essential Fish Habitat. The following determination has been made for botanical species: There would be **no effect** to ***Fritillaria gentneri*** (Gentner's fritillaria), ***Arabis macdonaldiana*** (Maccdonald's rock cress), or ***Lomatium cookii*** (Cook's lomatium), or any other plant species listed as threatened, endangered, proposed for listing, or candidates under the Endangered Species Act of 1973, as amended (ESA), administered by the U.S. Fish and Wildlife Service (USFWS) from the proposed Briggs Valley Project. This determination is based on the absence of suitable habitat within the project area and the absence of individuals known or expected to occur within the project area. The following determination has been made for terrestrial species determined to be within the range of the proposed project area: **Northern spotted owls** would have short-term impacts with long-term benefits by proposed activities, primarily from habitat modification and disturbance. Because activities are likely to adversely affect spotted owls and designated critical habitat, formal consultation with the Service was completed in 2017. A Biological Opinion was transmitted to the RRSNF on

Consideration	Findings
	June 29, 2017 (USFWS 2017, Tails# 01EOFW00-2017-F-0308). All mandatory conservation measures (project design criteria) and terms and conditions from the biological opinion would be implemented.The ESA determination for the federally listed northern spotted owl (NSO) and designated critical habitat is ***may affect, and likely to be adversely affected* (LAA)** by project activities. NSO suitable nesting, roosting, foraging habitat would be treated and downgraded on ridgelines where relative habitat suitability is low for spotted owls. A small amount of dispersal habitat would be removed for meadow restoration. These activities would also occur within designated critical habitat for NSO. Anticipated project effects for all other Region 6 sensitive wildlife species listed in Table 361 may impact individuals or habitat, but would not likely contribute to a trend towards federal listing or cause loss of viability to population or species (MIIH). Furthermore, continued viability is expected for Siskiyou National Forest management indicator species (MIS) with habitat affected by the project. Please review section 3.2.2. for a list of terrestrial species determined not to be present within the range of the proposed project area.
Wild and Scenic Rivers - 16 USC 1271	There are no congressionally designated Wild and Scenic Rivers in the Upper Briggs Project planning area.
Wilderness and inventoried roadless areas • Wilderness Act of 1964 • Roadless Area Conservation Rule of 2001	Evaluation of the Wilderness Act and Roadless Area Conservation Rule is incorporated in its entirety within this section; there is no stand-alone specialist report. Based on a review of the project area (conducted using standards put forth in FSH 1909.12 Section 71.1[2] and using GIS to perform the analysis), there are no wilderness, potential wilderness, or inventoried roadless areas within the project area.

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Appendix A- Changed Condition Review Due to Fire Effects

Summary of the Taylor and Klondike Fire within the Upper Briggs project area

The intent of this summary is to determine if there are fire effects leading to changed conditions within the project area and to identify whether the purpose and need of the project can still be met by implementing alternative 2. Project actions outlined in alternative 2 is the alternative with the greatest level of impact evaluated for this project; any action conducted under alternative 3 would still be considered a lesser action alternative.

Two separate fires, the Klondike and the Taylor fires started from lightning on 15 July 2018 in two different watersheds just southwest of Grants Pass. The Klondike fire started in the Illinois watershed, to the south of the planning area. The Taylor fire started in the Hellgate-Rogue River watershed, to the east of the planning area. The Klondike and Taylor fires grew to over 232,313 combined acres as of 16 October 2018. The majority of the project area was burned through by the Taylor fire. The Burned Area Emergency Response (BAER) team evaluated both fires collectively and completed the initial report on 11 October 2018. The BAER report is available on the Rogue River-Siskiyou National Forest website here: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd601810.pdf The 2018 Taylor and Klondike fires are hereon referred to as the 2018 fires unless otherwise specified.

Fire suppression and post-fire rehabilitation work was conducted within the planning area. Fire suppression actions that may have occurred within the planning area include but are not limited to: hand line construction, dozer lines, snag mitigation, road side brushing, hand and aerial ignition, helicopter bucket drops, and aerially delivered retardant. Post-fire rehabilitation that may have occurred include but are not limited to: closure and decommissioning of dozer lines, replacement of damaged culverts, seeding and mulching disturbed areas, placement of waterbars on trails and roads, and decommissioning of staging areas. Any road maintenance actions conducted followed the minimum engineering standards and are covered within the engineering section. These actions are considered a one-time event and were implemented following project design criteria designed to minimize impact and are repaired post-action. Resource Advisors assigned to the fire ensured that the effects of implemented actions were mitigated or implemented with negligible effects on the landscape.

A soil burn severity analysis indicated that 22% of land within the overall fire perimeter burned at moderate to high severity, 49% low severity, and 29% very low or unburned. Within the project planning area, these numbers are 15% burned at moderate to high severity, 28% low severity, and 38% very low or unburned. Nineteen percent of the planning area was outside any fire perimeter. The 2018 fires within the planning area is determined to have been a "mixed severity fire".[9]

During and post-fire, specialists' field reviewed the effects of the fire (team-specific site visits: 5 September 2018 and 16 October 2018, individual site visits occurred throughout September 2018), reviewed the BAER report, maps, and evaluated representative units to determine the extent of any potential changed conditions. The interdisciplinary team (team) considered all available information and circumstances.

Methodology of review

Members of the team reviewed different types of data, depending on their resource specialty needs. A majority of the data considered during this evaluation referred to the RAVG or SBS data, and used the BAER assessment to inform their review. Specialists reviewed effects on the planning and project level scale.

Soil Burn Severity (SBS)[10] mapping is a rapid assessment tool utilized for Burned Area Emergency Response assessments. SBS maps are a tool used to determine the fire's effect on the ground surface. A fire's soil burn severity is mapped out based on post-fire soil conditions. The intent of the SBS map is to identify fire-induced changes in soil and ground surface properties that may affect infiltration; thus allow for a prediction of accelerated risk of runoff or erosion. The SBS map is intended for the rapid prediction of accelerated runoff and erosion from the post-fire landscape from an expected precipitation event, to highlight potential unacceptable risk to BAER critical values. This map can be interpreted using a variety of tools and tailored towards specific resource concerns specialists might

[9] Mixed severity fire - a fire that exhibits a wide range of fire severity as a result of underburning some patches, burning others with stand-replacing severity, and thinning the overstory in other patches. (Agee, J.K. 1998. The landscape ecology of western forest fire regimes. Northwest Science. 72 (special issue): 24-34.) Mixed severity fires can range from low, medium to high burn severities.

[10] https://www.fs.fed.us/rm/pubs/rmrs_gtr243.pdf

have. The soil burn severity numbers were provided for the team to use for their analysis (table 1). See the SBS map (map 1).

Rapid Assessment of Vegetation Condition After Wildfire (RAVG)[11] is a tool used to determine basal area loss within a fire perimeter. Basal area loss resulting from fire is used as a surrogate to determine post-fire vegetation conditions. RAVG products are generated for Forest Service lands (including wilderness) to provide information that can assist post-fire vegetation management planning designed to address a number of management objectives. The primary benefit is cost-effective, efficient, and precise identification of potential resource concern areas following wildfire. In the context of RAVG analysis, basal area loss measures the percent change in basal area or tree cover (relative number of live trees on the site) from the pre-fire condition. Basal area loss is reported as four classes of percent change in tree cover and is expressed in square feet. Basal area loss does not describe a permanent loss of basal area within a forest, but describes the amount of change in the live tree cover immediately (approximately 30 days after wildfire containment) after a wildfire that undergoes RAVG analysis. The following basal area loss numbers were provided for the team to use for their analysis (table 2). See the RAVG map (map 2).

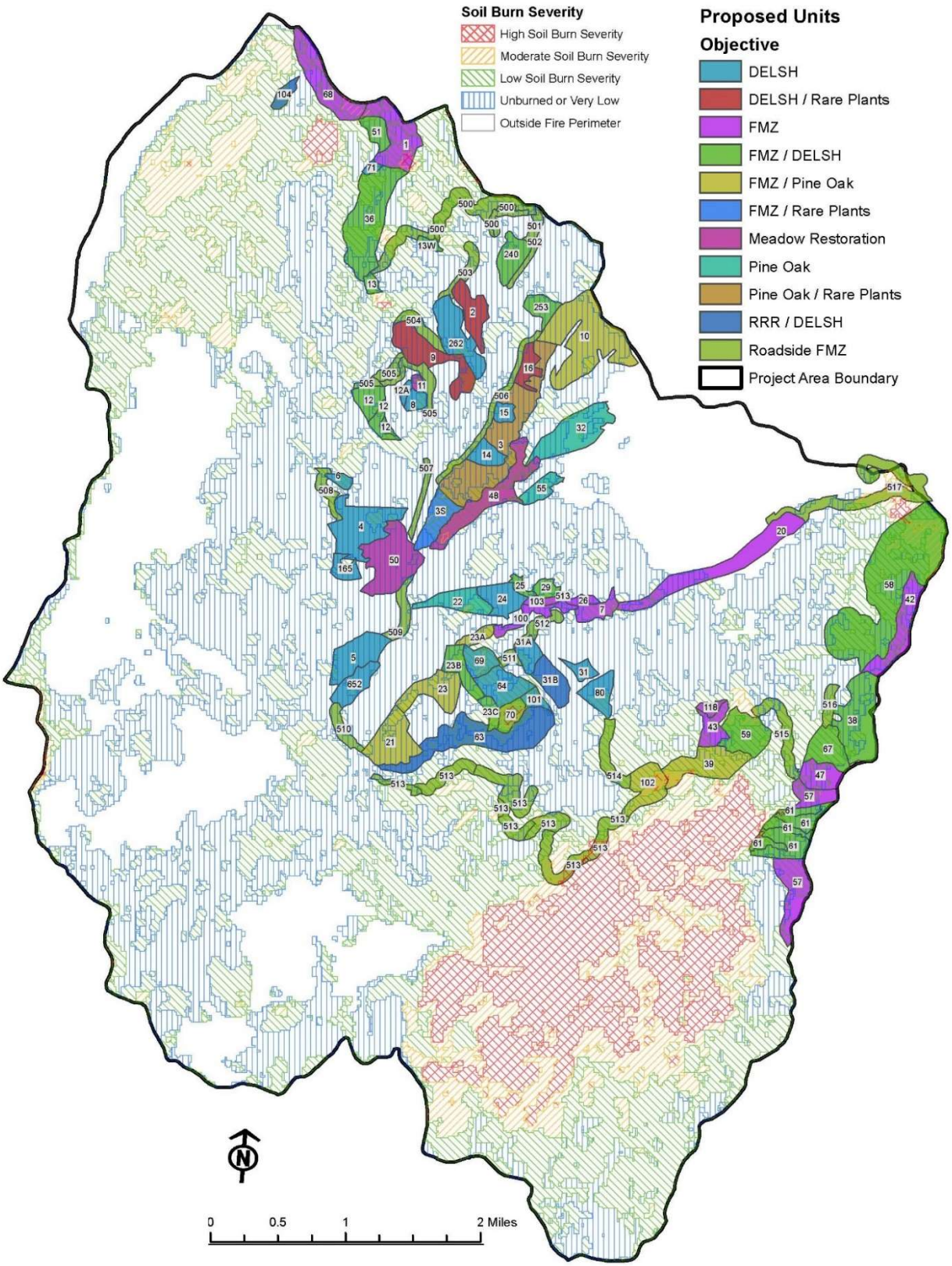
Table 1. Soil burn severity acreage for each unit.

Unit	Acres with High SBS	Acres With Moderate SBS	Acres with Low SBS	Acres with Very low SBS / Unburned	Acres not within 2018 fires footprint
1	4	38	6	26	0
2	0	0	1	42	0
3	0	<1	31	124	0
3S	0	4	26	11	0
4	0	0	14	76	0
5	0	0	3	55	0
6	0	0	7	3	0
7	0	1	18	5	0
8	0	0	6	8	0
9	0	0	13	60	0
10	0	0	6	141	14
11	0	<1	3	3	0
12	0	0	7	38	0
12A	0	0	0	6	0
13	0	<1	6	2	0
13W	0	0	2	6	0
14	0	0	1	22	0
15	0	0	1	12	0
16	0	0	1	23	0
20	0	<1	14	26	65
21	0	0	14	56	0
22	0	2	12	27	0
23	0	0	12	41	0

[11] https://www.fs.fed.us/postfirevegcondition/process.shtml

23A	0	0	6	8	0
23B	0	0	14	18	0
23C	0	5	5	4	0
24	0	0	3	34	0
25	0	0	1	8	0
26	0	0	1	8	0
29	0	0	3	10	0
31	0	0	0	14	0
31A	0	0	6	16	0
31B	0	0	3	34	0
32	0	<1	6	41	36
36	0	3	51	72	0
38	0	0	15	51	34
39	2	10	43	16	0
42	0	<1	21	28	10
43	0	<1	13	15	0
47	0	0	9	16	10
48	0	2	61	12	9
50	0	0	6	93	0
51	0	1	3	19	0
55	0	0	3	17	4
57	0	<1	53	13	22
58	3	55	160	83	<1
59	0	13	39	5	0
61	1	5	11	16	1
61	0	2	16	42	2
63	<1	2	44	87	0
64	0	1	31	16	0
67	0	0	38	4	3
68	0	10	37	27	<1
69	0	6	20	2	0
70	10	9	2	0	0
71	0	0	1	5	0
80	0	0	15	18	0
100	0	0	8	18	0
101	0	<1	9	4	0
102	4	10	32	2	0
103	0	0	5	5	0
104	0	0	8	5	0
118	0	0	8	1	0
165	0	0	2	16	0
240	0	0	3	34	0

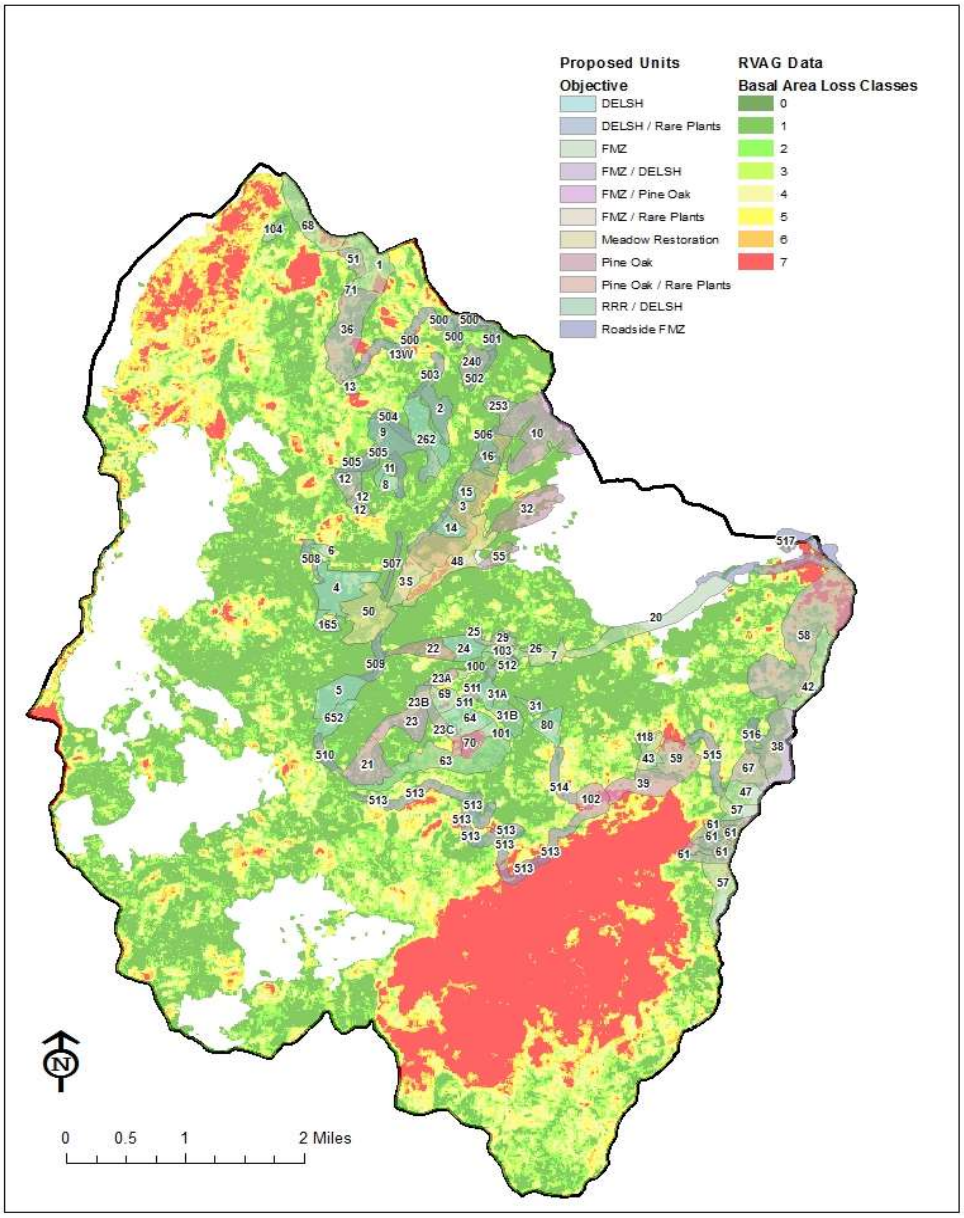
253	0	0	1	23	0
262	0	0	13	53	0
500	0	4	58	39	0
501	0	0	2	9	0
502	0	0	0	11	0
503	0	0	7	14	0
504	0	0	5	16	0
505	0	0	6	40	0
506	0	0	14	21	0
507	0	0	<1	15	0
508	0	0	9	10	0
509	0	0	2	22	0
510	0	0	5	14	0
511	0	0	5	4	0
512	0	0	1	16	0
513	0	0	1	<1	0
513	14	24	109	38	0
514	0	<1	27	2	0
515	0	1	24	14	0
516	0	0	6	9	0
517	1	21	14	22	41
652	0	0	3	32	0



Map 1. Soil Burn Severity Map.

Table 2. Upper Briggs Watershed Acres Burned (RAVG Oct 19, 2018, map two below displays RVAG data).

%BA Loss	Acres	%Watershed
1-25	4,608	19
26-50	2,607	10
51-75	1,634	7
76-100	3,801	15



Map 2. RVAG Map displaying classes of basal area loss (see Table 3 for Basal Area loss classes).

Table 4. RVAG basal area loss percentage by class as identified in map two.

BA Loss Class	1	2	3	4	5	6	7
Percent BA Loss	0%	0%-<10%	10%<25%	25%-<50%	50%<75%	75%<90%	>90%

Summary of effects by resource

The following provides, by resources, of their findings as it relates the effects of the 2018 fires and whether the desired conditions would still be met if this project were to be implemented.

BOTANY

The team botanist reviewed the effects of the 2018 fires on botanical resources. There were different levels of burn severity throughout the project area. Most botanical species are located in areas that received no fire effects or had low to moderate low burn severity. The botanist reviewed the RAVG data and used their best professional judgement when conducting their review.

The effects of the project and the cumulative effects from the fire to botanical resources will remain the same. Table 3 itemizes botanical resources within the project footprint that received a moderate-high to high burn severity rating. Objectives to restore sensitive plant habitat in units 2, 3, 3S, 9, and 16 can be found in Alternative 2 section of the EA (page 15). The objectives are to reduce canopy cover and create openings for shade-intolerant sensitive plants and use techniques to mimic natural disturbances that perpetuate these species, including fire. The intent is to create disturbance for western sophora including adding fire to the landscape and canopy reduction. The units have received fire effects with some percentage of canopy loss and openings resulting from the 2018 fires. These objectives have in part been met although additional actions can be implemented in the future. Enhancement actions for western sophora habitat are prescribed in design and mitigation measures (page 42 of the EA). Survey and Manage species will still be buffered and avoided as prescribed in design and mitigation measures (EA pages 43 and 44). Forest Service sensitive species will be buffered and avoided as prescribed in design and mitigation measures section.

Table 5. Upper Briggs Burn Severity and Botanical Species

Unit	Species	Category	Burn Severity	Impact	Comment
3S	*Buxbaumia viridis*	Survey and manage	Moderate High - High	Negative	Dependent on soil mycorrhiza
3	*Cypripedium fasciculatum*	Sensitive	Moderate low	Negative	Dependent on over story canopy and soil mycorrhiza
3	*Iliamna latibracteata*	Sensitive	Moderate High	Positive	Fire and disturbance dependent species

Unit 48	*Otidea leporina*	Survey and manage	Moderate High - High	Negative	Dependent on soil mycorrhiza
3	*Sophora leachiana*	Sensitive	Moderate Low-Moderate High - High	Positive	Fire and disturbance dependent species

Invasive plant infestations within the Upper Briggs project area and alongside roads within the planning area are anticipated to spread as a result of the newly burned disturbed areas created by 2018 fires and suppression activities. In addition, suppression activities have the potential to introduce new invasive plants infestations into disturbed areas. However, preventative measures were applied to minimize introduction of invasives. A weed-wash station was in-place for equipment to decontaminate prior to entering the burn area. The 2018 fires repair operations included revegetation of some disturbed areas with native plant seeds with an application of straw mulch to mitigate invasive plant establishment. Additionally, project design and mitigation measures for the Upper Briggs project would be implemented to decrease the establishment and spread of invasive plant species. Application of the Upper Briggs project design and mitigation measures will still be effective to keep the overall risk of invasive species establishment to a moderate level. No changes to the project design and mitigation measures are needed for botanical resources; the design and mitigation measures can be found in the EA (pages 44, 45, and 46).

FISHERIES

The team fisheries biologist reviewed the effects of the 2018 fires on aquatic resources and found that the 2018 fires will not result in a change to the proposed activities or in the effects to aquatic biota that were not already considered in the EA. The fisheries biologist reviewed the RAVG data, SBS data, and used professional judgement when conducting their review.

The riparian management strategies proposed and analyzed in the EA would be adequate to ensure that aquatic habitats would retain adequate shade, sufficient wood recruitment over time, and not be exposed to measurable sedimentation from project related activities. The Aquatic Conservation Strategy (ACS) objectives and the riparian reserve standards and guidelines (S&Gs) will still be met because there are no changes to the proposed treatment in riparian reserves since all fire-killed trees will be retained in this land use allocation.

WATER QUALITY

The team hydrologist reviewed the effects of the 2018 fires on hydrologic resources. The hydrologist reviewed the BAER report, conducted site visits and used their best professional judgement to inform their review. The project planning area is the entire Upper Briggs Creek 6th field watershed (171003110701). Briggs Creek is a major tributary and contributor to the water quality of the Wild and Scenic portion of the Illinois River. The main tributaries in the project boundary are Meyers, Brushy, Dutchy, Horse, Secret, and Onion Creeks.

***There are no changes to the watershed analysis* fo**r the Upper Briggs project due to the 2018 fires since the high severity soil burn was limited to 6.8% of the planning area. According to the hydrology BAER report, approximately 7,007 acres or 28.4% of the Upper Briggs project planning area had low soil burn severity. Moderate soil burn severity occurred in 1908 acres or about 7.7% of the planning area. High soil burn severity occurred in 1679 acres or 6.8% of the Upper Briggs planning area. Last, 57% of the planning area was unburned.

