United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Grants Pass Field Office
2164 NE Spalding Avenue
Grants Pass, Oregon 97526
www.blm.gov/or/districts/medford

FEB 04 2016

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DOI-BLM-ORWA-M070-2015-0009-EA

Dear Interested Party,

The Grants Pass Field Office is releasing the Upper Cow Late Successional Reserve Project Environmental Assessment (EA) and Draft Finding of No Significant Impact (FONSI) for a 30-day public comment period, beginning on February 9, 2016. The EA and the Draft FONSI document the project within policies set forth in the National Environmental Policy Act.

The Upper Cow Late Successional Reserve (LSR) Project is designed to meet the Bureau of Land Management's obligation to implement the 1995 Medford District Resource Management Plan. There is a need for this project in that the stands identified for treatment lack late-successional characteristics, an important component for an area that serves as a connectivity corridor for wildlife between the Cascades and the Coastal Ranges. The project's purpose is to enhance and/or maintain late successional forest conditions using silvicultural practices and prescribed fire.

The Upper Cow LSR Project Planning Area is located near Galesville Reservoir, east of I-5 and the community of Azaela within the Middle Cow Creek, Upper Cow Creek, and Days Creek-South Umpqua River 5th Field watersheds. All proposed project units are located on BLM-managed land within the Late Successional Reserve Land Use Allocation. The Planning Area legal description includes sections of Townships 31 and 32 South, in Ranges 3, 4 and 5 West, in Douglas County, Willamette Meridian.

The EA analyzed 3 Alternatives. Alternative 1 is the No Action Alternative. Under this Alternative, no action would occur and the project would not meet its purpose and need. Alternatives 2 and 3 are the Action Alternatives. The Action Alternatives would meet the purpose and need for this project and include the following activities:

	Alternative 2	Alternative 3
Number of units	79	60
Treatment Type*	**Alternative 2**	**Alternative 3**
Variable Density Thinning (VDT)	474	474
VDT / Understory Reduction	132	130
Density Management (DM)	182	12
DM / Understory Reduction	109	0
Restoration Thinning (RT)	143	140
RT / Understory Reduction	20	20
Legacy Tree Culturing (LTC)	7	0
LTC / Understory Reduction	4	0
Understory Reduction	302	415
Total Acres	1,373	1,193
Harvest Type	**Approximate Amount (Acres)**	
Ground-based harvesting	248	187
Cable yarding	602	415
Helicopter yarding	221	176
	Alternative 2	**Alternative 3**
Road Work Summary	**Approximate Amount (miles)**	
New Temporary Route Construction	0.60	0.29
Existing Temporary Route Renovation/Reconstruction	1.60	1.42
Road Maintenance	63.4	57.11

** The definitions of treatment types can be found in the EA and the Reader's Guide on our website.*

You can access the Upper Cow LSR Project EA, Draft FONSI, and Readers Guide on the BLM's ePlanning internet site at: http://tinyurl.com/BLMePlanning-UpperCow. If you do not have internet access, or would prefer a paper copy, please contact Ferris Fisher, Planning and Environmental Coordinator at (541) 471-6639 or ffisher@blm.gov. Paper copies of the project documents are also available at the Grants Pass Interagency Office at 2164 NE Spalding Ave, Grants Pass, OR 97526. Office hours are Monday through Friday, 8:00 p.m. to 4:30 p.m., closed on holidays.

Public Involvement

The 30-day comment period for the EA and Draft FONSI will begin when the legal notice is published in the *Grants Pass Daily Courier* and the *Roseburg News-Review* and posted online on February 9, 2016. Any comments you may have regarding this project must be received at the above address by the close of business on March 10, 2016 to be considered in the final decision making process. Please send hard copy or email comments to Ferris Fisher at the contact

information provided above.

All comments will be made available for public review. If you would like your personal information withheld from public review or disclosure under the Freedom of Information Act, please state this clearly at the beginning of your written comment. All comments received from organizations or officials of organizations, businesses, or government agencies will be made available for public inspection in their entirety.

Thank you for your interest in the Upper Cow LSR Project. I look forward to your engagement and participation on public land management projects.

Sincerely,

Allen Bollschweiler
Field Manager,
Grants Pass Field Office

BLM

Grants Pass Resource Area

Environmental Assessment

DOI-BLM-ORWA-M070-2015-0009-EA

Upper Cow Late Successional Reserve Project

February 2016

Prepared by:

U.S. Bureau of Land Management
Medford District Office – Grants Pass Field Office
2164 NE Spalding Ave
Grants Pass, OR 97526

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Acronyms

ACS	Aquatic Conservation Strategy
AREMP	Aquatic and Riparian Effectiveness Monitoring Program
ARPA	Archaeological Resources Protection Act of 1979
ASQ	Annual Sale Quantity
ASR	Annual Species Review
BA	biological assessment
BLM	Bureau of Land Management
BMP	Best Management Practice
BO	biological opinion
BSS	Bureau Special Status
CCA	Clean Air Act of 1990
CCH	Coho Critical Habitat
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CHU	Critical Habitat Unit
CWA	Clean Water Act
CWD	coarse woody debris
CX	Categorical Exclusion
DBH	diameter at breast height
DEQ	Department of Environmental Quality
DM	Density Management
EA	Environmental Assessment
ECA	Equivalent Clearcut Area
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EPZ	Environmental Protection Zone
ESA	Endangered Species Act of 1973
ESU	evolutionarily significant unit
FEIS	Final Environmental Impact Statement
FGR	Fragile Gradient Restricted Soils
FLPMA	Federal Land Policy and Management Act of 1969
FNR	Fragile Nutrient Restricted Soils
FOI	forest operational inventory
FRCC	Fire Regime Condition Class
FSEIS	Final Supplemental Environmental Impact Statement
FWR	Fragile Groundwater Restricted
GIS	Geographic Information Systems
GPFO	Grants Pass Field Office
GPS	Global Positioning Systems
HUC	Hydrological Unit Code