A total of 957 riparian treatment acres is proposed in the Upper Briggs project area. Approximately 67% (638 acres) of the riparian treatment acres were unburned. Only 3.5 acres (0.36%) had high soil burn severity. Drainages where riparian treatments are proposed experienced predominately low soil burn severity. Therefore, a significant sediment response from a high probability precipitation event would not be expected. By implementing the Project Design Criteria ***there would be no increase in fine sediment delivery to a stream or associated increase in turbidity from treatment activities.***

High burn severity did occur in the Onion Creek headwater area. However, this area is *downstream of* the Upper Briggs project area and outside the project analysis area. Higher stream flow volumes are expected when compared to unburned conditions. Suspended sediment loading and turbidity levels below the Upper Briggs project area will be elevated during runoff season (November-March) until ground cover becomes re-established (Hydrology BAER report).

Peak Flow

For basins within the transitional snow hydrologic zone, Grant et al 2008 found that the detection threshold for changes in peak flows occurs at 20% of watershed area clear cut or regeneration harvested. Thus, changes in peak flows cannot be detected at harvest levels of less than 20% (Grant et al 2008). Based on the hydroregions developed by Grant et al., the Upper Briggs project area would be located in the transitional hydroregion. Based on the detection threshold for changes in peak flows occurring at 20% of watershed area harvested, changes in peak flows cannot be detected at harvest levels of less than 20%. The Upper Briggs project proposes less than 16% of the watershed for thinning treatments. The existing studies examined were for clear-cut and shelter-wood harvests. Thus, evaluating this type of treatment would interpret the maximum likely effects and exceeds the potential effects for the thinning treatments proposed in the Upper Briggs project area. Gordon et al. also concludes that partial cutting and thinning should result in peak flow changes that are commensurately lower than those indicated and may be undetectable in some basins (Grant et al. 2008). For thinning treatments with riparian buffers the study finds a low likelihood of peak flow increase. Considering the low likelihood of peak flow increases from thinning and the proposed area for treatment is below 20% threshold for detecting increases in peak flow from clear-cut harvest, ***there will be no increase in peak flow from the proposed thinning activities in the Upper Briggs Project area.***

Cumulative Effects

There will be no effect on the sediment or flow regime

Aquatic Conservation Strategy

Since the Upper Briggs project would not remove fire-killed trees from the Riparian Reserves of the planning Area, the fire in combination with the Upper Briggs project would meet ACS objectives for down wood retention. The proposed treatments of the Upper Briggs project are still warranted for striving to obtain ACS objectives. The wildfire may have contributed, in part, to ACS objectives for enhancing the distribution, diversity, and complexity of landscape-scale features to maintain or protect aquatic systems where the fire had a low-intensity burn. However, since wildfires do not result in targeted treatment where always needed, the strategic and active management of the Upper Briggs project is still necessary to reach the desired conditions described in the EA for within and outside Riparian Reserves. For example, the proposed activities of the Upper Briggs project would more successfully decrease stand densities, shift tree species and seral stages, and provide growing space and access to light and nutrients for residual tree development toward late successional conditions

since the treatments are specifically target to reach the specific desired outcomes in key locations identified in the EA.

The Upper Briggs project would continue to contribute toward maintaining and restoring the sediment regime of the project area through application of project design criteria and no-treatment areas within Riparian Reserves.

SILVICULTURE

The team silviculturist reviewed the effects of the fire on forest resources and found that the desired conditions stated in the EA still needs to be met. The silviculturist relied on the RAVG, SBS data and existing data for their evaluation.

The 2018 fires encroached on the project area; however, the majority of the project area did not experience high severity burn. Out of 87 units, 17 units experienced greater than 25% basal area loss. The seral stage distribution within the watershed was slightly affected by the fire; forest seral stage discussed on pages 242-245 of the EA have been altered as a result of the fire. Table 6 estimates the following differences in seral stages, pre and post fire against the desired conditions. The seral conditions were evaluated utilizing the RAVG map following the wildfire. Entire units that experienced higher than 50% or greater basal area loss were identified. Based on this review it is determined that there is still a need to treat the project area in order to move stands towards DELSH condition, restore pine/oak communities, restore meadow systems, restore riparian reserves, and create and maintain strategically located fuel management zones.

Table 6. Differences in seral stages, pre and post fire vs, the desired conditions.

Seral stages	Pre-fire distribution	Post fire distribution	Desired conditions
Mid-seral	27%	23%	10-15%
Late-seral	18%	10%	45%

Stands (regardless of seral stage) that experienced greater than 75% basal area loss are considered as transitioned back into early seral habitat. Mid-seral stands impacted by fire (equal to or greater than 50%) have been transitioned to early seral condition. Mid-seral stage stands in the project area are still considered overstocked and are at high risk from future loss to fire, insects, and disease; the desired condition is to reduce the risk of landscape-level loss to fire, insects, and disease. (See EA on pages 50, 90 111, 159, 180, 183-184, 232, 238-240, 242,244,246,264,266) Table 7 identifies these units.

Table 7. Units with greater than 50% or greater basal area loss with reduced treatments.

Commercial	Unit	Objective	ACRES
Y	5	DELSH	58
	1*	FMZ	75
	36*	FMZ	127
Y	39	FMZ / Pine Oak	70
Y	47	FMZ	35
N	21	FMZ / Pine Oak	69
N	57	FMZ	61
	67*	FMZ / DELSH	45
Y	68*	FMZ	74
	58*	DELSH	101

Y	69	DELSH	28
N	70	FMZ / DELSH	21
Y	102	FMZ / Pine Oak	48
	26	FMZ	9
Y	7	FMZ	24
N	118	FMZ	9
N	103	FMZ	9
	500*	Roadside FMZ	101
	514	Roadside FMZ	5
N	517	Roadside FMZ	98
	513	Roadside FMZ	185
	515	Roadside FMZ	37

* = scattered high severity in the unit.

Units with reduced treatment will have commercial treatment dropped from the prescription. Where appropriate, non-commercial treatment would still occur. It is expected that there will be a reduction of commercial thinning. The estimated acres with reduction in commercial thinning are listed in table 3.

Table 8. Acreage of treatment.

Primary Treatment Objective of Unit	Alternative 2 Acres	Alternative 2 % Watershed	Acre reduction in treatment as result of fire
DELSH	1053	4%	58
Riparian Restoration	183	<1%	128
Roadside FMZ	713	3%	
Pine Oak	706	3%	
Rare Plants	42	<1%	
Meadow Restoration	188	<1%	
Ridgeline FMZ	1132	4%	421
Total Acres	**4017**	**16%**	**607**

Upper Briggs Creek Silvicultural Prescriptions

Post-fire proposed silvicultural prescriptions for each unit based on RAVG fire intensity data are described below. The majority of the project area did not experience high intensity burn, and therefore treatment needs remain in order develop late successional habitat; retain and enhance pine/oak communities, meadow systems and riparian reserves; and create and maintain strategically located fuel management zones. Project design criteria remain the same as outlined in the EA with the addition of retaining Post Fire Foraging (PFF) to the extent possible.

Development of late successional habitat (DELSH):

The DELSH treatments were intended to meet conservation recommendations for recovery of the northern spotted owl, specifically recovery action 10 of the 2011 Recovery Plan. The 2018 fires reduced NRF habitat in all NSO home ranges and core areas in the Action Area (see Table 17 – site table). Table 9 presents information used to determine treatment modifications for DELSH units based on the amount of the unit burned with greater than 25 percent basal area loss, the origin or age of the stand, and whether it is located in an NSO core area and/or home range. Units with more than 20

percent of their acres having greater than 25% basal area loss may still receive treatments that would achieve objectives, but may be limited to prevent increasing the amount of openings. Legacy snags and down wood including those created by the fire, would be retained to the extent possible per Forest Plan standards and any treatments in NRF or dispersal canopy cover would be maintained with at least 60 or 40 percent canopy cover respectively.

Table 9. DELSH unit acreage by RAVG % ba loss

DELSH Unit	Total Acres	Acres RTV HPS	Acres <25% ba loss	Acres >25% ba loss	% of unit acres >25% ba loss	Mngd Stand or Under 80yr
2	43		42	1	2%	n
4	90		82	8	9%	n
5	58		57	1	2%	Y
6	9	2	5	4	40%	n
8	14		10	4	28%	Y
9	73	1	68	5	7%	n
12	45		42	3	7%	n
12A	6		6	0	0	n
13	9		5	4	44%	n
13W	7		6	1	14%	n
14	23		23	0	0	n
15	13		13	0	0	n
16	24	14	24	0	0	n
23C	14		7	7	50%	n
24	38		37	1	2%	n
31	14		14	0	0	n
31A	22		21	1	5%	n
36	127		94	33	26%	n
51	22	17	20	2	9%	Y
59	58		16	42	72%	Y
61	34		21	13	38%	
64	48		29	19	40%	Y
69	28		2	26	93%	Y
70	21		0	21	100%	Y
71	6		5	1	17%	Y
80	32		25	7	21%	Y
101	13		9	4	31%	n
165	18		18	0	0	Y
240	37		36	1	3%	Y
253	24		24	0	0	Y
262	66	2	62	4	6%	Y
652	35		34	1	3%	Y
	1071		857	214		

Pine-Oak/Rare Plants: Objectives for retaining pine and oak (especially black and white oak) and rare plants that need sunlight have not entirely been met. Stands impacted by fire where 50% or less of the basal area loss occurred still face competition with young Douglas-fir. Table 7 displays the post-fire condition for each unit. Treatments would remain the same with maintenance of at least 40% canopy cover and no more than 20% openings in the units. Two units that experienced more than 20% of their acreage lost (39 and 102) are managed stands. These units may receive some variable density thinning while maintaining at least 40 percent canopy cover to benefit live pine and hardwoods, and prepare for future underburning.

Table 10. Pine-Oak unit acreage by RAVG % ba loss

Pine-Oak Unit	Total Acres	Acres RTV HPS	Acres <50% ba loss	Acres >50% ba loss	% of unit acres >50% ba loss	Managed Stand or under 80yr
3	156	6	148	8	5%	Y
10	161	26	161	0	0	Y
21	69		68	1	1%	n
22	41		37	4	10%	n
23	54		52	2	4%	n
32	83		83	0	0	Y
39	71		46	25	54%	Y
55	23		23	0	0	n
102	48		24	24	50%	Y
	706		642			

Meadow Restoration units would be treated for conifer encroachment with retention of legacy trees and snags. Table 8 summarizes the post-fire condition of meadow restoration units. Basal area loss in meadows includes tree, shrub and grass cover that burned. Meadow restoration activities such as seeding with native grasses and forbs and desirable shrubs such as elderberry, treating brush encroachment or decadent brush rejuvenation, and future burning may occur throughout the units.

Table 11. Meadow restoration unit acreage by RAVG % ba loss

Meadow Unit	Total Acres	Acres <25% ba loss	Acres >25% ba loss	% of unit acres >25% ba loss	Managed Stand or under 80yr
11	6	3	3	50%	Y
48	83	23	60	72%	Y
50	99	88	11	11%	Y
	188				

Riparian reserves still need treatments to meet ACS objectives (see EA fisheries and hydrology section). Stands with high basal areas will still experience competition-based mortality and be

susceptible to insect and disease mortality. These stands require fuel treatments to prepare for both natural and prescribed fire. Table 9 displays the post-fire condition of riparian restoration units. Treatments will remain the same in unit acres that experienced less than 25% basal area loss. Unit acres that experienced more than 25% basal area loss would only receive manual treatments for fuel reduction and maintain existing canopy cover. The portion of unit 31B between Secret Creek and road 2500643 would only receive hand thinning to reduce ladder fuels where needed to prevent crown fire for underburning per the NSO PDC.

Table 12. Riparian restoration unit acreage by RAVG % ba loss

Riparian Unit	Total Acres	Acres <25% ba loss	Acres >25% ba loss	% of unit acres >25% ba loss	Managed Stand or under 80yr
31B	37	36	1	3%	n
63	133	110	23	17%	Y
104	13	11	2	15%	Y
	183	157			

<u>Fuel management zones</u> still need treatment due to the high amount of fuels located in proposed units. Fire effects within these units serve as an initial treatment, however depending on stand type, may contribute more fuels as burned and dead material increases fuel build up on the forest floor over the next ten years. The objective of fuel treatments is to facilitate successful natural and prescribed fire management from strategic locations (ridges or roads).

Ridgeline FMZ treatments would remain the same; retain live trees greater than 120 years in age, maintain at least 40 percent canopy cover and result in no more than 20 percent openings across the unit to meet the ridgeline FMZ objective and PDCs.

Roadside FMZ treatments would also remain the same; retain live trees greater than 120 years in age, maintain at least 60 or 40 percent canopy cover, and result in no more than 20 percent openings across the unit.

Treatments in FMZ units having more than 20 percent of the area with greater than 50% basal area loss would not result in additional openings. Tables 10 and 11 display information used to determine specific treatment acres for each unit.

Table 13. Ridgeline FMZ unit acreage by RAVG % ba loss

Ridgeline FMZ Unit	Total Acres	Acres RTV HPS	Acres <50% ba loss	Acres >50% ba loss	% of unit acres >50% ba loss	Mngd Stand or Under 80yr
1	74	28	58	16	22%	Y
3S (Rare Plants)	42		29	13	31%	Y
7	24	1	19	5	21%	n
20	106		104	2	2%	n

Ridgeline FMZ Unit	Total Acres	Acres RTV HPS	Acres <50% ba loss	Acres >50% ba loss	% of unit acres >50% ba loss	Mngd Stand or Under 80yr
23A	14		12	2	14%	n
23B	32	4	28	4	12%	n
25	8		8	0	0	Y
26	9		9	0	0	n
29	14		14	0	0	n
38	100		99	1	1%	Y
42	60		59	1	2%	n
43	28		23	5	18%	Y
47	35		35	0	0	n
57	88		75	13	15%	Y
58	300		199	101	34%	n
61	62		58	4	6%	n
67	45		38	7	15%	Y
68	74	18	57	17	23%	Y
100	26		26	0	0	n
103	10		8	2	22%	Y
118	9		6	3	33%	Y
	1160		941			

Table 14. Roadside FMZ unit acreage by RAVG % ba loss

Roadside FMZ Unit	Total Acres	Acres RTV HPS	Acres <50% ba loss	Acres >50% ba loss	% of unit acres >50% ba loss	Mngd Stand or Under 80yr
500	101		87	14	14%	n
501	11		11	0	0	Y
502	11		11	0	0	Y
503	20		19	1	5%	n
504	21	9	21	0	0	n
505	47	2	47	0	0	n
506	35	5	33	2	6%	n
507	15		15	0	0	n
508	18		16	2	11%	n
509	24		24	0	0	n
510	19		19	0	0	n
511	8		7	1	12%	n
512	17		17	0	0	n
513	186		128	58	31%	Y and n

Roadside FMZ Unit	Total Acres	Acres RTV HPS	Acres <50% ba loss	Acres >50% ba loss	% of unit acres >50% ba loss	Mngd Stand or Under 80yr
514	29		24	5	17%	n
515	38		33	5	13%	n
516	15		15	0	0	Y
517	99		65	34	35%	Y
	714		587	122		

The team silviculturist uses tree survivability for selecting the predicted probability of mortality (Pm) level; this in turn helps ensure that the project meets land management objectives. The probability of mortality (Pm) levels incorporated into the guidelines are thresholds where all trees meeting or exceeding a selected Pm level are marked for removal. Providing a range of Pm levels afford land managers more options to meet post-fire objectives in the project area. The number of trees removed from a project area will generally vary with different Pm levels; fewer trees will be marked at higher Pm levels (a more conservative mark) and more trees will be marked at lower Pm levels (a less conservative mark). The exact amount of difference in the mark between Pm levels depends on the population of fire-injured trees within the project area. For example, if the project consists primarily of high severity burn areas the number of trees marked for removal will not substantially change with different Pm levels.

Prescriptions are written to use lower probability thresholds when it is important to prevent leaving trees that may die or to use higher probability thresholds when it is important to prevent taking trees that may live.

Site specific prescriptions will be developed at implementation of the decision document. Marking guidelines will incorporate *Marking Guidelines for Fire-Injured Trees* (Smith and Cluck 2011) to identify trees with high burn severity that have probability of mortality of 0.7 to die within five years. PFF would be retained but may be affected where dead snags identified as safety risks to operations may be felled in which case they would be left for down wood.

WILDLIFE

The team biologist reviewed the effects of the fire on wildlife resources and found that the desired conditions stated in the EA still needs to be met. The biologist relied on the RAVG date for their evaluation of fire impacts on existing resources.

Dead Wood

The Forest Service Region 6 uses the DecAID model to evaluate snag and down wood densities at the watershed scale (http://www.fs.fed.us/r6/nr/wildlife/decaid/). DecAID is an advisory tool based on best available science to help determine reference and current conditions for large snags and other dead wood at the watershed scale (Mellen-McLean and others 2012). It is based on data from inventory plots in unharvested stands to provide dead wood distribution that represents natural variation for comparison with the current distribution of dead wood in a watershed. This provides a basis to evaluate the effects of management activities on dead wood levels and the organisms that use decayed wood and considerations for dead wood management.

For the Briggs Creek fifth-field watershed, southwest Oregon mixed conifer-hardwood is the forest habitat type characterized by the plot data used for the DecAID analysis. The GNN vegetation data

provides the best current scientific data on dead wood ecosystem attributes (see this website for an explanation of GNN spatial data http://lemma.forestry.oregonstate.edu/methods). While not perfect at a site specific or stand level scale, GNN data helps to show general trends at a landscape scale. RAVG fire intensity data for the Klondike and Taylor Creek fires were used to update the GNN vegetation data used for this analysis which was the best data available for the project timeline. These data estimate approximately 64 percent of the fifth-field watershed experienced fire intensity that resulted in 1 percent or more basal area mortality, of which 28 percent burned with greater than 50 percent basal area mortality.

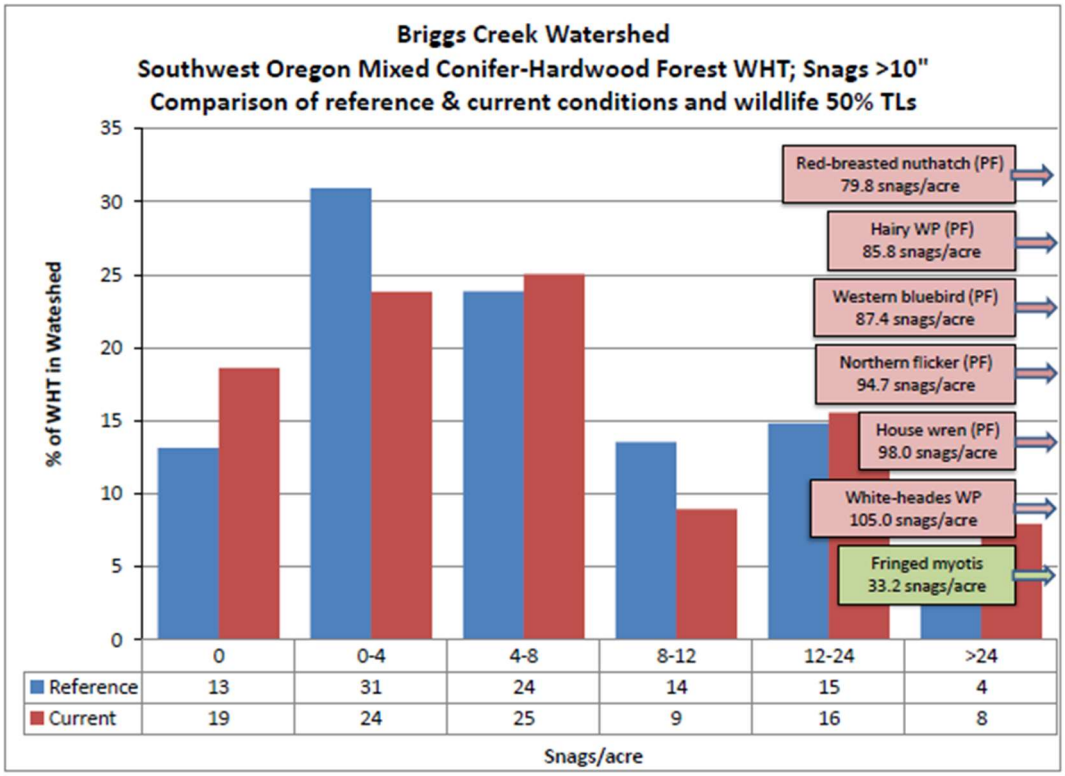
Snags

Figures 1 through 4 compare pre- and post-fire snags per acre. Down wood distribution is measured by percent cover which represents the abundance of down wood in an area providing cover for wildlife species. Information needed to model post-fire down wood is not available so assumptions about post-fire down wood are based on pre-fire histograms and the amount of high fire intensity in the watershed.

In addition, 50 percent tolerance levels for certain species that use snags are displayed. These tolerance levels indicate the density of snags per acre that 50 percent of individuals in the population of a species would use within this habitat type, while the other 50 percent would use a higher amount. For example, 50 percent of fringed myotis (bats) in the population would use habitat with approximately 33.2 snags per acre while the other 50 percent would use habitat with more snags per acre (Figure 1).

Figure 1 shows that prior to the fire, the Briggs Creek watershed was 6 percent deficient in snags per acre compared to reference conditions (19 vs 13 percent of the watershed with 0 snags per acre) although it had twice as much area with over 24 snags per acre than reference (8 vs 4 percent).

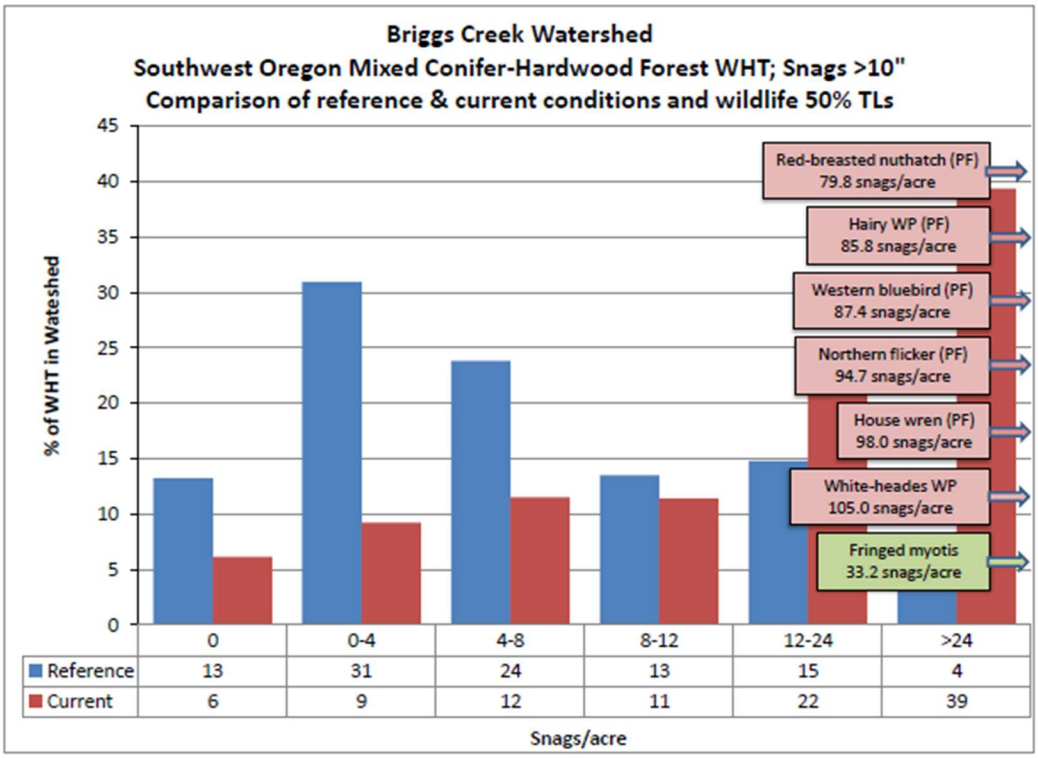
Figure 1. Pre-fire distribution of all snags > 10" diameter per acre within Briggs Creek watershed.



	0	0-4	4-8	8-12	12-24	>24
Reference	13	31	24	14	15	4
Current	19	24	25	9	16	8

Post-fire (Figure 2), the overall snag deficiency was made up and the snag distribution exceeds the reference condition by 7 percent (6 vs 13 with 0 snags per acre). Furthermore, there are nearly 10 times more acres than the reference condition with more than 24 snags per acre (39 vs 4 percent).

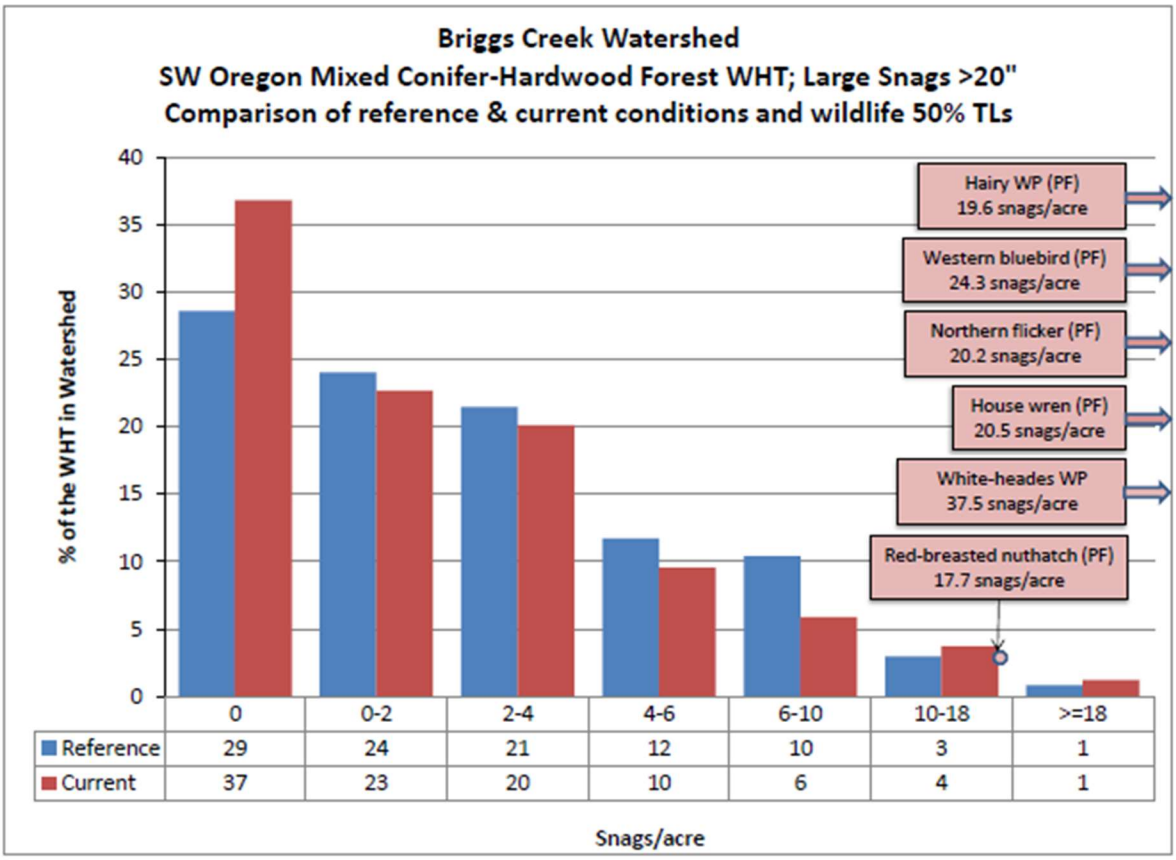
Figure 2. Post-fire distribution of all snags >10 inches diameter per acre within Briggs Creek watershed.



	0	0-4	4-8	8-12	12-24	>24
Reference	13	31	24	13	15	4
Current	6	9	12	11	22	39

Inventory data for large snags (>20 inches diameter) prior to the fires suggest the Briggs Creek watershed was 8 percent deficient in area with large snags per acre compared to reference conditions (37 vs 29 percent area with 0 snags) with deficiencies in ranges with <10 snags per acre and a slightly higher amount of acres with more than 10 snags per (Figure 3).

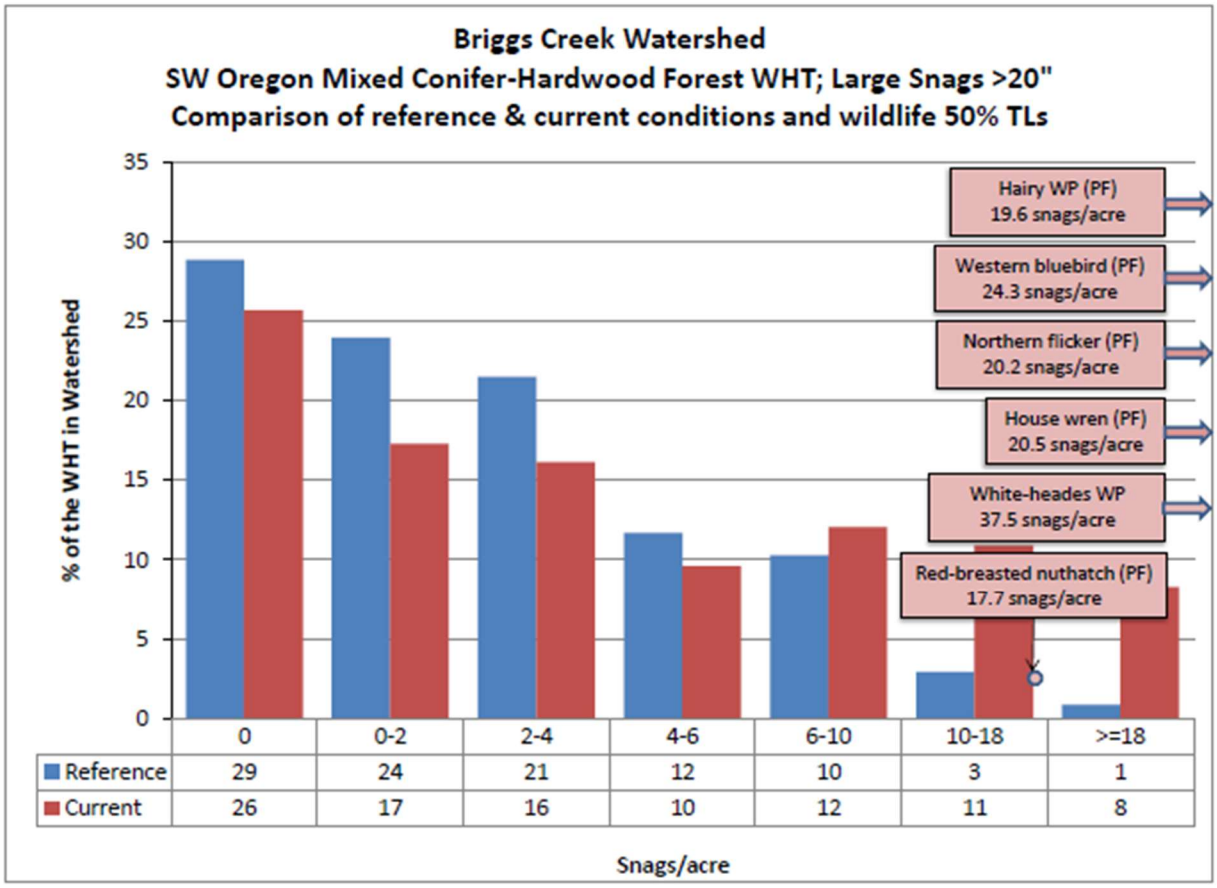
Figure 3. Pre-fire distribution of snags >20 inches diameter per acre within the Briggs Creek watershed.



	0	0-2	2-4	4-6	6-10	10-18	>=18
Reference	29	24	21	12	10	3	1
Current	37	23	20	10	6	4	1

Post-fire distribution in Figure 4 shows the watershed now has more acres with large snags than reference (26 vs 29 with 0 snags per acre) and has considerably more area with higher densities of large snags. However, the distribution is still skewed with less than reference distributions of lower densities of large snags (0 to 6 snags per acre). Overall, areas with higher densities of snags of all sizes potentially provide more suitable habitat for cavity nesters and bats than reference conditions.

Figure 4. Post-fire distribution of snags >20 inches diameter per acre within Briggs Creek watershed.



	0	0-2	2-4	4-6	6-10	10-18	>=18
Reference	29	24	21	12	10	3	1
Current	26	17	16	10	12	11	8

Down Wood

Figure 5 compares reference and pre-fire distributions of all down wood greater than 5 inches diameter in the Briggs Creek watershed.

Overall, the Briggs Creek watershed had more down wood pre-fire than the reference condition indicated by the amount of the watershed with 0 percent cover (18 vs 28 percent). This is evident in the amount of acres with 0-4 and 6-8 percent cover being higher than reference.

Furthermore, down wood greater than 20 inches diameter is used by fisher, marten and other mammals. Figure 6 compares the distribution of large down wood between pre-fire and reference conditions in the Briggs Creek watershed. Overall, the watershed had a little more large down wood cover than reference conditions with a slight deficiency in area with greater than 4 percent cover. It is unknown how much down wood was consumed during the fire, but approximately 64 percent of the watershed experienced fire effects that resulted in 1 percent or more basal area loss and down wood is accumulating as weakened trees continue to fall. Considering this and the high amount of snags in the watershed post-fire, the amount of down wood of all sizes is expected to increase over time and reach or exceed reference conditions.

Figure 5. Distribution of down wood > 5 inches diameter by percent cover within Briggs Creek watershed.

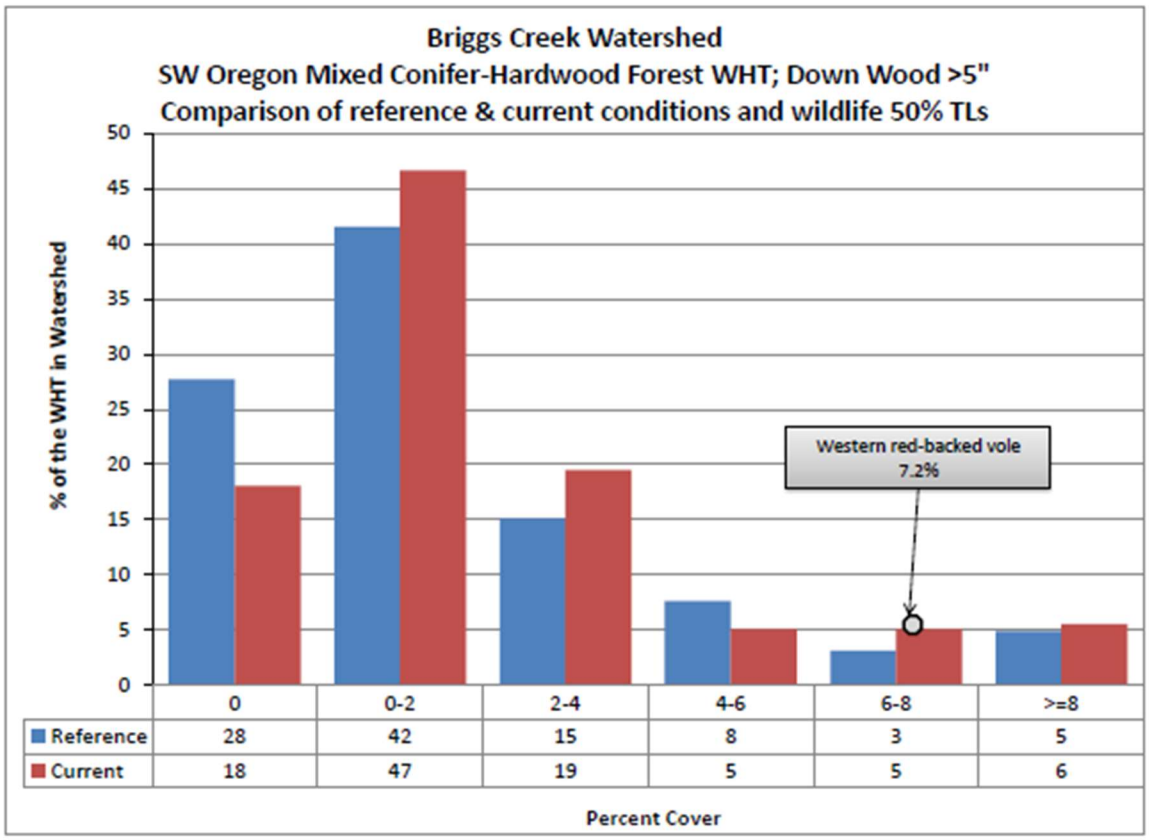
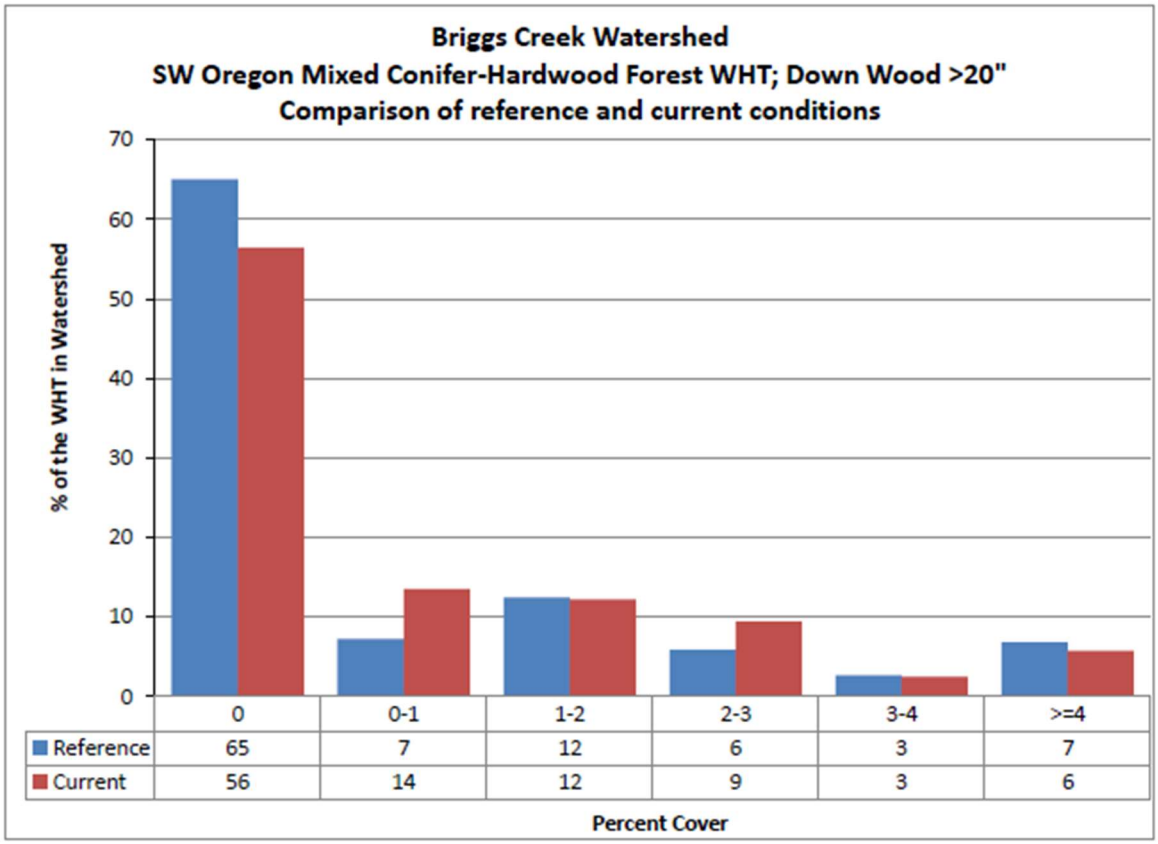


Figure 6. Distribution of large down wood by percent cover within Briggs Creek watershed.



Site Specific Dead Wood

Snags are expected to continue to accrue in and adjacent to the proposed units due to delayed stress response from fire effects, and down wood will also increase as snags decay and fall. Project design criteria specify that project activities would avoid disturbance of and protect existing snags and down wood ≥10 inches dbh to the greatest extent possible. Treatment skips would be used to avoid disturbance of large dead wood (>20 inches dbh) or areas of accumulated dead wood. Damaged, cull or defective trees would be left on site. Snags would be created in units where snags are deficient (< 4 snags per acre) and where it is desirable to eliminate trees >10" dbh. For example, where a Douglas-fir could be girdled to favor a black oak. Distribute as singles and clumps, across all treatment types.

Post-fire foraging (PFF) for northern spotted owls exists in the project area where nesting, roosting, and foraging (NRF) habitat was burned to where it no longer functions as NRF (>50% ba loss), but may still provide foraging opportunities for owls, particularly mice. This *PFF habitat would be retained to the extent possible and only affected where occasional snags may be felled for safety concerns during project activities, but left on-site for down wood.*

Species Potentially Impacted

There are no changes to species potentially impacted by the project. The final Project Wildlife Report and BE identifies federally threatened species for which no effect was determined, and also sensitive species for which there would be "no impact" from the Project. A compliance report for the northern spotted owl consultation and biological opinion (June 29, 2017) was also prepared and submitted to The Service on February 4, 2019 and the letter of concurrence was received by the Forest on February 9, 2019. The Service concurred with the conclusion of the assessment that effects

of the fire combined with the effects of the post-fire proposed action would not exceed the effects anticipated in the 2017 Biological Opinion. Consultation re-initiation was not triggered and no subsequent changes to the Opinion are needed. A summary of the analysis is provided later in this document.

In addition, conferencing for the Humboldt marten (*Martes caurina humboldtensis*), subspecies of the Pacific marten (*Martes caurina*) is not required because the Project does not overlap the known range for this subspecies (USFWS 2018). Therefore, there would be "no effect" to the Humboldt marten.

Following are those regionally sensitive species, Northwest Forest Plan (NWFP) Survey and Manage, and Siskiyou National Forest Plan management indicator species (MIS) previously analyzed in the Project Wildlife Report and BE because their habitat or individuals could be impacted by activities. The conclusion of Project effects for all of these species prior to the fires was "**May Impact Individuals and or Habitat, but not likely contribute towards a trend to federal listing or a loss of viability to the population or species**".

R6 Sensitive:

Pacific fisher	Oregon shoulderband	Coronis fritillary
Pacific marten	Travelling shoulderband	Johnson's hairstreak
Lewis' woodpecker		Pallid bat
White-headed woodpecker	Franklin's bumble bee	
Purple martin	Western bumble bee	

NWFP Survey and Manage:

Great gray owl, Oregon red tree vole, Chase sideband

Siskiyou National Forest LRMP Management Indicator Species (MIS):

Spotted owl, woodpeckers, Pacific marten, deer & elk

Table 3 summarizes how changed conditions from the 2018 fires interact with R6 Sensitive Species and NWFP Survey and Manage species and if there is a need for further analysis of the project effects due to the changed conditions.

Table 3. Summary of changed conditions for R6 sensitive species and NWFP Survey and Manage species previously analyzed in the Project Wildlife Report and BE.

Common Name	Interaction of changed condition with individuals or habitat and Proposed Action
R6 Sensitive Species	
Pacific fisher	
	Approximately 20 percent of the pre-fire denning/resting habitat in the sixth-field watershed experienced more than 50% basal area mortality and is no longer considered denning/resting habitat. Approximately 5 percent had 26 to 50 percent basal area mortality and may still function as denning/resting habitat where percent mortality was closer to 26 and pre-fire canopy cover at least 85 percent.

Pacific marten	The fires resulted in short-term removal of understory vegetation in approximately 50 percent of the sixth-field watershed which has temporarily reduced stand complexity in suitable mature forest habitat. Long-term fire recovery (shrub regeneration in areas with large snags and down wood) and treatments to enhance stand complexity in DELSH units would provide more potential habitat for martens than what was expected in the previous analysis. 17 percent of the FMZ treatment areas experienced >50% ba loss which is a short-term loss of late successional forest habitat for marten. These acres would be included in the long-term FMZ maintenance that would reduce understory complexity for up to 10% of the watershed as previously analyzed. No change in impacts from previous analysis, no further analysis needed.
Lewis′ woodpecker & White-headed woodpecker	Overall, the fires increased snags and open areas favoring pine and oak regeneration. Pine-oak and FMZ treatments would favor development of large pine and open habitat in 7-10% of the sixth-field watershed. DELSH treatments would increase late successional habitat structure for WHW. Incidental loss of snags may occur for danger tree mitigation. No change in impacts from previous analysis, no further analysis needed.
Purple martin	The fires increased snags and edge habitat in riparian and meadow areas. Purple martins would benefit from riparian and meadow restoration treatments that increase or maintain riparian and edge diversity proposed in less than 2% of the sixth-field watershed. Incidental loss of snags may occur for danger tree mitigation. No change in impacts from previous analysis, no further analysis needed.
Oregon shoulderband & Travelling sideband	Oregon shoulderband unlikely inhabitant, Travelling sideband common in watershed. The fires burned through the understory in at least 50 percent of the sixth-field watershed. Many burnt mollusk shells have been found throughout the project area and it assumed that the fires resulted in at least a short-term decrease in the travelling sideband population. However, suitable unburned habitat is still present in a mosaic throughout the watershed where unburned mollusk shells have been observed which is normal in the fall. Twenty-six percent of the watershed with >50% ba loss likely resulted in loss of suitable habitat for these species. Thirteen percent of units proposed in Alternative 2 burned with more than 50% basal area loss. Proposed activities in the unburned portion of units may disturb remaining suitable habitat or individuals. PDC to protect existing down wood, hardwood retention, and seasonal restrictions for NSO would reduce potential impacts to these species. No change in impacts from the previous analysis, no further analysis is needed.
Franklin′s & Western bumble bees	The fires resulted in short-term loss of late-season nectar and pollen sources in the sixth-field watershed. Long-term increase in nectar and pollen sources is expected in areas that now have less overstory canopy (at least 26% of the watershed). Treatments that increase understory sunlight and flowering plant diversity would provide more nectar and pollen. Ground disturbing activities could harm individuals, damage nest sites or cause short-term loss of forage. These activities would occur within a smaller proportion of the treatment units than previously analyzed and treatment timing would vary. With the post-fire increase in habitat and less disturbed area, there is no change in impacts from the previous analysis and no further analysis needed.

Coronis fritillary	A very small amount of potential larval habitat in the sixth-field watershed (serpentine with *viola halli*) may have burned in the fires, but would likely recover in the next growing season. FMZ maintenance (prescribed fire) may affect potential larval habitat and nectar sources and harm individuals if burned in the spring. Nectar sources (forage) may be enhanced by treatments that increase sunlight and understory diversity. *Avoid spring burning in serpentine areas with Viola halli.* No change in impacts from previous analysis and no further analysis needed.
Johnson's hairstreak	The fires and associated suppression activities resulted in loss of mature pines throughout at least 50 percent of the sixth-field watershed and likely loss of associated dwarf mistletoe (*Arceuthobium spp*) which provides food for larvae of this species. Treatments that increase development of late successional habitat and favor ponderosa and Jeffery pine would benefit this species along with treatments that increase nectar sources. The Project may cause short-term loss of nectar from prescribed fire. Incidence of eggs or larvae lost from disturbance or removal of suitable mistletoe host would be low since legacy pines will be retained. No change in impacts from previous analysis and no further analysis needed.
Pallid bat, Fringed myotis	Overall, the fires increased snags in the sixth-field watershed (although up to 13% of the watershed may have danger tree mitigation from fire-killed trees) and created more habitat for these bats than what was available prior to the fires. Incidental loss of snags or potential disturbance of individuals from project activities and danger tree mitigation may occur. Retention and promotion of legacy trees in treatment units would promote future large snag habitat. No change in impacts from previous analysis and no further analysis needed.
Northwest Forest Plan Survey and Manage Species	
Great gray owl	There are no known sites for this species that require protection by the Project. No change from previous analysis, no further analysis needed.
Oregon red tree vole (RTV)	The RTV High Priority Site Conservation Plan for the Briggs Creek 5th field watershed has been revised based on changed conditions to RTV habitat caused by the fires, and internal and public review. The final Wildlife Report and Biological Evaluation, and the final EA for this project have been revised to include the effects of the RTV Plan to other resources. No further analysis in this addendum is needed.
Chase sideband	There are no known sites for this species that require protection by the Project. No change from previous analysis, no further analysis needed.

MIS

Baseline habitats previously documented for the Siskiyou National Forest MIS in 2011 (USDA Forest Service 2012) have been considerably affected by the 2017 and 2018 fires. Table 4 compares the habitat available in the 2012 Forest document to the 2012 GNN data and the 2012 GNN data updated with fire severity (BARC) or fire intensity mapping (RAVG) for fires that have occurred through 2018.

The habitat data source explains much of the difference between the 2011 MIS report versus the 2012 GNN habitat data. The 2011 habitat data were based on general cover type mapping derived from satellite data acquired in 1988 and 1991 used for the Northwest Forest Plan, and was updated after the 2002 Biscuit fire. The GNN data is based on satellite imagery acquired in 2011 and has been updated for large fires that have occurred on the forest between 2011 and 2018.

Table 4. Comparison of MIS habitat in 2011 report with the 2012 GNN and 2018 post-fire habitat for the Siskiyou National Forest.

Management Indicator Species	Habitat Acres 2011 (% of SNF)	2012 GNN Habitat Acres (% of SNF)	2018 Post-fire Habitat Acres (% of SNF)	Change in Habitat Acres (2012-2018)	% Change of Habitat since 2012
Northern spotted owl (mature and old growth)	368,428 (34)	374,720 (34)	364,231 (33)	-10,489	-3%
American marten (mature forest)	368,428 (34)	374,720 (34)	364,231 (33)	-10,489	-3%
Pileated woodpecker (mature forest)	368,428 (34)	374,720 (34)	364,231 (33)	-10,489	-3%
Woodpeckers[1] (unmanaged, snags)	864,290 (79)	953,094 (87)	953,094 (87)	0	0
Deer and elk (thermal/hiding)	368,428 (34)	762,311 (70)	732,488 (67)	-29,863	-4%
Deer and elk (forage)	486,985 (45)	300,228 (28)	330,963 (30)	+30,735	+10%

[1] 2012 data includes managed stands. 2018 acres assume that all acres provide potential snag habitat regardless of burned or unburned, however the density of snags on burned acres (43,190 acres) has increased. This would especially benefit woodpecker species that use post-fire habitat (see also the DecAID analysis).

Habitat trends for MIS displayed in Table 4 show that the greatest change due to fire was the 10 percent gain in early seral habitat which benefits deer and elk forage and is mostly related to the loss of thermal/hiding cover. The difference in forage from 2011 to 2012 is attributed mostly to young plantations and thinned stands included in the 2011 foraging habitat that are considered hiding/thermal cover in the 2012 data because they have at least 40% canopy cover. Therefore, the difference in thermal/hiding cover from 2011 to 2012 is that younger stands are considered to provide hiding cover, while the 2011 report only accounted for the thermal cover of mature forest (20+ inch DBH with 40%+ canopy cover).

Finally, while late successional forest has decreased by about 3 percent at the forest level, early seral (deer/elk forage) and late successional habitat now each comprise nearly 1/3 of the Siskiyou NF MIS habitats. Snag habitat for woodpeckers has actually increased with the large fires described in the footnote of Table 4.

Table 5. Summary of changed conditions for SNF MIS previously analyzed in the Project Wildlife Report and BE.

Common Name	Interaction of changed condition with individuals or habitat and Alternative 2
SNF MIS	
Northern Spotted Owl	At the forest scale, the proposed action would downgrade a small amount of NRF habitat (0.1 percent of mature forest habitat) for FMZs. Legacy trees and down wood would be retained where they exist and these stands would still function as dispersal habitat. Treatments in approximately 1,600 acres of younger stands would promote development of mature forest (<1% at the forest level).

American (Pacific) Marten	At the forest scale, treatments are expected to reduce the understory complexity and overstory density of a small amount (0.1%) of mature forest habitat for FMZs but would retain legacy trees and down wood per project design criteria. Treatments in younger stands would promote development of mature forest (<1% at the forest level).
Pileated Woodpecker	At the forest scale, the project may cause a small loss of snag habitat to danger tree mitigation, while treatments that enhance and develop late successional habitat would promote a small (<1%) increase of mature forest.
Woodpeckers	More snag habitat is available now than prior to the fire. Snags felled as danger trees in areas of project implementation would be a small loss at the forest scale. The project would result in less than a 1% contribution to open pine and oak habitats for woodpeckers at the forest scale.
Deer and Elk	Minimal loss of hiding or thermal cover may occur in FMZ units, and small increase (1%) at the forest scale in cover and foraging habitat from treatments that enhance or rejuvenate shrubs, forbs and meadow habitat.

Changed Condition Analysis – Terrestrial Wildlife

The following section describes the change in extent and intensity or degree of effects of the Project proposed action for the northern spotted owl (federally threatened), Pacific fisher (federally proposed), MIS, migratory birds and pollinators previously analyzed in the Project Wildlife Report and Biological Evaluation. Primary changes to the proposed action are fewer acres impacted by thinning, landings, and temp roads, or delayed treatments (fuel treatments and underburning). However, the mechanisms for effects are the same as previously analyzed.

Background for Cumulative Effects

Approximately 98 percent of Upper Briggs Creek watershed is National Forest, managed by the Wild Rivers Ranger District. Approximately 20 percent of the watershed is composed of managed stands with some level of past timber harvest. Activities occurring or reasonably certain to occur on National Forest lands within the Upper Briggs Creek watershed separate from the proposed project include plantation thinning, slash treatment, and underburning; fuel wood cutting; road maintenance; roadside danger tree mitigation, recreation site maintenance including hazard tree mitigation, and invasive weed treatments. To avoid or minimize adverse effects on spotted owls, all activities employ mandatory protection measures similar to Upper Briggs (appendix A), unless consultation with the U.S. Fish and Wildlife Service (USFWS) allows otherwise.

The small amount of private land in the sixth-field watershed is generally managed for timber production, mining and residential use. Industrial lands are managed in accordance with the Oregon Forest Practices Act. The OFPA requires modification of activities in some cases for wildlife species identified as sensitive, threatened, or endangered (http://www.oregon.gov/ODF/Working/Pages/FPA.aspx). Salvage of burned timber has occurred and is expected to continue on private lands that burned within the analysis area. These acres are not included in habitat calculations.

Recreational use occurs year-round though the most use occurs when the roads are clear of snow. Trails and roads receive motorized and non-motorized use. Developed and dispersed camping and game and mushroom hunting occur seasonally. Larger group events that utilize the campgrounds and trails occur annually. The Upper Briggs area is also popular for small type mining, panning, sluicing, and suction dredging, since this area is not closed to suction dredging per the state of Oregon.

Federally Listed or Proposed Species

Northern Spotted Owl

Adverse impacts to the northern spotted owl (NSO) by the Project would be short-term with long-term benefits such as increasing resilience and biodiversity in the watershed. A consultation compliance report to evaluate the effects of the Project considering the changed conditions of NSO habitat due to the 2018 fires was submitted to the Service on February 4, 2019. It was determined that the effects from implementing the "post-fire" Proposed Action would remain consistent with the original Biological Assessment and Biological Opinion completed in 2017 and re-initiation of consultation unnecessary. The report is available in the project record and a summary is provided below. All mandatory conservation measures (project design criteria) and terms and conditions from the Project biological opinion would be implemented.

The following describes the degree of changes in habitat baseline conditions due to the 2018 fires for various scales of analysis in the NSO Biological Assessment:

- Action Area: 9 percent reduction of NRF, 16 percent reduction of dispersal-only, 7 percent now post-fire foraging (PFF).
- Critical Habitat unit KLW2: 42 percent reduction of NRF, 23 percent reduction of total dispersal
- Four 5th Field Watersheds: 13 percent reduction of total dispersal in Lower Applegate; 29 percent reduction in Briggs Creek; 30 percent reduction in Silver Creek; 22 percent reduction in Hellgate Canyon-Rogue River (Briggs Creek and Silver Creek now have less than 50 percent dispersal habitat with 49 and 25 percent respectively).
- NRF within the Nest Patch, Core Area, Home Range for 7 known sites in the Action Area (see Table 9 for details):
    a. Pre-fire NRF in nest-patches ranged from 23-86 percent, post-fire ranges from 20-59 percent.
    b. Pre-fire NRF in core areas ranged from 30-50 percent, post-fire, the core areas range from 19-46 percent NRF. None of the core areas currently meet the minimum NRF threshold of 50 percent needed to support reproductive success of NSO.
    c. Pre-fire NRF in home ranges ranged from 28-44 percent, post-fire, the home ranges have from 18-37 percent NRF. None currently meet the minimum NRF threshold of 40 percent needed to support reproductive success.
- NRF within Action Area outside of known NSO Home Ranges: 40 percent reduction

Table 6 displays the pre- and post-fire comparison of acres of NSO habitat within proposed treatments under Alternative 2. PFF would be retained as explained previously, but is included to show the amount of this habitat within the proposed action acres.

Table 6. Total acres of NSO habitat affected by proposed treatments and temp road/landing construction

Treatment Type	Pre-Fire Acres	Post-fire Acres
Develop and Enhance Late Successional Habitat (Incl. rare plant, riparian reserve and FMZ objectives)	**1,254 (total)**	
NRF (*treat and maintain*)	331	269
PFF	0	9
Dispersal (*treat and maintain*)	606	578

Treatment Type	Pre-Fire Acres	Post-fire Acres
Pine Oak Restoration (Incl. rare plant and FMZ objectives)	**706**	
NRF *(downgrade with legacy retention)*	127	77
NRF (t*reat and maintain riparian and RTV HPS*)	8	11
PFF	0	14
Dispersal (*treat and maintain*)	435	408
Meadow Restoration[1]	**188**	
Dispersal (t*reat and maintain riparian*)	65	44
Dispersal *(removal with legacy retention)*	30	15
Roadside FMZ	**620**	
NRF (*treat and maintain*)	170	120
PFF	0	9
Dispersal (*treat and maintain*)	278	239
Strategic Ridgeline FMZ	**1,250**	
NRF (t*reat and maintain riparian and RTV HPS*)	43	32
NRF *(downgrade with legacy retention)*	424	281
PFF	0	64
Dispersal (*treat and maintain*)	578	395
Estimated Temp Road and Landing Construction[2]	**37.5**	
NRF (removal)	15.5	15.5
Dispersal (removal)	22	22

[1]The original table had the acres for the two dispersal categories reversed, the correct acres are shown.
[2]These acres would be reduced now that more non-habitat is available for landings

Tables 7 and 8 compare pre and post-fire acres of habitat effects for the Project Alternative 2. Treatment acres are less in the post-fire proposed action and degree of effects is less or nearly the same as what was consulted on within the action area, the entire KLW-2, and the Briggs Creek 5th field watershed shown as "% change to baseline" in Table 8.

Table 7. Pre- and Post-fire comparison of habitat affected by the proposed action

Effects to Habitat	Pre-fire Proposed Action	Post-fire Proposed Action
NRF removal	16	16
NRF downgrade	551	358
NRF treat and maintain	552	432
Dispersal removal	87	37
Dispersal treat and maintain	1,927	1,664

Table 8. Comparison of pre- and post-fire effects of proposed action to scales of analysis

Analysis Area	Effects to Habitat	Pre-fire Proposed Action Acres (% change to baseline)	Post-fire Proposed Action Acres (% change to baseline)
Action Area	**NRF removal**	16 (-0.16)	16 (-0.16)
	NRF downgrade	551 (-6)	358 (-5)
	NRF treat and maintain	552 (0)	432 (0)
	Dispersal removal	87 (-0.4)	37 (-0.3)
	Dispersal treat and maintain	1,927 (0)	1,664 (0)
CHU KLW-2	**NRF removal**	16 (-0.02)	16 (-0.03)
	NRF downgrade	509 (-0.5)	350 (-0.6)
	NRF treat and maintain	535 (0)	421 (0)
	Dispersal removal	87 (-0.2)	37 (-0.08)
	Dispersal treat and maintain	1,790 (0)	1,534 (0)
KLW-2 500-acre analysis	**NRF reduced**	500 (-16)	344 (-13)
	Dispersal-only reduced	63 (-1)	15 (-0.5)
Briggs Creek watershed	**NRF removal**	16 (-0.1)	16 (-0.2)
	NRF downgrade (to dispersal)	551 (-4)	358 (-4)
	NRF treat and maintain	552 (0)	432 (0)
	Dispersal removal	87 (-0.4)	37 (-0.3)
	Dispersal treat and maintain	1,927 (0)	1,664 (0)

Effects to NSO Sites

Table 9 compares pre- and post-fire NRF habitat available in the nest patch, core area and home range of seven known NSO sites in the Action Area. The table also displays the acres of habitat effects expected as a result of implementing the Project Alternative 2. A comparison is made between the effects of Alternative 2 from the consultation vs. the effects of Alternative 2 now modified. Note that some acres affected overlap between the home ranges where treatment units occur within more than one home range. Corrections were made to a couple of home ranges for post-treatment PFF and post-treatment NRF that were incorrectly calculated in the version submitted to the Service. These changes were minor and inconsequential to the final conclusions of the compliance document and letter of concurrence.

Post-fire habitat affected by the proposed Alternative 2 for each site would be less than that covered by the consultation. NRF and dispersal removal for landing construction within home ranges and core areas included in the consultation is expected to be less due to fewer acres that will be commercially thinned and more opportunities to use existing openings due to fire suppression activities. Any new landings would be included within the 20% of allowable openings per unit.

Sites 55, 60 and Sam Brown would have dispersal removed for meadow restoration within less than 1 percent their home ranges for meadow restoration, which would also affect less than 1 percent of the core areas for sites 60 and Sam Brown. This impact is less extensive than that in the consultation.

Downgrade of NRF within all of the home ranges outside of the core area and nest patch was also included in the consultation. The proposed reduction would not affect the percent NRF within three home ranges (50, 59, 60) and would result in a 1 percent NRF reduction in two home ranges (55 and 228). Sam Brown would experience a 2 percent reduction, resulting in 35 percent NRF where it would have been at 38 percent post-treatment prior to the fire. Secret Creek would experience a 2 percent reduction, resulting in 27 percent NRF, where it would have been at 39 percent prior to the fire.

There would be no NRF downgrade in core areas. Dispersal would be reduced for meadow restoration in the core area for sites 55 (2 ac) and Sam Brown (2 ac). A total of 134 acres of NRF and 336 acres of dispersal would be treated and maintained across five of the core areas. Pre-fire acres consulted on were 152 NRF and 388 dispersal treat and maintain across the same five core areas.

In summary, the 2018 fires reduced NRF levels within core areas, and home ranges below what they were in the consultation and all are now below threshold levels of NRF associated with NSO reproductive success. Proposed NRF downgrade would result in slightly lower NRF percentages (1-2 percent lower) within four home ranges (55, 228, Sam Brown and Secret Creek). This downgrade is associated with sites that have low relative habitat suitability such and treatments are focused on maintenance of pine/oak habitat or establishment of ridgeline fire management zones. This percent change in NRF for these home ranges is the same or lower than what was consulted on prior to the fires and is displayed in Table 11. In addition, treatments that maintain dispersal habitat outside of the FMZs and pine/oak habitats in these home ranges are expected to develop future NRF habitat because they are on sites with higher relative habitat suitability.

Table 9. Pre- and Post-fire NSO habitat condition and effectsof Alternative 2 for sites analyzed in Upper Briggs Project Action Area.

(HR = Home Range, Core (CA) = Core Area, NP = Nest Patch, PFF = post-fire foraging, T&M = treat and maintain.)

1- NRF on federal lands/ percent of habitat within the total home range or core area – acres of NRF / 3400 acres for HR; acres of NRF / 500 acres for CA.

2- Reduced = NRF or Dispersal removed or downgraded from the proposed action. Removal of NRF or dispersal for landings and road construction in the acreage for respective treatments and not double-counted

3- PFF in treated acres may have occasional snags felled and left on-site

Site	Pre-treatment NRF Habitat[1] acres (%)			Pre-Treatment PFF Habitat acres (%)			NRF Reduced[2] acres		PFF in treated acres[3]		Dispersal Reduced acres		T&M in Nest Patch acres (%NP)		T&M in Core acres (%CA)		T&M in Home Range Acres (%HR)		Post-Treatment NRF Habitat acres (%)		Post-Treatment PFF acres (%)		Effects Rationale
	HR	Core	NP	HR	Core	NP	HR	Core	HR	Core	HR	Core	NRF	Disp	NRF	Disp	NRF	Disp	HR	Core	HR	Core	
50 Pre-fire	1246 (36)	197 (39)	16 (23)				7	0			0.2	0	0	0	0	0	228 (7)	427 (13)	1239 (36)	197 (39)			7 ac NRF downgrade at edge of HR in small patches within low RHS pine-oak restoration. No change in % NRF, long-term increase in NRF in HR.
50 Post-fire	880 (26)	153 (30)	14 (20)	141 (4)	7 (1)	<1 (0)	6	0	0	0	0	0	0	0	0	0	16 (<1)	51 (1)	874 (26)	153 (30)	141 (4)	7 (1)	6 ac NRF downgrade at edge of HR in small patches within low RHS pine-oak restoration. No change in % NRF, long-term increase in NRF in HR T&M dispersal.
55 Pre-fire	1094 (32)	207 (41)	37 (53)				31	0.5			65	7	4 (6)	6 (9)	42 (8)	151 (30)	189 (6)	690 (20)	1063 (31)	206.5 (41)			31 ac NRF reduction in HR for low RHS pine-oak restoration will decrease NRF by 1% in deficient HR in short term with long-term increase from treat an maintain acres. No change in CA % NRF short-term with long-term increase. Dispersal reduced: HR- 65 ac meadow restoration; CA - 7 ac meadow restoration. Nest Patch TM is along an existing road to be used as a holding line for underburning a pine-oak restoration treatment. Only ladder fuel treatment by

Site	Pre-treatment NRF Habitat[1] acres (%)			Pre-Treatment PFF Habitat acres (%)			NRF Reduced[2] acres		PFF in treated acres[3]		Dispersal Reduced acres		T&M in Nest Patch acres (%NP)		T&M in Core acres (%CA)		T&M in Home Range Acres (%HR)		Post-Treatment NRF Habitat acres (%)		Post-Treatment PFF acres (%)		Effects Rationale
	HR	Core	NP	HR	Core	NP	HR	Core	HR	Core	HR	Core	NRF	Disp	NRF	Disp	NRF	Disp	HR	Core	HR	Core	
55 Post-fire	1040 (31)	164 (33)	36 (51)	23 (1)	5 (1)	0	20	0	7	3	19	2	4 (6)	6 (9)	42 (8)	128 (25)	178 (5)	665 (19)	1020 (30)	164 (33)	23 (1)	5 (1)	20 ac NRF downgrade in HR for low RHS pine-oak and Ridgeline FMZ will decrease NRF by 1% in deficient HR in short term with long-term increase from treat an maintain acres. No change in CA % NRF short-term with long-term increase. Dispersal reduced: HR- 19 ac meadow restoration; CA - 2 ac meadow restoration. Nest Patch TM is along an existing road to be used as a holding line for underburning a pine-oak restoration treatment. Only ladder fuel treatment by hand to safely underburn would occur here.
59 Pre-fire	1356 (40)	200 (40)	38 (54)				2	0			0	0	0	0	0	0	0	0	1354 (40)	200 (40)			2 ac NRF downgrade in low RHS ridgeline at edge of Home Range. No change in % NRF.

Site	Pre-treatment NRF Habitat[1] acres (%)			Pre-Treatment PFF Habitat acres (%)			NRF Reduced[2] acres		PFF in treated acres[3]		Dispersal Reduced acres		T&M in Nest Patch acres (%NP)		T&M in Core acres (%CA)		T&M in Home Range Acres (%HR)		Post-Treatment NRF Habitat acres (%)		Post-Treatment PFF acres (%)		Effects Rationale
	HR	Core	NP	HR	Core	NP	HR	Core	HR	Core	HR	Core	NRF	Disp	NRF	Disp	NRF	Disp	HR	Core	HR	Core	
59 Post-fire	668 (20)	94 (19)	25 (36)	298 (9)	38 (8)	1 (1)	1	0	0	0	0	0	0	0	0	0	0	0	667 (20)	94 (19)	298 (9)	38 (8)	1 ac NRF downgrade in low RHS ridgeline at edge of Home Range. No change in % NRF. No Change in PFF
60 Pre-fire	948 (28)	185 (37)	60 (86)				39	0			6	0	0	0	24 (5)	49 (10)	103 (3)	350 (10)	909 (27)	185 (37)			39 ac NRF reduction in HR on low RHS ridgeline. 1% short-term NRF reduction in deficient HR with long-term increase in HR and CA. 6 ac dispersal removed for meadow restoration at edge of HR.
60 Post-fire	622 (18)	144 (29)	25 (36)	171 (5)	12 (2)	<1	11	0	9	0	2	0	0	0	17 (3)	33 (7)	101 (3)	299 (9)	611 (18)	144 (29)	171 (5)	12 (2)	11 ac NRF reduction in HR on low RHS ridgeline. No change in % NRF. Long-term increase in HR and CA with dispersal T&M. 2 ac dispersal removed for meadow restoration at edge of HR.
228 Pre-fire	1007 (30)	151 (30)	35 (49)				17	0.5			10	2	0	0	9 (2)	52 (10)	64 (2)	369 (11)	990 (29)	150 (30)			17 ac NRF reduced in deficient HR for pine-oak restoration results in 1% NRF reduction. No change in CA %NRF. Long-term increase of NRF at HR and CA with treat and maintain.

Site	Pre-treatment NRF Habitat[1] acres (%)			Pre-Treatment PFF Habitat acres (%)			NRF Reduced[2] acres		PFF in treated acres[3]		Dispersal Reduced acres		T&M in Nest Patch acres (%NP)		T&M in Core acres (%CA)		T&M in Home Range Acres (%HR)		Post-Treatment NRF Habitat acres (%)		Post-Treatment PFF acres (%)		Effects Rationale
	HR	Core	NP	HR	Core	NP	HR	Core	HR	Core	HR	Core	NRF	Disp	NRF	Disp	NRF	Disp	HR	Core	HR	Core	
228 Post-fire	733 (22)	99 (20)	30 (43)	207 (6)	31 (6)	2 (3)	7	0	2	0	0	0	0	0	9 (2)	50 (10)	67 (2)	358 (10)	726 (21)	98.5 (20)	207 (6)	31 (6)	7 ac NRF reduced in deficient HR for pine-oak restoration results in 1% NRF reduction. Small reduction in HR PFF would not reduce % PFF. No change in CA %NRF. Long-term increase of NRF at HR and CA with treat and maintain.
Sam Brown Pre-fire	1356 (40)	251 (50)	38 (54)				72	0.6			54	7	0	0	43 (9)	50 (10)	158 (5)	367 (11)	1284 (38)	250 (50)			72 ac NRF reduction in HR on low RHS ridgeline and pine oak restoration. 2% NRF reduction would move HR below threshold in the short-term. No change in CA %NRF. Long-term increase in NRF in HR and CA. Dispersal reduced for meadow restoration and landing construction.
Sam Brown Post-fire	1245 (37)	231 (46)	36 (51)	29 (1)	<1	<1	62	0	10	0	16	2	0	0	43 (9)	55 (11)	142 (4)	349 (10)	1183 (35)	231 (46)	29 (1)	<1	62 ac NRF downgrade in deficient HR on low RHS ridgeline and pine oak restoration results in 2% NRF reduction. No change in CA %NRF. Long-term increase in NRF in HR and CA. Dispersal reduced for meadow restoration.

Site	Pre-treatment NRF Habitat[1] acres (%)			Pre-Treatment PFF Habitat acres (%)			NRF Reduced[2] acres		PFF in treated acres[3]		Dispersal Reduced acres		T&M in Nest Patch acres (%NP)		T&M in Core acres (%CA)		T&M in Home Range Acres (%HR)		Post-Treatment NRF Habitat acres (%)		Post-Treatment PFF acres (%)		Effects Rationale
	HR	Core	NP	HR	Core	NP	HR	Core	HR	Core	HR	Core	NRF	Disp	NRF	Disp	NRF	Disp	HR	Core	HR	Core	
Secret Creek Pre-fire	1488 (44)	185 (37)	43 (61)				175	0.5			5	1	0	4 (6)	34 (7)	86 (17)	185 (5)	440 (13)	1313 (39)	184 (37)			175 ac NRF reduction would occur in low RHS ridgeline FMZ and for pine-oak restoration. These acres are spread out at the edges of the Home Range. 5% NRF reduction would move HR 1% below threshold in the short term with long term increase from TM acres.
Secret Creek Post-fire	989 (29)	155 (31)	41 (59)	222 (6)	4 (1)	0	65	0	63	0	0	0	0	4 (6)	23 (5)	70 (14)	124 (4)	396 (12)	924 (27)	155 (31)	222 (6)	4 (1)	65 ac NRF downgrade would occur in low RHS ridgeline FMZ and for pine-oak restoration in deficient HR resulting in 2% reduction of NRF. These acres are spread out at the edges of the Home Range. No reduction in CA NRF. Long term NRF increase from TM acres.

Effects to prey

Effects of the fires likely shifted prey species abundance and composition throughout the action area depending on the fire severity and pre-fire habitat structure. For instance, suitable habitat for red tree voles and flying squirrels is likely reduced where fire effects resulted in large tree and canopy loss. Conversely, post-fire response of herbaceous vegetation, shrubs and re-sprouting hardwoods, and newly-created edges may increase populations of prey species such as mice and woodrats.

Fontaine (2008) found that just after the 2002 Biscuit Fire (directly adjacent to the Upper Briggs watershed), small mammal communities transitioned from low abundance and high species richness to high abundance and low species richness, largely dominated by deer mice. Partial recovery to pre-fire conditions was observed at about 17 years after the fire with wood rats being present but vole species still absent relative to unburned mature forest. Zwolack and Foresman (2007) found varying degrees of response to stand replacement fire in their study with a large negative response from red back voles, a relatively common prey item for spotted owl. Zwolak and Foresman (2007) also found that relatively rare species such as northern flying squirrels and bushy-tailed woodrats were largely restricted to unburned areas in severely burned landscapes. Flying squirrels are generally most abundant in older, multi-storied forests with large trees and snags and relatively abundant down wood and fungi. They can also be found in in younger, relatively dense commercial-aged stands. Stand replacement fire would likely remove this species from those areas and even on lower severity fire, if there is a loss of the middle stand layer where they could be impacted by predators (Wilson 2010). Nevertheless, some of these stands may still provide low-moderate quality habitats for flying squirrels where they burned at low intensity.

The action area provides habitats for both bushy-tailed woodrats (Neotoma cinerea) and dusky-footed woodrats (N. fuscipes). Both of these species use small-diameter woody material for building nests which may be constructed either on the ground or in trees. Both species also forage on shrubs, forbs, grasses, and parts of conifers. Lee and Tietje (2005) concluded that a low-medium intensity prescribed understory fire had no negative effect on the survival or temporary emigration on dusky-footed woodrats in San Luis Obispo County, California and that prescribed understory fire in oak woodland is unlikely to alter woodrat populations significantly if patches of well-distributed habitats are maintained. Fire can increase the abundance of shrubby vegetation used by woodrats (along with mice and vole species). Edge ecotones created from fire can be areas of increased woodrat abundance and exposure to foraging NSOs (Zabel et al.1995). However, high severity fire is likely to remove habitat for woodrats, at least in the short term (D. Clayton per obs).

The effects to prey from proposed alternative 2 would remain the same as analyzed in the Project BA, however the extent of impacts would be less with fewer acres treated. Treatment implementation would be spread out temporally and spatially within the Action Area which would reduce the short-term negative effects from habitat disturbance or reduction due to thinning. Long-term effects of habitat reduction in ridgeline FMZs would remain the same, however less NRF habitat would be downgraded and maintenance with prescribed fire would not all occur at the same time.

Effects to designated critical habitat

The biological assessment prepared for this project determined that implementation of alternative 2 would be likely to adversely affect critical habitat subunit KLW2 for the northern spotted owl due to downgrade of NRF in ridgeline FMZ and pine oak treatments and removal of dispersal habitat for meadow restoration.

Table 10 shows that the degree of loss of NRF within the entire subunit from implementation of alternative 2 would be slightly higher than pre-fire effects, but still very small (< 1%) at the scale of

the subunit. The degree of dispersal habitat removed would be less than the pre-fire effects.

Table 10. Effects to NSO Critical Habitat from the Proposed Action

	NRF Removed (acres)	NRF Downgrade (acres)	NRF T&M (acres)	PFF (acres)	Dispersal-Only Removed (acres)	Dispersal-Only T&M (acres)	Total Habitat Acres Treated
KLW-2 (Pre-fire baseline acres)	91,442				36,709		
Proposed Action acres (Pre-fire)	15.5	509	535		87	1,790	**2,900**[1]
% Change to KLW-2 Baseline Habitat (Pre-Fire)	**< - 0.02%**	**-0.5%**	**No Change**		**- 0.2%**	**No Change**	
KLW-2 (Post-fire baseline acres)	52,549			4,519	46,465		
Proposed Action acres (Post-fire)	15.5	350	421	94	37	1,534	**2,342**[1] (not including PFF)
% Change to KLW-2 Baseline Habitat (Post-Fire)	**< -0.03%**	**-0.7%**	**No Change**		**-0.08%**	**No Change**	

[1]Acres of NRF and dispersal-only removed for road and landing construction are also included in downgrade and TM acres

The 500-acre analysis recommended in the 2012 Final CHU rule (77 *Federal Register* 46:14062-14165) to evaluate localized effects to CHU was updated with the post-fire habitat and proposed action. To conduct this recommended analysis within critical habitat boundaries, a 500-acre (0.5-mile radius) buffer around centroids of proposed treatment units that would remove or downgrade NRF or dispersal only habitat were delineated. Acres of pre-and post-treatment NRF habitat in the 500-acre analysis areas were compared to determine effects to primary constituent elements and primary biological features of critical habitat. Tables 11 and 12 compare the pre- and post-fire analysis.

Table 11. Pre-fire: Pre- and Post-Treatment NRF Habitat on NF lands within 500-acre CHU Analysis Areas

CHU Subunit	NRF Pre-Treatment (acres)	NRF Reduced (acres)	NRF Post-Treatment (acres)	Percent Change
KLW-2	3,073	500	2,573	-16%
	Total Dispersal Pre-Treatment	**Dispersal-only Reduced**[1]	**Total Dispersal Post-Treatment**	
	6,471	63	6,408	-1%

[1]Does not include landing/tmp road construction

Table 12. Post-fire: Pre- and Post-Treatment NRF Habitat on NF lands within 500-acre CHU Analysis Areas

CHU Subunit	NRF Pre-Treatment (acres)	NRF Reduced (acres)	NRF Post-Treatment (acres)	Percent Change
KLW-2	2,537	344	2,193	-13%
	Total Dispersal Pre-Treatment	**Dispersal-only Reduced**[1]	**Total Dispersal Post-Treatment**	
	2,876	15	2,861	-0.5%

[1]Does not include landing/tmp road construction

The post-fire analysis in Table 12 shows measurable localized effects of NRF downgrade and dispersal-only removal associated with the Upper Briggs Project in subunit KLW-2. The percent change would be lower than what was included in the Project consultation.

Cumulative Effects to Northern Spotted Owl and Designated Critical Habitat

The private lands which comprise 2 percent of the Upper Briggs Creek watershed are not considered to contribute long-term owl habitat in the watershed. Treatment of up to 500 acres of plantations throughout the watershed (covered by separate NEPA and consultation) and adjacent to proposed units may occur concurrently with proposed Upper Briggs treatments (e.g. underburning). These plantations are either non-habitat for owls or dispersal that would continue to function as dispersal habitat post-treatment. The same restrictions to avoid disturbance to owls during the critical breeding season would be applied to these activities. It is desirable to treat these young stands to promote their development into suitable dispersal or NRF habitat for owls.

As described previously, fire effects and suppression activities have reduced suitable NSO habitat within sites and designated critical habitat that overlap the proposed action treatment areas. Treatments proposed under alternative 2 have been reduced where fire and suppression effects have eliminated the need to treat in order to achieve desired objectives. The direct and indirect effects of proposed treatments that would downgrade NRF and remove dispersal under alternative 2 may be additive to cumulative effects to NSO and critical habitat, though the degree of effects would be less than what was expected from the proposed action prior to the fires as displayed in the tables above.

There would be no accumulation of disturbance effects to owls during the critical breeding season with other activities such as recreation and mining, because seasonal restrictions to eliminate project-related noise and smoke disturbance would be implemented.

Pacific fisher – Proposed

Fisher habitat consists of mature and late-successional coniferous and mixed forests. Large dead wood (both standing and down) are key components, which are used for denning and resting. The best predictor of fisher occurrence is moderate to high amounts of contiguous canopy cover (Lofroth and others, 2010). The fisher has been described as one of the most habitat-specialized mammals in western North America (Buskirk and Powell 1994); however, more recent research has shown that specialization appears to be tied primarily to patches or stands of mature and older forests with complex structures for denning and resting habitats. The varied diet of fishers suggests they may forage in a broader range of forested habitats.

Fisher sightings are documented in the Forest NRIS database within 5 miles north and south of the Upper Briggs Creek sixth-field watershed. The abundance of mixed conifer-hardwood habitat in the watershed including black and white oak and the proximity of sightings suggests fishers are likely to occur within the project area. Furnas et al (2017) estimates that there are up to 139 individuals in Josephine County using density estimates. These data estimate up to 5.4 individuals per 101/km^2 in the watershed, which is about 7 individuals in the 126 km^2 action area.

Direct and Indirect Effects of the Proposed Action

Effects to the fisher from the proposed action could include removal of habitats, denning and resting structures, potential impacts to dispersal, and disturbance impacts.

Effects to Habitat

Direct impacts to fisher habitat could be the removal or reduction of closed canopy habitat and possible removal of trees with mistletoe that may provide denning/resting habitat which may occur within any of the proposed units. Fisher are relatively resilient to commercial and non-commercial fuels work in the Ashland watershed that is similar to proposed Upper Briggs treatments (Clayton Pers. Obs). Treatments designed to increase stand development, maintain habitat diversity and lower fire risk such as variable density thinning and prescribed burning may ultimately improve suitability of habitat for the fisher and may be essential to reducing loss of suitable habitat to wildfire. However, short-term impacts may include reduction of important habitat features such as canopy cover, and potential rest and denning structures including snags and logs. Furthermore, treatments that could take place in in the spring would coincide with the west coast fisher breeding season, and thus may impact natal dens or displace fisher from areas used for breeding.

Effects to Denning and Resting habitats

Denning and resting habitats can be affected by the proposed action where canopy cover may be reduced below 60 percent (374 acres) and possible removal of trees with mistletoe which could occur within approximately 2,507 total acres, which is 10 percent of the 24,386 acres of closed-canopy and spotted owl dispersal habitat that potentially provide potential fisher denning/resting/foraging habitats in the AA. Removal of these structures particularly during the denning season which is generally from mid-March to June, could lead to direct impacts to denning fisher and their young. The retention of hardwoods in treatment areas and treatments designed to enhance hardwood growth would promote fisher denning habitat in the watershed.

Effects to Dispersal Habitats

At the scope of landscape dispersal habitat for fisher, proposed treatments distributed across a total of 4,017 acres (16 percent) of the Upper Briggs sixth-field watershed are not likely to appreciably impact fisher dispersal. All treatments would maintain at least 40 percent canopy cover except 15 acres of conifer removal for meadow restoration distributed among three meadows in the watershed.

Effects from disturbance

Little is known how fisher respond to vegetation management activities, and effects from motorized vehicles showed no impact to fisher in the Sierras (USDI Fish and Wildlife Service 2015) which may have been due to the lack of access into fisher habitats. In a study in the southern sierras, burning within a den stand caused the female to move her kits the day after the burn was conducted and levels of CO2 were elevated within the den itself which could impact kits (C. Thompson pers comm.). In the Ashland watershed, fisher showed marked responses to different levels of disturbance; fisher moved up to 800 meters during helicopter operations, while several successful den sites were within 100-200 meters of high use roads where log hauling was occurring. Other fishers in rest sites seemed to tolerate cutting crews conducting work within 100 meters (D. Clayton Pers. Obs). In the Ashland Forest Resiliency project, activities were limited during the early breeding season (March to June) within 400 feet of known and occupied dens with no apparent response or adverse effect to the female of kits. Given the lack of any definitive data on disturbance distances, a fisher den located within a treatment area could be impacted by certain proposed activities if conducted during the breeding season (March-mid-June). *Since we do not know if any given treatment unit is occupied by denning fisher, a restriction on thinning, yarding and burning activities is recommended from March 1 through June 30 which coincides with northern spotted owl critical breeding season restrictions.*

Cumulative Effects

Treatment of up to 500 acres of plantations throughout the watershed (covered by separate NEPA and consultation) and adjacent to proposed units may occur concurrently with proposed Upper Briggs treatments (e.g. underburning). These plantations may provide foraging or dispersal habitat that would continue to function as such post-treatment. It is desirable to treat these young stands to promote their development into resilient, mature forested stands. These activities would be subject to the same restrictions on thinning, yarding and burning activities between March 1 and June 30 as described above.

Non-federal lands represent 1% of the action area, which is private or industrial timberland. Management practices occurring on private lands range from residential home site development to industrial timber management. The majority of state and private forests in Washington, Oregon, and Northern California are managed for timber production. Historically, non-federal landowners practiced even-aged management (clear-cutting) of timber over extensive acreages. Private industrial forestlands are managed for timber production and will typically be harvested between 40 and 60 years of age, in accordance with State Forest Practices Act Standards. The RRSNF and the Medford BLM assume past management practices on private lands will continue and do not track private land harvest activity. Activities on non-federal lands do have the potential to impact fisher from disturbance.

The effects of proposed activities may be additive to impacts of other past, present, and reasonably foreseeable future actions on the small amount of non-federal lands in the watershed that would result in cumulative negative impacts to fisher.

Conclusion

Existing habitat for fisher could be negatively impacted with the implementation of the proposed activities from vegetation modification within 10 percent of potential habitat in the action area and may be additive to cumulative negative effects. Long-term effects of treatments are expected to benefit fisher by increasing resilience of suitable habitat to extreme disturbances such as drought and fire, and promoting growth of hardwoods. Effects from project-related disturbance could be largely mitigated through application of timing restrictions and other conservation measures, if implemented. However, if disturbance minimization PDCs are not followed at any given den the proposed actions could cause abandonment of one or more fisher dens in any given year. Therefore, as described above in the effects analysis, implementation of these activities **may impact individuals, but would not lead to a loss of viability** for the fisher.

Other Species of Concern

Migratory and Focal Bird Species

Table 13 (Table 10 from the Project Wildlife Report and Biological Evaluation) lists the species of concern and focal species associated with habitat that occurs within the Upper Briggs project.

Table 13. Migratory bird species of concern and associated habitat attributes within the Upper Briggs project area.

Forest Condition	Habitat Attribute	Focal Species
Old-growth/Mature	Large snags	Pileated Woodpecker
Old-growth/Mature	Large trees	Brown Creeper
Old-Growth/Mature	Deciduous canopy trees	Pacific-slope Flycatcher
Old Growth-Mature	Mid-story tree layers	Varied Thrush
Mature	Conifer-deciduous canopy	Northern goshawk
Mature	Large patches of moist conifer forest	Chestnut-backed chickadee
Mature/Young	Closed canopy	Hermit/Townsend's Warbler

Mature/Young	Open mid-story	Hammond's Flycatcher
Mature/Young	Deciduous understory	Wilson's Warbler
Mature/Young	Forest floor complexity	Winter Wren
Young/Pole	Deciduous canopy trees	Black-throated Gray Warbler
Young/Shrub	Open shrub dominated	Mountain quail
Young/Shrub	Dense brush/young plantations	Wrentit
Sapling/Seedling	Residual canopy tree	Olive-sided Flycatcher
Sapling/Seedling	Snags	Northern Flicker
Sapling/Seedling	Deciduous vegetation	Orange-crowned Warbler
Unique	Nectar-producing plants	Rufous Hummingbird
Unique	Mineral springs/seeps	Band-tailed Pigeon
Unique	Montane wet meadows	Lincoln's Sparrow
Unique	Large hollow snags	Vaux's Swift
Unique	Landscape mosaic forest	Blue (Sooty) Grouse
Klamath Mts. Mixed Forest	Pine-oak canopy/subcanopy trees	Purple Finch
Klamath Mts. Mixed Forest	Dense shrub understory	Nashville Warbler
Klamath Mts. Mixed Forest	Shrub-herbaceous interspersion	Hermit Thrush
Klamath Mts. Mixed Forest	Forest canopy edges	Western Tanager
Klamath Mts. Mixed Forest	Montane brushfields	Fox Sparrow
Klamath Mts. Mixed Forest	Post-fire	Lazuli Bunting
Conifer Hardwood Forest	Mixed conifer and hardwoods	Pine siskin
Conifer Forest Edge	Forest edge/shrub openings	Evening grosbeak
Forest Edge/Riparian	Dense, moist vegetation	Allen's hummingbird
Edge/Riparian	Dense riparian shrubs (willow)	Willow Flycatcher

The fires changed the distribution of habitats used by migratory birds within at least 50 percent of the sixth-field watershed. As discussed for the MIS species, forested habitats of all ages were reduced while early seral habitats have increased. Meadows are expected to recover in the next growing season. Areas of dense brush will take longer to fill in, however increased brushy habitat, deciduous vegetation and forest edge is expected to be available for a few decades until tree cover is re-established. In addition, snag habitat has increased.

PDCs to protect migratory bird nests would be implemented. Given reduction of treatment acres and delays in prescribed fire, the effects of the Project to migratory birds would be the same as previously analyzed, but to a lesser degree. Therefore, no further analysis is needed.

Pollinators

The best pollinator habitat consists of open landscapes with good sun exposure and many types of native, herbaceous plants (Xerces Society for Invertebrate Conservation 2015). One key is having a variety of plants that produce pollen and nectar from spring through early fall. The response of flowering plants following the 2018 fires is expected to increase the availability of nectar and pollen throughout the areas that burned and are now open to sunlight. This was observed following the Chetco Bar fire especially in spring to mid-summer.

With an expected increase in pollinator habitat from the fires and less soil disturbance from reduced treatment acres, there would be no change in the expected effects of the Project to pollinators from what was previously analyzed and no further analysis is necessary.

SOILS

The team soil scientist reviewed the effects of the fire on soil resources and found that the desired conditions stated in the EA have not been reached. The scientist relied on the SBS data, field review, best professional judgement, and BAER reports for their evaluation.

Slope Stability

A geologic hazards assessment was conducted during the Taylor and Klondike Fires Burned Area Emergency Response assessment (Cole 2018) [12]. This assessment evaluated the potential for increased post-fire risk from debris flows, landslides, rockslides and rockfall to critical values. Field observations and USGS modelling indicated there will be limited post-fire geologic response across the 2018 fire areas, and no drainage areas within the Upper Briggs planning area have a probability greater than 0.40 for the occurrence of debris flows, with the overwhelming majority having a probability of 0 to 0.20, based on the USGS modelling conducted for the BAER assessment. As a result, project design criteria and mitigation measures identified in Chapter 2 of the EA are still expected to be effective for maintaining slope stability, and there are no changes to the effects analyzed in the soils report.

Soil Productivity

All of the Upper Briggs proposed units experienced some level of wildfire effects from the 2018 fires. Table 1 displays the breakout of soil burn severity acres for each unit. Soil burn severity was field sampled and mapped by soil scientists during the BAER assessment completed on October 11, 2018: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd598221.pdf. Soil burn severity identifies the fire-induced changes in soil and ground surface properties that may affect infiltration, runoff, and erosion potential (Parsons 2002[13]). While effects of fire to overstory canopy is taken into account when evaluating soil burn severity (SBS), SBS ratings do not equate to levels of canopy mortality. Overall the 2018 fires are considered to be low to mixed severity fires which resulted in a mosaic pattern of burn severities across the landscape. Refer to the Fuels and Silviculture sections for more discussion.

The vast majority of proposed Upper Briggs units experienced low or very low soil burn severity, and acres that were unburned. In these areas, there is no detrimental effects to soils, and there would be no changes to the effects analyzed in the soils report. In areas that experienced some moderate severity, immediate impacts include loss of surface cover but soil structure is generally unchanged. Field reviews are showing a high level of needle cast blanketing the soil surface and replacing the fire-consumed ground cover, which is effectively mitigating the initial loss of cover (J. Brazier, personal observations). In these areas, there is no detrimental effects to soils, and project design criteria and mitigation measures identified in Chapter 2 of the EA are still expected to be effective for maintaining soil productivity, and there are no changes to the effects analyzed in the soils report.

Areas of high soil burn severity have experienced loss of surface organics with less opportunity to gain an effective needle cast cover. They have experienced higher levels of soil heating that result in charring or consumption of organic matter into the mineral soil layer, especially where downed

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[12] Cole, R. 2018. Taylor and Klondike Fires Burned Area Emergency Response Geologic Hazards Assessment, Rogue River-Siskiyou National Forest. October 3, 2018. 16 pgs.

[13] Parsons, A. 2002. Mapping post-fire wildfire burn severity using remote sensing and GIS; 8-12 July 2002; San Diego, CA. Proceedings ESRI user conference. 9 p.

woody debris was consumed, and therefore have experienced some detrimental impacts to soil productivity. Resprouting hardwood species and other fire adapted vegetation (such as tanoak, Pacific madrone, Oregon grape, and poison oak) have been observed during the Fall of 2018 already responding with new growth even in high SBS areas, which will aid in quicker soil recovery in these burned areas.

The soils analysis of the BAER assessment examined the potential for change in erosion response off the burned areas, and areas with the greatest risk of accelerated erosion are where areas of moderate and high soil burn severity occurred on steep slopes, as expected (Reinwald and Huynh 2018[14]). A Soil Erosion Index Map was created which shows a spatial breakout of the Erosion Index across the burned areas. In areas of moderate and high soil burn severity, modelling showed areas of potential accelerated erosion during an average 2-year precipitation event, which could be enough to impact soil productivity and result in sediment transport (ibid). Due to the low percentage and scattered extent of moderate and high SBS areas, as well as the amount of fire-adapted vegetation that was already responding with re-sprouting or new growth, even in moderate and high severity areas, the risk to soil productivity was considered low (ibid). In addition, moderate SBS areas are showing a high level of needle cast blanketing the forest floor and providing 100% effective groundcover where the original duff layer had been scorched or consumed, which has mitigated soil erosion risk from precipitation events since initially being exposed from the fire (J. Brazier, personal observations). See image 1 and 2 for examples of burn effects.

[14] Reinwald, T. and U. Huynh. 2018. Klondike/Taylor BAER Soils Specialist Report. October 2018. 7 pgs.

Image 1. Example of a moderate SBS area, showing the needle cast that is now creating effective ground cover to protect the soils from erosion.

Image 2. Example of a high SBS area showing lack of needle cast, impacts to the soil surface, but native hardwoods are resprouting which will benefit recovery.

Eight units experienced some acreage of high SBS: Units 1 (5% of unit), 39 (3% of unit), 58 (1% of unit), 61 (1% of unit), 70 (48% of unit), 102 (8% of unit), 513 (8% of unit), and 517 (1% of unit). Assuming all of the high SBS acreage is considered detrimental, which is an extremely cautious estimate because it is often not continuous across the landscape, then only unit 70 is now exceeding Siskiyou National Forest Plan Standards and Guidelines for detrimental disturbance due to effects from the 2018 fires. Per the project design criteria and mitigation measures identified in Chapter 2 of the EA, no activities can add to detrimental disturbance in this unit, and ideally should move toward a net improvement in soil quality (USDA Forest Service 1998). In the other units that experienced some high SBS, project design criteria and mitigation measures identified in Chapter 2 of the EA are still expected to be effective for maintaining soil productivity during project implementation, and there are no changes to the effects analyzed in the soils report.

Table 13 in the EA identified the effective groundcover (EGC) minimum protections required for project activities to protect soils from erosion. Based on soil burn severity and the soil erosion index developed from BAER assessment modelling from the 2018 fires, units that have an adjustment to 85% in required EGC to assure soil protection from erosion as well as soil recovery from fire consumed organic matter include Units 3S, 48, 59, and 515. All other units that experienced some moderate and high SBS and an erosion index of high or very high already required 85% EGC.

Ground disturbing activities that have the potential to affect the soil resource will be less than what was expected in Alternative 2, based on adjustments to the treatment prescriptions to meet stand objectives based on 2018 wildfire effects. For example, some areas that originally identified commercial treatments, would now have that treatment reduced to pre-commercial, which is less ground disturbing (see Silviculture section for detailed discussion). The project design criteria and mitigation measures identified in Chapter 2 of the EA are still expected to be effective for maintaining slope stability and soil productivity during project implementation, and there are no changes to the effects analyzed in the soils report.

Cumulative Effects

Fire suppression and post-fire rehabilitation work was conducted within the planning area. Fire suppression actions that may have occurred within the planning area include but are not limited to: hand line construction, dozer lines, snag mitigation, road side brushing, hand and aerial ignition, helicopter bucket drops, and aerially delivered retardant. Post-fire rehabilitation that may have occurred include but are not limited to: closure and decommissioning of dozer lines, replacement of damaged culverts, placement of waterbars on trails and roads, and decommissioning of staging areas. Any road maintenance actions conducted followed the minimum engineering standards and are covered within the engineering section. These actions are considered a one-time event and were implemented following project design criteria designed to minimize impact and are repaired post-action. Resource Advisors assigned to the fire ensured that the effects of implemented actions were mitigated or implemented in a way where the effects were negligible on the landscape.

Where these actions directly overlap with proposed units, the project design criteria and mitigation measures for the geologic and soil resource identified in Chapter 2 of the EA, which include the Siskiyou National Forest Standards and Guidelines for the maintenance of soil productivity, are still expected to be effective for maintaining slope stability and soil productivity during project implementation.

BAER treatments that are expected to occur in the Upper Briggs planning area within the next year include Early Detection Rapid Response for noxious weeds, road and trail infrastructure protection actions (such as ditch and culvert cleaning, road armored dip installation, culvert work, fillslope stabilization, trail stabilization and drainage improvements, and trail infrastructure protection), imminent hazard tree mitigations in developed recreation sites, and installation of hazard warning signs or temporary barriers for the protection life. All of these actions have restorative effects to soils, as these actions protect the soil resource from the potential from more damaging impacts, or have no effect to the soil resource.

FUELS

The 2018 fires burned through the Upper Briggs planning area with mixed severity effects. The fire planner reviewed the BAER reports, conducted multiple site visits and used best professional judgement for their determination. As noted in the previous resource sections, much of the planning area burned at low severity, primarily as a surface fire consuming duff and timber litter. Some portions of the planning area burned at a higher severity. Areas with higher severity burns also exhibit some vegetation mortality throughout the understory, mid-story as well as portions of the canopy.

Younger stands such as plantations and areas with a higher percentage brush composition tended to burn at higher severity.

Direct effects observed in the planning area were overall reduced loading of surface fuels in the size class of 0" to 3" with less reduction in the 3" to 9" diameter classes. There may be an increase of fuel from fire induced mortality of small trees and brush. Additionally, localized areas of overstory mortality are may provide needle cast and small branches. As a result, a short-term increase of fuel loading may occur within the system.

While the current conditions on the ground indicate that the duff and litter has been reduced, duff and litter will continue to accumulate over time. It is expected that fuels treatment will still need to occur in order to meet the objectives of the project. The need to treat post-harvest and activity fuels as well as subsequent maintenance burning within proposed units remains and the fuels prescription originally proposed in the EA remains viable. As Metlen et al 2018[15] found, historic fire return intervals for sites within the Briggs area had a median of 6 years. While the 2018 fires did reduce surface fuels and created some openings, fuel loadings within in the planning area will continue to accumulate in subsequent years, as much of the canopy remains intact. Maintenance burning (as defined in the EA) within the near term will be required to continue to maintain and improve surface fuel conditions and help to restore the fire regime. In addition to the normal leaf fall and needle cast, timber litter will accumulate and will support fire spread in the near future (less than 5 years). Metlen found that the range for fire return in the study site within the Briggs project area was as early as 3 up to 26 years (the last fire to burn in Metlen's study site was in 1906). Metlen's study would suggest that the Briggs area has missed multiple fire returns. This lack of fire return is partially responsible for the current conditions, specifically the higher proportion of Douglas-fir as well as the seral/structural classes.

The 2018 fires helped move toward desired conditions with regard to surface fuel loadings and consumed some small conifer regeneration and brush; however, the desired conditions as stated in the EA have still not been met. Fuel treatment throughout the project area and identified FMZs are still needed to reach the objectives of the Upper Briggs project. To meet the purpose and need of the project, subsequent and regular maintenance burning will be required to improve and maintain reduced surface fuels. In the higher severity areas that had mortality it is expected that in addition to the scorched vegetation, there will be a robust response from brush species such as tanoak, canyon live oak, manzanita and ceanothus, these species can contribute to higher flame lengths, and rates of spread.

In order to utilize the identified FMZs as designed, active management will be needed to maintain these areas for future fire response. Roadside FMZ still need to be treated; danger tree removal during the fire and immediately post-fire removed imminent and likely danger trees as defined by the *Region 6 hazard tree mitigation*. Other FMZs are along ridgelines where roads are not present and the danger tree removal was not addressed for immediate safety needs.

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[15] Metlen, K. L., Skinner, C. N., Olson, D. R., Nichols, C., & Borgias, D. (2018). Regional and local controls on historical fire regimes of dry forests and woodlands in the Rogue River Basin, Oregon, USA. Forest Ecology and Management, 430, 43-58.

HERITAGE

The 2018 fires will not result in a change to the heritage evaluation or in the effects to cultural resources that were not already considered in the EA. The BAER Cultural Resource report note two heritage sites within the planning area as within a burned area. The two sites were evaluated by archaeologists for impacts as a result of the fire. It was determined that the sites did not receive damage and no immediate or post-fire threats exist for these two sites. The heritage review conducted in the EA remains unchanged and no further review is needed.

ENGINEERING AND ROADS

The 2018 fires will not result in a change to alternative 2 or in the effects to transportation infrastructure (roads, bridges, culverts) that were not already considered in the EA. The BAER Engineering report identify critical values that may have been effected by the 2018 fires. Two Forest System Roads (FSR 2500 and 2402) were identified as areas that may require monitoring during the upcoming winter (storm) season.

Suppression and post-fire road maintenance activities performed on roads used to address the fire meet at least the minimum standard of road reconstruction and maintenance. Actions to open a road for fire activity access included brushing roadside vegetation, falling danger trees, blading roads, cleaning ditches and culvert inlets and outlets, removing slough and slide material and placing aggregate surfacing. Some roads that were in “storage” condition prior to the fire were opened and improved to gain access. This work included removing barricade berms, replacing culvert fill material that had been removed, lowering or removing water-bars, and other general road maintenance activities. The suppression efforts improved the existing road conditions within the project area by addressing the backlog of deferred road maintenance actions. The existing evaluation and actions proposed in the EA remain valid and in place.

RECREATION

The team recreation planner reviewed the effects of the fire on recreation resources and found that resources evaluated in the EA still needs to be met. The planner relied on the BAER report and best professional judgment when reviewing the project for effects from the 2018 fires.

According to the Recreation and Trails Resource Assessment for the Taylor and Klondike Fire BAER, 20 developed recreation sites (campgrounds, recreation rentals and developed day use areas), 49 trails-totaling 135 miles of trail, and 31 trailheads were identified within the fire perimeter. On the ground surveys conducted during the BAER assessment identified fire related impacts that pose a “very likely” probability of moderate to major threats to life, public safety, property, and critical natural resources at 13 of the 20 developed recreation sites, 20 of the 31 trailheads, and 19.2 miles of the 135 miles of trail. To mitigate these threats treatments were proposed which include hazard tree removal and hazard sign installation at trailheads and developed recreation sites and storm proofing trails, which includes repairing existing and installing additional drainage structures, armoring drainage crossings, replacing damaged/ destroyed retaining structures, restoring outslope and re-establishing the trail tread and bench as needed.

In the Upper Briggs project planning area, except for approximately 1 mile of the Dutchy Creek trail, all of the recreation facilities (campgrounds, trailheads and trails) were included in the fire perimeter

and analyzed in the BAER assessment. This includes 3 campgrounds (Sam Brown CG, Sam Brown Horsecamp and Big Pine CG) and all or portions of the 9 trails analyzed in the Upper Briggs EA.

Overall, fire impacts to the developed recreation sites were minimal and to mitigate public safety concerns the BAER assessment proposed treating hazard trees in Sam Brown Horsecamp and Big Pine Campground. Similarly, overall fire impacts to the trails in the Upper Briggs planning area were minimal and BAER treatments to storm proof trails are proposed on 0.1 mile of the Big Pine Access Spur # 1142A, 1.4 miles of the Dutchy Creek trail #1146, 0.1 mile of the Taylor Camp trail #1138 and 0.5 mile of the Taylor Creek trail #1142. These trail sections that are proposed for storm proofing treatments were identified through SBS modeling and field verification by BAER team members. The trail sections determined to be at the highest risk were those on steep slopes, within 100 feet of areas of high to moderate soil burn severity. While the BAER assessment addresses sections of trails that have a very likely probability of the loss of property (trail tread) based on SBS, there are other ongoing impacts associated with the fire to trails which includes downed trees and regrowth of vegetation. Downed trees and the regrowth of vegetation on trails associated with the 2018 fires will be an ongoing routine maintenance task.

While the 2018 fires did have minimal impacts to recreation facilities in the Upper Briggs planning area, with the proposed mitigation measures identified in the Upper Briggs EA the original effects analysis and effects determination for recreation remain the same.

Scenic Quality

As with any fire, the 2018 fires changed the scenic quality in some locations in the Upper Briggs planning area. Whereas previously views might have been of steep, heavily forested mountains, in some locations views now might be of a fire scarred landscape with burned trees and vegetation. This change in scenic quality as a result of fire has been ongoing in the Briggs Valley area and is a natural disturbance in the landscape that is not generally considered in the effects analysis. Therefore, there are no notable effects to scenic quality as a result of the fire.

CONCLUSION

I reviewed the project with the team and the Supervisors Office. I have determined that the Upper Briggs project collectively in consideration of the effects of the 2018 fires will not result in a significant effect on the human environment. This conclusion is based on my consideration of the Council on Environmental Quality's criteria for significance[16] (40 CFR §1508.27), with regard to the context and the intensity of the impacts described in the EA, and on my understanding of the project, review of the project analysis, and consideration of public comments.

While the 2018 fires addressed some of the objectives of the project, the overall resiliency of the Upper Briggs Creek watershed remains susceptible to short-term natural disturbance (fire, drought, storms) and long-term climate change. The results of the 2018 fires did not always achieve desired conditions where needed. Therefore the strategic and active management of the Upper Briggs project is necessary to reach the desired conditions described in the EA. The proposed activities of the Upper Briggs project would more successfully decrease stand residual tree development toward late

[16] The draft Finding of No Significant Impact speaks to the findings as evaluated by the team.

successional conditions since the treatments are specifically targeted where needed. The proposed treatments of the Upper Briggs project are still warranted for striving to obtain the project objectives.

Based on the evaluation of the current condition of the Upper Briggs project planning area after the 2018 fires and taking in consideration project design criteria and mitigation measures are expected to minimize any effects of the proposed action, which would otherwise result from the project., the project would not prevent attainment of the ACS; prevent compliance with Riparian Reserve Standards and Guidelines; and is consistent with the nine ACS Objectives (FONSI, p. 6). As stated in the EA, there would be a no effect or cumulative effect to botanical species as there are no T&E species present in the Project Area (FONSI, p. 7). The proposed action would have No Effect to SONCC coho salmon, SONCC coho CH, Pacific eulachon, North American green sturgeon, and Essential Fish Habitat (FONSI, p. 7).

It is still expected that effects to the northern spotted owl from the Upper Briggs Project are not expected to be persistent long-term negative impacts; as the treatments are designed as such that habitats will be more diverse and sustainable in the long-term. Impacts are not anticipated to affect the overall demographic resiliency of the local population of spotted owls because the impacts represent a small proportion (0.3 percent) of an estimated population of owls that could occur within the Klamath East and Klamath West modeling regions. The Service does not anticipate that the estimated take is likely to resonate at the range-wide level. Therefore, the proposed action is not expected to jeopardize spotted owls at the range-wide scale. The action area is expected to continue to fulfill its role in the survival and recovery of the spotted owl at the provincial scale (BO, p. 61). DN/FONSI, p.7

Appendix B- Red Tree Vole Conservation Plan for Briggs Creek Fifth-Field Watershed

I. Summary

The red tree vole (*Arborimus longicaudus*) is a category C survey and manage species. The objective for category C species is to identify and manage high-priority sites to provide for a reasonable assurance of species persistence. Until high priority sites can be determined, manage all known sites (USDA and USDI 2-001: 10). Effective in May 13, 2016, the high priority site management recommendations for the red tree vole were completed (Huff 2016). The high-priority site management recommendations outline a management approach under the survey and manage standards and guidelines to provide for a reasonable assurance of species persistence across the range of the species on forest service and Bureau of Land Management (BLM) lands.

The 2001 record of decision and standards and guidelines (USDA and USDI 2001) allow for the identification of high-priority sites that must be managed to provide for a reasonable assurance of persistence of the taxon or the procedures for designating such sites locally, as well as non-high priority sites that no longer need to be managed for the benefit of those species. Management recommendations may also identify areas where it is no longer necessary to continue surveys prior to habitat –disturbing activities or strategic surveys for the taxon (USDA and USDI 2001: 19-20). The following summary of the analysis for the Upper Briggs Creek Restoration Project incorporates by reference the high-priority site management recommendations (Huff 2016). This particular fifth-field

watershed, Briggs Creek, is 43,726 acres of which, 95 percent is National Forest (NF) managed by the Wild Rivers Ranger District. Approximately 45 percent of the NF lands provide suitable habitat for red tree voles. Fifty-two percent of NF lands in the watershed is within land management allocations that are managed consistent with red tree vole conservation. This red tree vole conservation plan (RTV Plan) identifies an additional 1,780 acres outside of those land allocations that would also be managed consistent with red tree vole conservation. The RTV Plan also identifies areas in the watershed that would continue to be subject to pre-disturbance surveys per the red tree vole management recommendations, survey protocol and subsequent management of any known sites. The RTV Plan and the survey areas collectively provide habitat that would be managed consistent with red tree vole conservation over approximately 76 percent of the watershed containing approximately 80 percent of the available suitable habitat. Therefore, a reasonable assurance of red tree vole persistence will be provided within this fifth-field watershed.

The RTV Plan summarized here was developed consistent with the High Priority Site Management Recommendations for the Red Tree Vole *(Arborimus longicaudus)* Version 1.0 (Huff 2016, hereafter HPS MR), to provide a reasonable assurance of RTV persistence within the Briggs Creek fifth-field watershed located entirely within Josephine County, Oregon. The goal of the plan is to identify National Forest System lands (USDA Forest Service) that would be managed to provide suitable habitat for a well distributed population of red tree voles and allow linkages to adjacent watersheds. The conservation plan covers approximately 23,442 acres (57 percent) of National Forest lands in the watershed. The RTV Management Plan for the Briggs Creek 5th Field Watershed (RTV Plan) is avaialbe in the project record and details how the conservation plan meets the rule set from the HPS MR and ultimately provides a science-based conservation strategy for RTV persistence. This appendix summarizes the RTV Plan and provides further evaluation of effects of the Plan on other resources.

Upon plan approval through the final decision document for the Upper Briggs Creek Restoration Project, National Forest System lands within the 5th-field watershed would be designated in one of four categories as follows:

1) **LUA-RTV -** Areas managed consistent with RTV conservation within reserve land use allocations (LSR, 100-acre LSRs, wild river, large riparian reserves and 70-acre northern spotted owl nest patches). No activities would occur in these areas which trigger pre-disturbance surveys for RTV.

2) **HPS –**high-priority sites designated for RTV conservation overlap other land allocations including riparian reserve, special wildlife sites, matrix and botanical areas. No activities would occur which trigger pre-disturbance surveys for RTV in these HPS.

3) **Non-HPS -** Non-high priority sites are all remaining areas and would not be designated for RTV conservation. Pre-disturbance RTV surveys and/or site protection buffers would not be required in this designation.

4) **Connectivity Areas** include small riparian reserves not identified as LUA-RTV and additional habitat corridors in between HPS and LUA-RTV. These areas are at least 300 feet wide and would not likely provide long-term occupancy by a red tree vole population but would provide dispersal habitat to larger patches of habitat. Management of these connectivity areas would not trigger pre-disturbance surveys for red tree voles.

National forest lands in the watershed where suitable habitat was not adequate to meet the ruleset for the RTV Plan would require pre-disturbance surveys per the red tree vole survey protocol. These

areas are not part of the RTV Plan for the Briggs Creek watershed and are displayed in the RTV Plan maps (Figures 5 and 6).

1. II. Background

Purpose of Document in Relation to Policy

Red tree voles are considered a category C survey and manage species under the Northwest Forest Plan, for which the objective is to "[i]dentify and manage high-priority sites to provide for reasonable assurance of species persistence. Until high-priority sites can be determined, manage all known sites (USDA Forest Service and USDI Bureau of Land Management 2001, Standards and Guidelines p 10). Mitigation prior to establishing high-priority sites requires pre-disturbance surveys and a minimum 10-acre habitat protection buffer surrounding one active or assumed active nest tree located during surveys, with sites incrementally growing depending on the number of nests located (USDA Forest Service and USDI Bureau of Land Management 1994, 2001; Rosenberg et al. 2016).

The HPS MR for red tree voles transmitted to field units in May, 2016, outlines a process to develop a conservation plan intended to provide a reasonable assurance of species persistence in one or more fifth-field watersheds (Huff 2016). Furthermore, the conservation plan must be included in project-level National Environmental Policy Act (NEPA) analyses conducted by the District. Upon plan approval, areas within the watershed(s) and under Forest Service management designated as non-high priority sites will no longer require surveys prior to habitat-disturbing activities nor site or habitat protection because they are not considered as habitat necessary to provide for a reasonable assurance of red tree vole persistence (Huff 2016; USDA Forest Service and USDI Bureau of Land Management 2001).

The Briggs Creek RTV Plan provides a reasonable assurance of red tree vole persistence and a science-based conservation strategy. The RTV Plan documents application of the rule set provided in the HPS MR within the Briggs Creek watershed on National Forest System land managed by the Wild Rivers Ranger District ("District"). This watershed is located in southwest Oregon, and entirely within the southern portion of the red tree vole's range.

Summary of Rule Set Used in Developing the RTV Plan

The rule set described by Huff (2016) is aimed at providing a well-distributed, interconnected population of red tree voles throughout federally managed lands in fifth-field watersheds. The key objective is to provide suitable habitat for species persistence within the watershed and allow movement (hereafter "connectivity") of red tree voles within the watershed and into adjacent watersheds. A detailed description of the ruleset and considerations for delineating land use allocations consistent with red tree vole management, high priority sites, connectivity areas, and non-high priority sites is provided in the Briggs Creek RTV Plan. The following is a summary of that process.

The rule set requires identification of the following elements, taken from Huff (2016:14):

1) Land-use allocations managed consistent with red tree vole conservation;
2) High-priority sites outside of those areas;
3) Connectivity areas linking sites and land-use allocations managed consistent with red tree vole conservation;
4) Non-high priority sites where pre-disturbance surveys and site management are no longer required;

5) Information gaps;
6) New information that would trigger revision of the RTV Plan.

1. III. Conservation Plan

This RTV Plan was developed with an iterative process which included consultation with Forest and Regional staff. The initial step was to (1) develop maps of federal land-use allocations and identify allocations that are managed consistent with RTV conservation, (2) identify non-federally managed lands, (3) identify areas of serpentine soils, (4) identify recently burned areas, and (5) develop maps of habitat suitability.

The second step incorporated aerial imagery and on-the-ground knowledge to evaluate habitat extent and connectivity within the Briggs Creek watershed, and delineate high priority site locations and connectivity areas within the watershed but outside of lands managed consistent with red tree vole conservation per pages 16-20 of the HPS management recommendations.

The third step was to evaluate connectivity between Briggs Creek watershed and adjacent fifth-field watersheds. Aerial image interpretation, GNN vegetation information, RAVG fire intensity mapping and on-the-ground knowledge were used to identify areas of "inter-watershed" connectivity (HPS MR pp 20-23).

1) Land-Use Allocations Managed Consistent with RTV Conservation (LUA-RTV)

Late-successional reserve (LSR), wild river, and riparian reserves on large perennial streams are the only land allocations with management standards and guidelines consistent with red tree vole conservation that would support long-term red tree vole persistence in the Briggs Creek watershed (Figure 1). This management allows activities that do not trigger pre-disturbance surveys such as thinning stands less than 80 years in age. Most LSR is in the southern portion of the watershed. The northern portion of the watershed has 126 acres of "100-acre" LSRs and 400 acres of northern spotted owl nest patches (300m buffer of an activity center) outside of the larger LSR. Riparian reserves are intended to not only provide habitat for aquatic and riparian dependent species, but also provide connectivity corridors between LSRs (NWFP ROD 1994, B-13). Collectively, 52 percent of Federal lands in Briggs Creek watershed is LUA-RTV (Table 1, Figure 5). Other administratively withdrawn allocations such as botanical areas and special wildlife sites may not be entirely managed consistent with red tree vole conservation depending habitat objectives for the site (eg. the Horse Creek Meadow wildlife site includes meadow and hardwood habitats that would benefit deer, elk and many other species) and are not included in LUA-RTV.

2) Non-federally Managed Lands

Approximately 5 percent of the Briggs Creek watershed is privately managed (Table 1, Figure 1). The remaining 95 percent is managed by the Wild Rivers Ranger District. Most of the private land is in a checkerboard configuration in the southern portion of the watershed. There is also a quarter of a section of private land in Briggs Valley north of Sam Brown campground.

3) Serpentine Soils

Approximately 16 percent of National Forest lands in the watershed are mapped as serpentine soils (Table 1). A large portion of these soils occur in the western part of the watershed (Figure 2). Jeffrey pine, sugar pine, incense cedar and Douglas-fir dominate the overstory of serpentine areas that have survived recent fire activity, however due to the natural chemical composition of the soil which is harsh for most vegetation, forest canopy cover is typically lower than 60 percent except in moist

drainages and areas with deeper soil that are adjacent non-serpentine soil. Therefore, serpentine areas are not considered suitable red tree vole habitat except where Douglas-fir persists in stand with greater than 60 percent canopy cover.

4) Recently Burned Areas

Recent fires that have influenced the distribution of red tree vole habitat in the watershed include the 2014 Onion fire and the 2018 Taylor Creek and Klondike fires. Figure 3 displays the known extent of fire history in the watershed from about 1940 to present. As of 2018, the entire watershed has experienced fire to some degree. Post-fire imagery for the Onion Mountain, Taylor Creek and Klondike fires that measure the level of fire severity or intensity based on post-fire soil mapping (BARC) or vegetation loss (RAVG) was used to update the habitat mapping used for the RTV Plan explained below.

5) Habitat Suitability

The HPS MR allows for assessment of suitable habitat through modeling approaches (Huff 2016 p 14). Habitat models provide an appropriate approach for assessing large areas for conservation planning and a means for including areas where tree voles may be present but not detected or where they may be absent because suitable habitat may not be presently occupied (Rosenberg et al. 2016).

Due to the effects of the Taylor Creek and Klondike fires in the Briggs Creek watershed, this RTV Plan uses the 2012 GNN vegetation data (Oregon State University (http://www.fsl.orst.edu/lemma/) updated by BARC fire severity data for the 2014 Onion Mtn fire, and Sentinel-RAVG fire intensity data for the 2018 Taylor Creek and Klondike fires to identify suitable habitat using the Van Norman 2014 description of red tree vole non-habitat; 1) non-forest areas (eg. > 90% basal area loss from fire, rock outcrops, etc.), 2) stands with no Douglas-fir, western hemlock or Sitka spruce, 3) stands of any age with less than 60 percent canopy closure, and 4) stands < 20 years old (Huff 2016, p 14).

Areas that burned with high soil burn severity according to BARC data for the Onion Mountain fire are considered non-habitat. The Sentinel RAVG data measures fire intensity in increments of vegetation basal area loss from 0 to 100 percent. For the Klondike and Taylor Creek fires, areas mapped with > 50% basal area loss are considered non-habitat. Areas with 26-50% basal area loss that had less than 80 percent canopy cover prior to the fire, are also considered non-habitat, while Douglas-fir stands with 80 percent or more canopy cover prior to the fire with 26-50% basal area loss are still considered suitable habitat. The latter accounts for about 2,500 acres in the watershed that may still provide habitat. All remaining Douglas-fir stands with greater than 60 percent canopy cover, quadratic mean diameter of 10 inches or more, and 25 percent or less basal area loss from the fire are considered suitable habitat. The quadratic mean diameter of 10 inches was suggested by the district silviculturalist (Rob Barnhart, pers. comm.) as an acceptable proxy for tree age greater than 20 years old for this watershed though it is variable based on site productivity. This query produced a reasonable estimate of approximately 18,785 acres of existing RTV habitat on NFS lands in the watershed when compared to aerial imagery and field verification.

High Priority Sites (HPS)

To allow for greater distribution of red tree voles outside of the LUA-RTV, twenty-two high priority sites (HPS) were designated in portions of matrix, riparian reserve and other administratively withdrawn land-use allocations based habitat mapping and characteristics of known red tree vole sites. These sites cover 764 acres and range from 11-104 acres in size with a mean size of 35 acres.

Care was taken to locate the sites in the best available habitat and were made larger to provide connected suitable habitat in areas with patchy canopy cover or younger stands or to include known red tree vole nest trees. Eighty three percent of the area in the HPS is suitable habitat. Seven of the sites include known red tree vole nests. The HPS are within 1 km of at least 3 other HPS or LUA-RTV, with the exeption of one site at the watershed boundary on Onion Mountain that is connected to 2 HPS and a large patch of suitable habitat in the adjacent watershed. They are connected by suitable habitat within LUA-RTV or connectivity areas described below. Detailed information and location of the HPS are provided in Tables 1 and 2 and Figures 5 and 6.

Connectivity Areas

The RTV Plan uses linear connectivity corridors to provide habitat connectivity between HPS and LUA-RTV. These corridors are >300 feet wide and include small riparian reserves and additional habitat to increase suitable habitat connectivity around gaps or forested areas with less than 60 percent canopy cover. Some connectivity areas are extensions of riparian reserves to provide connectivity across ridgelines. Connectivity corridors cover approximately 1,016 acres (2%) of the watershed.

Identification of habitat connectivity to adjacent watersheds was based on adjacent reserved land allocations (LSR, wilderness) outside of the Briggs Creek watershed and any substantial linkages of existing suitable habitat between watersheds. However, habitat in adjacent watersheds is not designated as part of this RTV Plan.

The habitat map (Figure 4) shows limited post-fire habitat connectivity across the ridgeline with the Josephine Creek-Illinois River watershed to the south, which is also within the LSR (Figures 1 and 4). Connectivity also appears limited with the Klondike Creek-Illinois River watershed. A small amount of habitat still exists where the LSR crosses the ridgeline and would be managed consistent with red tree vole conservation in the long-term. Likewise, there is limited habitat connectivity across the ridgeline with the Deer Creek watershed. The habitat condition in this south portion of the Briggs Creek watershed does not provide opportunities to delineate HPS or connectivity corridors that meet the spacing and habitat contiguity requirements in the ruleset which is why they are identified as areas that would require pre-disturbance surveys (described later).

In addition, LSR in the Hellgate Canyon-Rogue River watershed is adjacent north of the Briggs Creek watershed. A combination of connectivity areas, HPS and LUA-RTV are delineated in this plan to provide habitat connectivity with that LSR. A small area near Onion Mountain with limited habitat connectivity in the Hellgate Canyon-Rogue River watershed is identified for pre-disturbance surveys.

The ridgeline with the Silver Creek watershed to the west is predominantly serpentine and burned in the Biscuit fire and in the Klondike and Taylor Creek fires. For these reasons, little habitat or connectivity exists on or near the ridgeline and the area has a low likelihood of providing suitable habitat for red tree voles for decades.

A high use paved road on the east ridgeline shared with the Lower Applegate River watershed may inhibit dispersal, however connectivity areas and HPS delineated along this ridgeline contain some of the heavier tree canopy available next to the road and across the ridgeline.

In summary, habitat connectivity from the Briggs Creek watershed into adjacent watersheds is limited to the north and east sides of the watershed due to lack of suitable habitat as a result of recent fire and serpentine influence along the south and west sides.

Non-High Priority Sites (Non-HPS)

Non-HPS are areas within the RTV Plan that are released from future management of red tree voles because the RTV Plan provides adequate amounts of well-distributed suitable habitat to ensure persistence of the species according to the HPS MR ruleset. Non-HPS cover approximately 25 percent of National Forest lands in the watershed, 17 percent of which is matrix (Table 1, Figures 5 and 6).

Survey Areas

Suitable habitat within approximately 19 percent of National Forest lands in the watershed was fragmented by recent fires or serpentine to the extent that HPS could not be designated in these portions of the watershed to meet the spacing and connectivity requirements of the ruleset (Table 1, Figures 5 and 6). These areas require red tree vole pre-disturbance surveys for any actions that would affect suitable habitat according to the Management Recommendations for the Oregon Red Tree Vole *Arborimus longicaudus* Version 2.0 and current survey protocol.

Relationship of Known Red Tree Vole Sites to High Priority Sites

Known RTV nest trees in the watershed are displayed in Figure 6. Of 1,834 acres surveyed within the Briggs Creek watershed, 196 red tree vole nests were confirmed in individual trees though not all of them were active when they were discovered. These surveyed acres are outside of LSR and comprise 4 percent of NFS lands in the watershed. Given this density of nest trees within 7 percent of the habitat in the watershed prior to the 2018 fires, it is presumed that red tree voles were fairly well distributed throughout the watershed. Of the 196 nest trees, 27 were located in areas that burned with greater than 50 percent basal area loss and are assumed to be unsuitable. Seventy of the remaining nest trees are within HPS, and 28 are included in LUA-RTV. This leaves 71 nest trees that are not within an HPS or LUA-RTV, 47 of which are in matrix, and 24 within land allocations that are not managed for timber production.

Information Gaps

The amount and distribution of suitable habitat included in the RTV Plan is believed to be sufficient for the persistence of red tree voles in the watershed based on research used to develop the rule set (Huff 2016) and the best available data to identify suitable habitat including air photos, vegetation maps based on remote sensing technology and field verification. No information gaps were identified that caused unreasonable assumptions about the ability of this Plan to meet the ruleset and provide a reasonable assurance of persistence of red tree voles within the Briggs Creek watershed.

2. IV. Information to Trigger a Change in Management

The Briggs Creek RTV Plan provides the management direction for red tree voles in the Briggs Creek fifth-field watershed until updated, replaced or removed through a new project NEPA decision (Huff 2016:24). The expected longevity of the RTV Plan is 15 years or sooner if new information would necessitate an update. If events occur in which vegetative conditions on the ground would be changed to those areas identified as contributing to red tree vole conservation and they no longer are functioning to provide for red tree vole, then a review and update of this RTV Plan would be needed. An example of an event that would trigger a review of and may require an update to this RTV Plan would be an extensive wildfire occurring in the watershed.

Although habitat models other than what we used would alter the estimates of the distribution and abundance of suitable habitat, the general corroboration with GIS-based data on vegetation and stand age, as well as photo imagery, and field verification provide strong support that the foundation of the

plan would remain unchanged if different models were used. However, if future data determines that the RTV Plan misinforms delineations of habitat suitability now and in the future, then a revision to the RTV Plan may be appropriate. Climate change and plant disease may alter the distribution of red tree vole habitat, but any predictions on such changes would be naïve to make at this time. Fire has had a major effect on the extent of red tree vole habitat within the RTV Plan watersheds (Figure 2) and it is reasonable to expect fires in the future. The extent of currently suitable habitat and areas that are expected to mature into suitable habitat will provide future resilience.

3. V. Effects of the RTV Plan on Other Resources

Other resources that would be affected by implementation of this RTV Plan include those targeted for management in the land allocations listed in the table below which displays the approximate acres of RTV Plan elements within various land allocations.

SNF LMP Land Allocation	Matrix/Partial Retention	Riparian Reserve	Special Wildlife Site	LSR	Botanical Area	Backcntry Recreation	Wild River	Scenic-Recreation River	Total Acres
LUA-RTV	365[1]	1,675	283	19,328	0	4	7	0	21,662
HPS	605	98	61	0	0	0	0	0	764
Connectivity	458	478	80	0	0	0	0	0	1016
Total RTV Plan Acres [2]	**1,428 (10%)**	**2,251 (46%)**	**424 (23%)**	**19,328 (100%)**	**0**	**4 (<1%)**	**7 (100%)**	**0**	**23,442**
Survey Area	5,879 (40%)	1608 (33%)	284 (16%)	0	127 (76%)	0	0	0	7,897

[1] Areas where large riparian reserves were expanded to provide suitable habitat connectivity around gaps.

[2] Percentage shown (%) is that of the total land allocation acres in the Briggs Creek 5th field watershed.

Vegetation management allowed on these acres would be consistent with RTV management recommendations described on page 25 of Huff 2016, which state that activities "should not remove or modify nest trees, the canopy structure of the stand, or remove any of the dominant, codominant or intermediate (Daniel et al. 1979) crowns…". Furthermore, underburning, pile and jackpot burning are allowed on these acres, but should be low in intensity and direct heat and smoke away from these areas (Huff 2016, p 25). This would essentially reduce commercial timber harvest on suitable habitat acres in matrix and partial retention within the HPS and connectivity areas. The RTV plan may also limit habitat improvement opportunities within riparian reserves and special wildlife sites for the same reason. Specific vegetation management objectives such as fuels reduction or habitat improvement for other wildlife species were considered in the placement of HPS and connectivity corridors. For example, care was taken to place HPS and connectivity corridors in locations where it may be reasonable to retain higher canopy as shaded fuel breaks in order to extend connectivity of riparian corridors over ridgelines to adjacent watersheds. Most habitat in the HPS is currently suitable nesting, roosting, foraging (NRF) habitat for northern spotted owls, which usually has to be maintained at 60 percent canopy cover for any vegetation management projects. Although RTV management recommendations are more restrictive, they wouldn't be as limiting to habitat development for spotted owls or other species in NRF as they would be in spotted owl dispersal habitat with canopy cover >40 percent and tree size 11- 20 inches dbh. Acres within the HPS and

connectivity areas that are not considered suitable RTV habitat at this time and are capable of supporting suitable habitat may be treated to promote development of future habitat.

Furthermore 7,897 acres of the watershed are identified where pre-disturbance surveys would be required prior to any activities that do not meet Pechman Exemptions and may affect suitable red tree vole habitat ("Survey Area" in the table above). Results of those surveys would determine how much limitation there may be for vegetation management on those acres. Approximately 31 percent of those acres are suitable habitat.

4. VI. Literature Cited

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USDA Forest Service; USDI Bureau of Land Management. 2001. Record of decision and standards and guidelines for amendments to the survey and manage, protection buffer, and other mitigation measures standards and guidelines. Vol. 1. Portland, OR.

5. VII. Attachments: Tables and Maps

Table 54. Acreage of land-use allocations, RTV Plan and suitable habitat within the Briggs Creek watershed.

Spatial Unit	Total Acres	% of WS	% of Federal WS	Suitable Habitat Federal Acres (% total)
Briggs Creek Fifth Field Watershed	43,726	100	NA	19,399 (44)
Federal management	41,364	95	100	18,785 (45)
Total LSR, Riparian Reserve, Wild River	24,149	55	58	11,287 (47)
Total Administratively withdrawn allocation (Backcountry Rec, Botanical Area, Special Wildlife Site, Scenic River)	2,730	6	7	1,196 (44)
Total Matrix land use allocation	14,485	33	35	6,302 (43)
Total Suitable RTV habitat on NF lands	18,785	41	44	18,785
RTV Plan within the watershed (LUA-RTV, Connectivity Areas, HPS)	**23,442**	**54**	**57**	**11,514 (49)**
Land-use allocations managed consistent for tree voles (LUA-RTV) not including small riparian reserves	21,662	49	52	10,408 (48)
Connectivity corridors	1,016	2	2	768 (76)
High Priority Sites	764	2	2	638 (83)
Acres requiring pre-disturbance surveys	7,898	18	19	2,476 (31)
Non-HPS (Total WA Federal minus HPS, LUA-RTV, Connectivity Areas, no pre-disturbance surveys required)	**10,189**	**23**	**25**	**4,610 (45)**
Matrix Non-RTV Plan	7,214	16	17	3,386 (47)
NHP Riparian Reserve (small, with isolated habitat)	1,061	2	2	381 (34)
Non-high priority sites in other LUA	1,914	4	5	843 (44)
Serpentine soils (NFS lands)	6,689	15	16	1,118
Serpentine in RTV conservation strategy	5,013	11	12	990
Serpentine in non-high priority sites	1,697	4	4	139

Table 2. Characteristics of habitat and topography for the RTV Plan within the Briggs Creek watershed.

Spatial Unit	Total Acres	Suitable Habitat Federal Acres (% total)	Acres forested 40-60% CC low contrast (% total)	Acres Aspect SE-S-SW-W (% total)	Acres Aspect NW-N-NE-E-Flat (% total)	Low RHS[1] ridgeline (% total)	High RHS low and mid-slope (% total)	Riparian Reserve (% total)
Briggs Creek Fifth Field Watershed	43,726	19,399 (44)	3,395 (8)	23,515 (54)	20,211 (46)	17,363 (40)	26,363 (60)	11,011 (25)
Total Suitable RTV habitat on NF lands	18,785	18,785		16,791 (89)	1,994 (11)	4,432 (24)	14,353 (76)	10,079 (54)
Known RTV nest trees	196 trees	163 (83)	6 (3)	158 (81)	38 (19)	14 (7)	182 (93)	42 (21)
LUA-RTV (not including small riparian reserves)	21,662	10,408 (48)	1,854 (9)	11,231 (52)	10,431 (48)	6,987 (32)	14,675 (68)	6,992 (32)
Connectivity corridors	1,016	768 (76)	65 (6)	500 (49)	516 (51)	189 (19)	827 (81)	527 (52)
High Priority Sites	764	638 (83)	34 (4)	508 (66)	256 (34)	212 (28)	552 (72)	98 (13)
HPS 1[2]	11	11	0	11	0	0	11	0
HPS 2	48	45	1	45	3	0	48	11
HPS 3	36	34	1	28	8	0	36	0
HPS 4	37	28	3	20	17	15	22	1
HPS 5	16	13	1	16	0	0	16	0
HPS 6	40	34	2	23	17	0	40	7
HPS 7	23	21	0	12	11	0	23	13
HPS 8	40	40	0	10	30	14	26	0
HPS 9	45	38	3	36	9	0	45	6
HPS 10	13	13	0	5	8	0	13	0
HPS 11	32	15	5	29	3	3	29	0
HPS 12	17	16	0	12	5	4	13	0
HPS 13	17	17	0	16	1	0	17	0
HPS 14	18	17	0	6	12	8	10	0
HPS 15	32	24	3	8	24	3	29	20
HPS 16	104	76	4	62	42	90	14	5
HPS 17	32	25	2	21	11	0	32	8
HPS 18	26	20	1	12	14	25	1	0
HPS 19	45	40	2	36	9	12	33	10
HPS 20	68	60	3	59	9	20	48	18
HPS 21	37	32	1	34	3	18	19	0
HPS 22	28	22	2	7	21	0	28	5

1 RHS – relative habitat suitability is the potential for a site to produce high value nesting/roosting habitat for northern spotted owls based on the environmental conditions of a site (Davis et al. 2016). These are usually some of the best site conditions for red tree vole habitat.

2 See Figure 7 for individual HPS locations.

Figure 1. Land-use allocations in Briggs Creek and within 2 miles of adjacent fifth-field watersheds. Riparian reserves within LSR, wilderness and wild river are managed to the more restrictive standards and guidelines of those allocations.

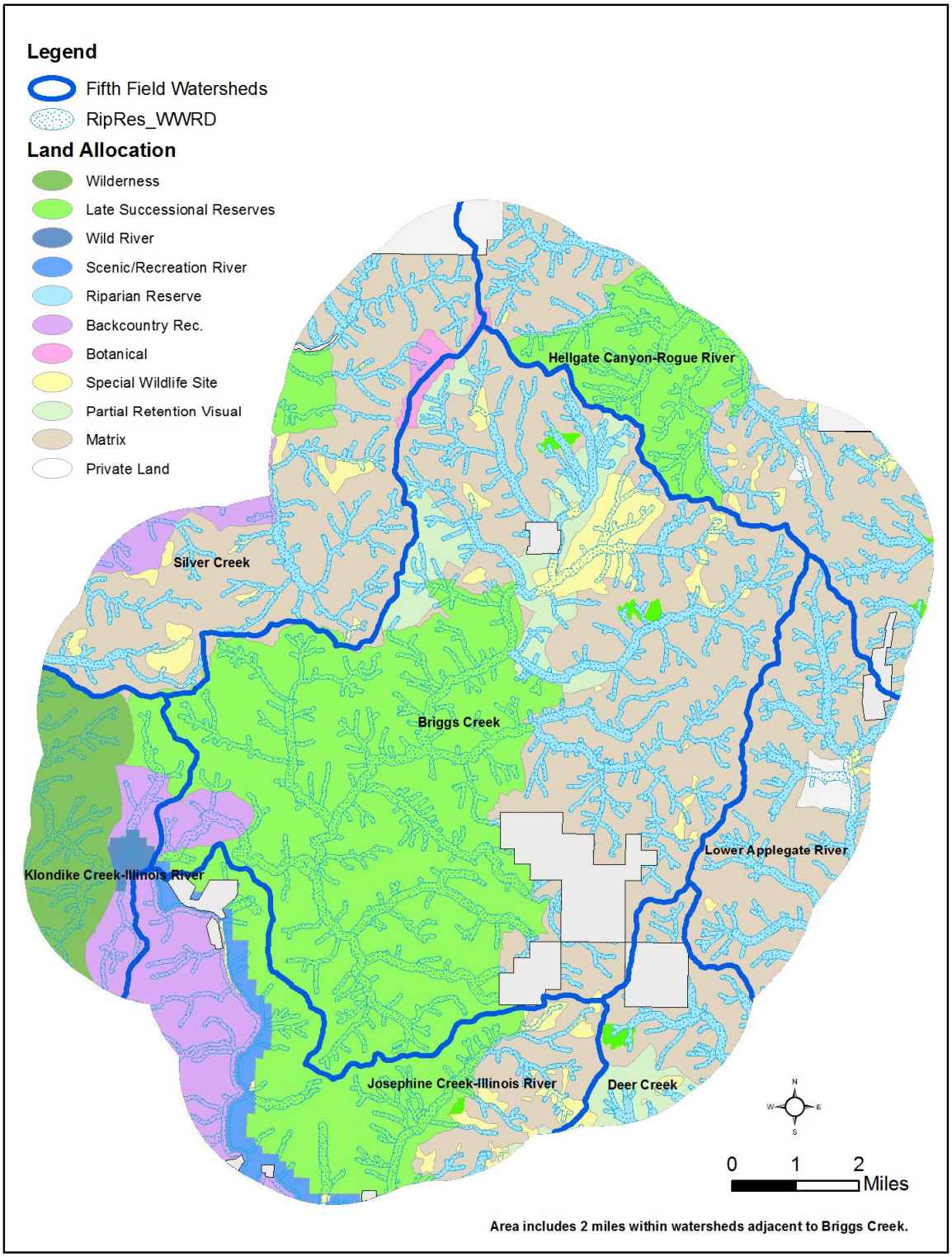


Figure 2. Serpentine soils and soil water storage in the Briggs Creek fifth-field watershed and within 2 miles of surrounding watersheds.

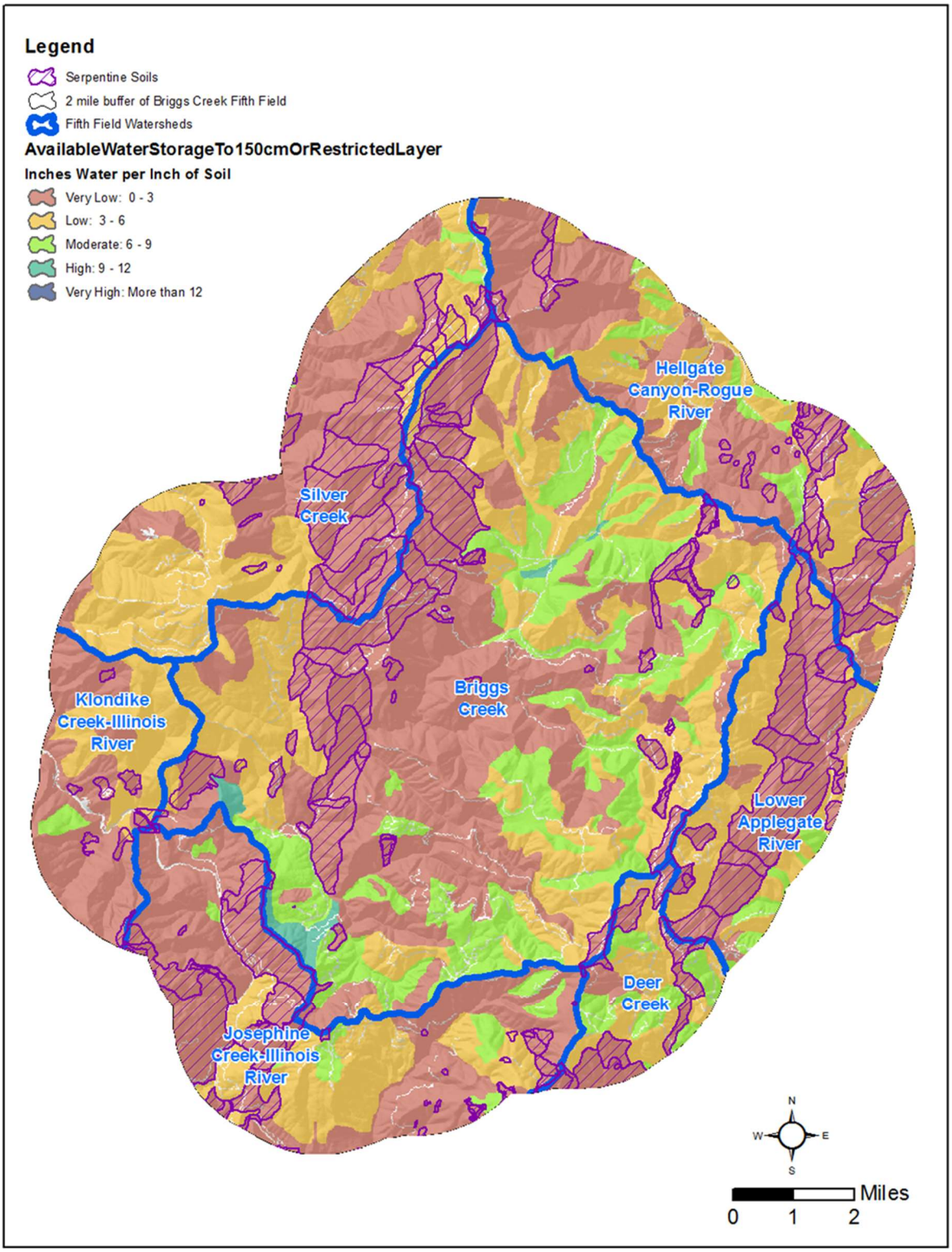


Figure 3. Fire history and serpentine soils in the Briggs Creek watershed

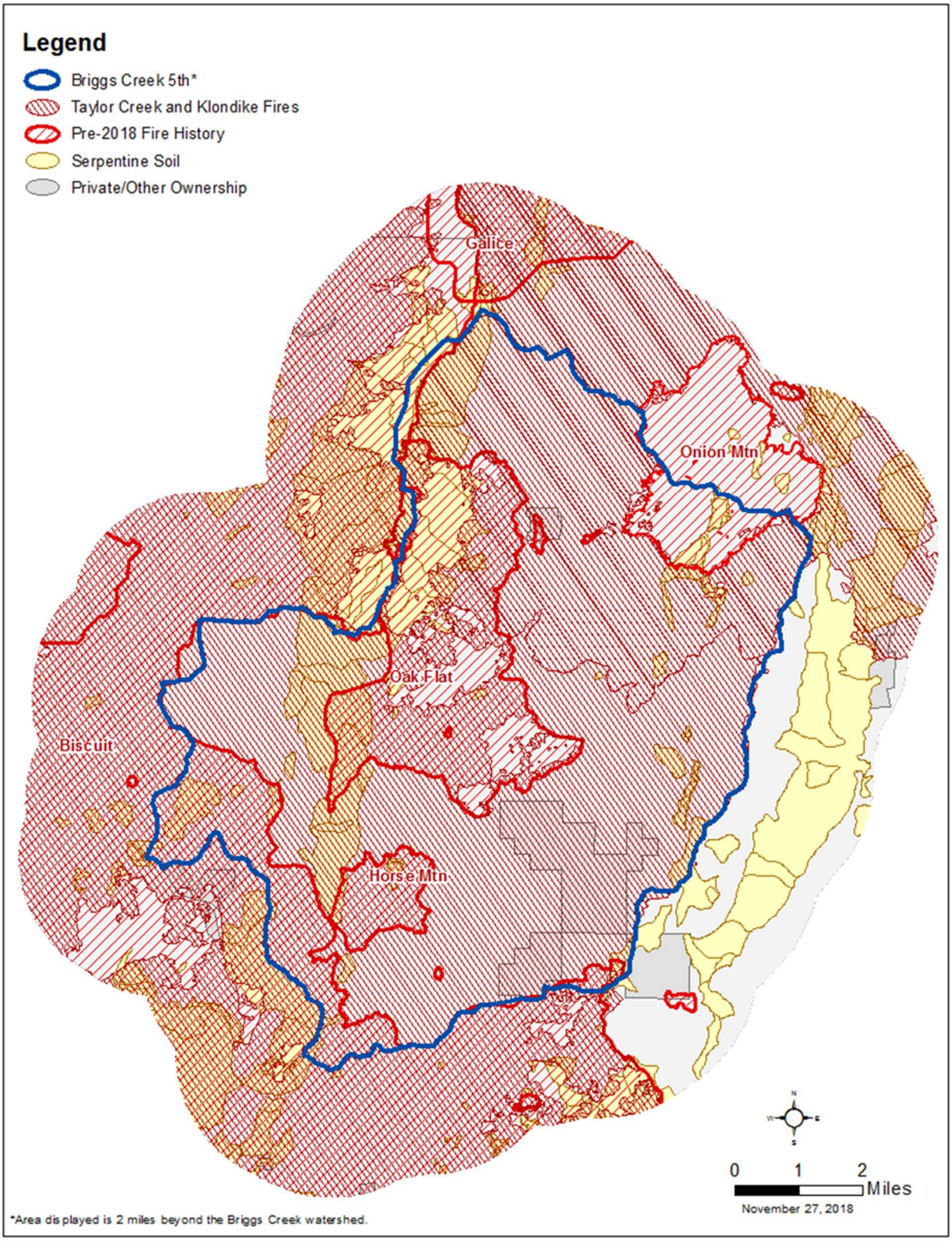


Figure 4. Suitable red tree vole habitat based on GNN updated with fire intensity data within Briggs Creek and adjacent watersheds.

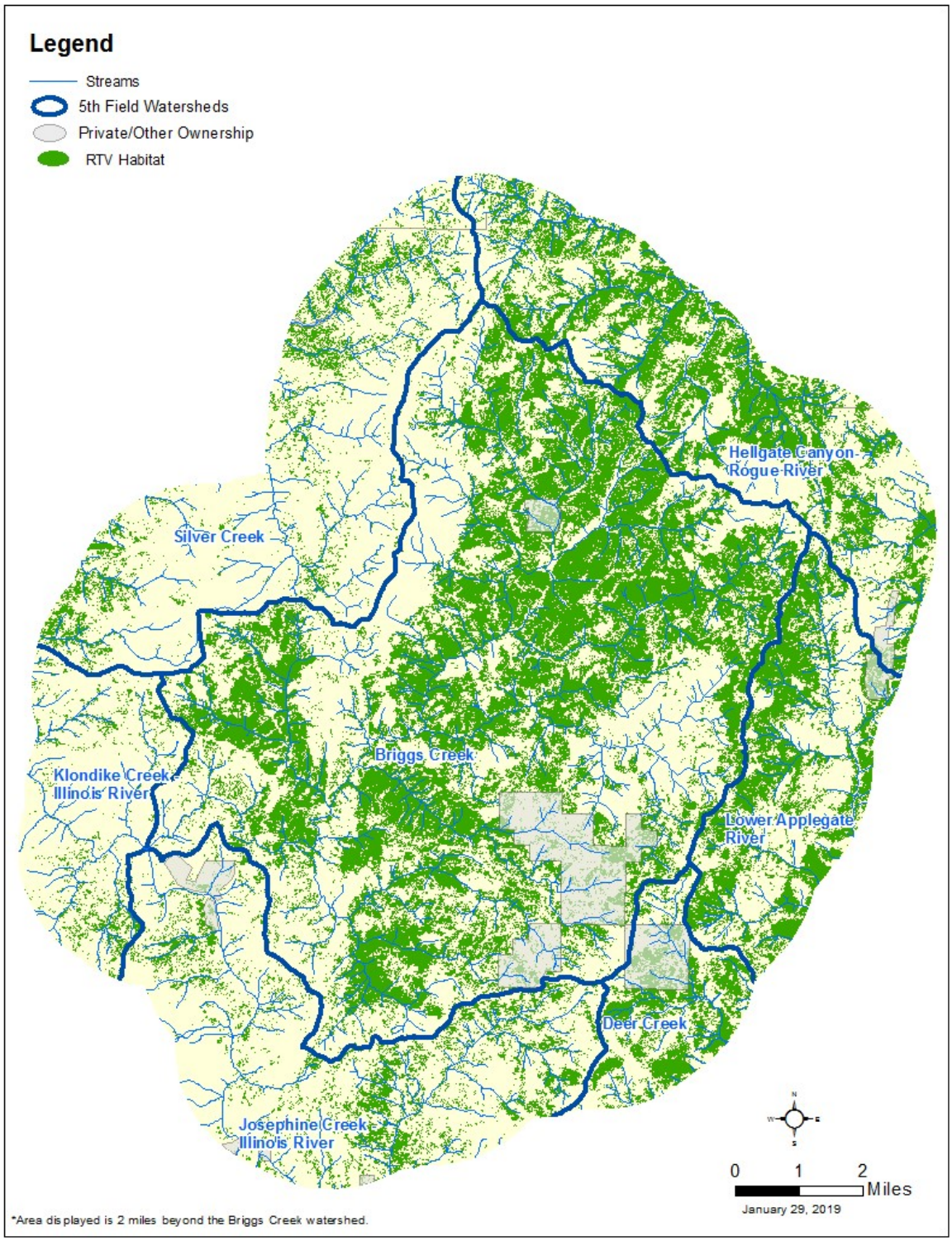


Figure 5. Red tree vole conservation plan (RTV Plan) within the Briggs Creek watershed and suitable habitat.

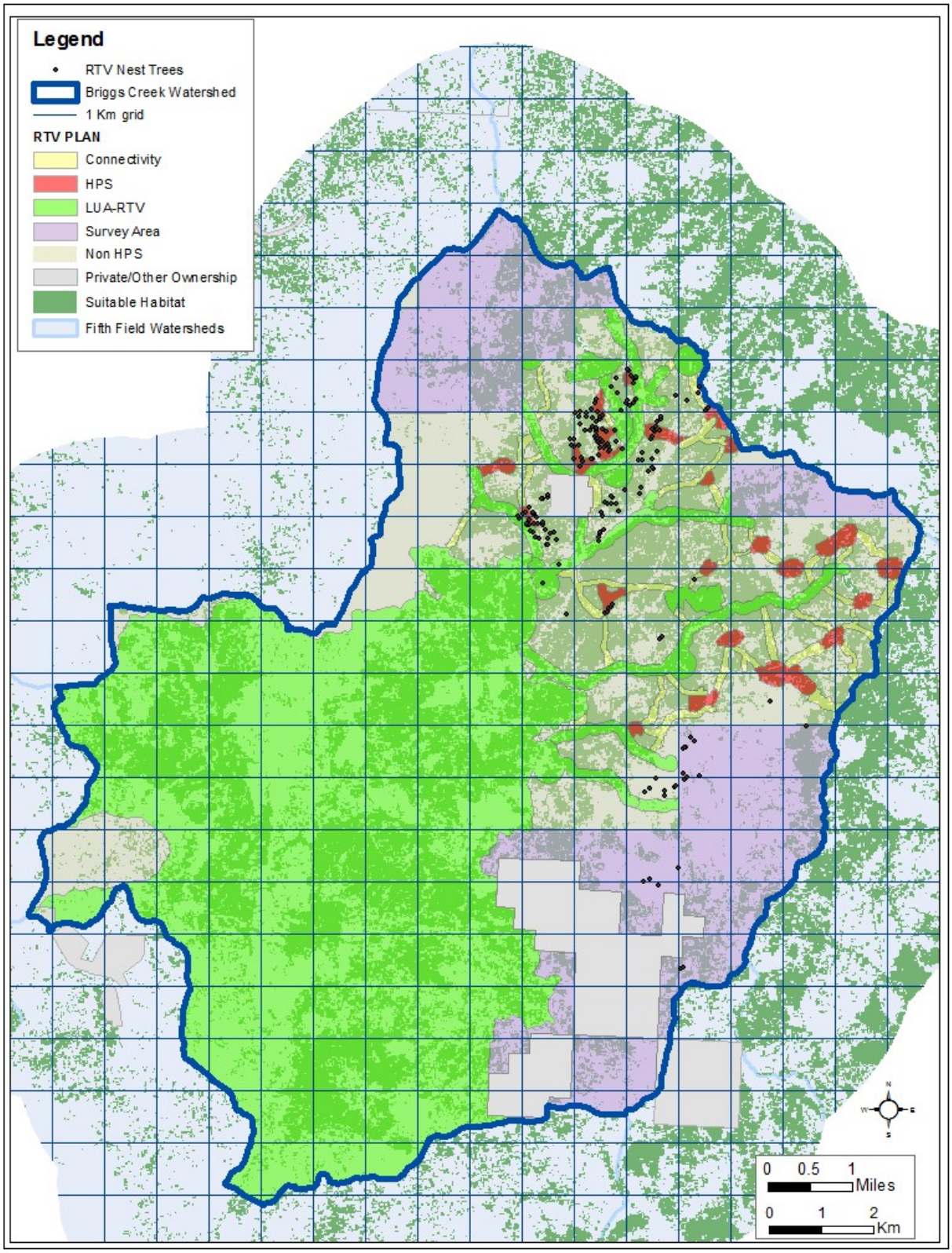
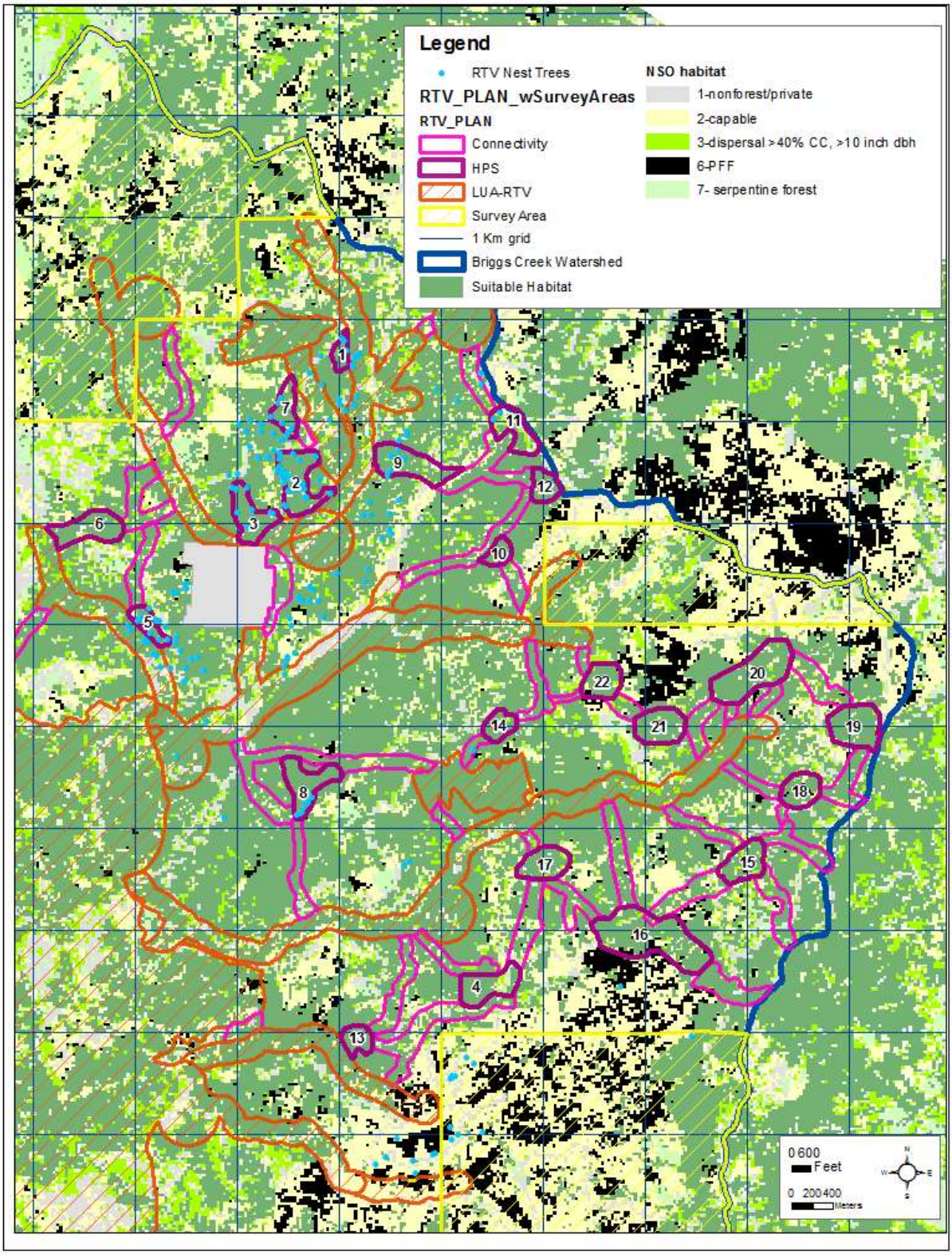
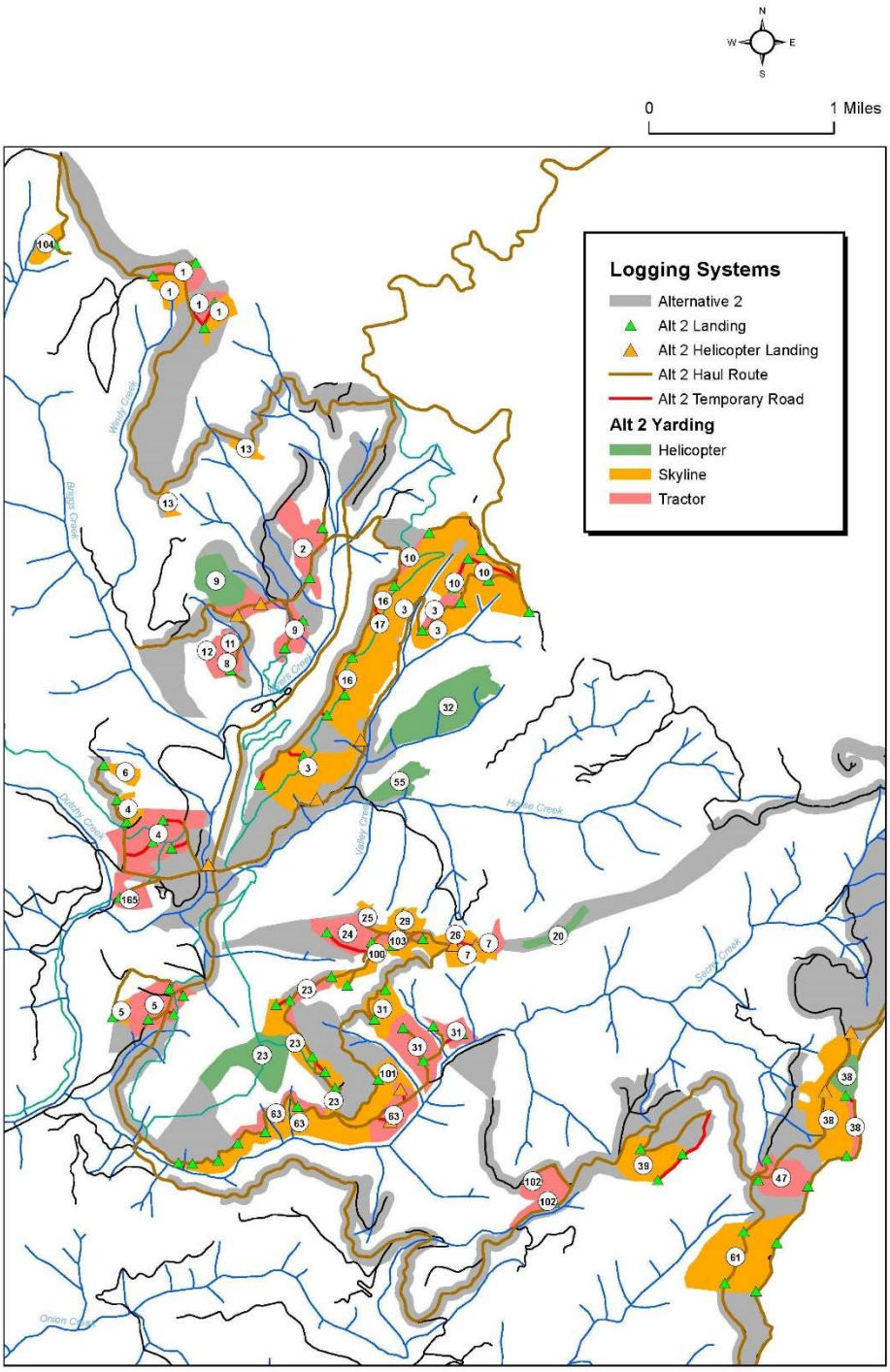


Figure 7. RTV Plan High Priority Sites and surrounding habitat within the Briggs Creek watershed.



Appendix C Temporary Roads Map

Upper Briggs Valley Restoration Project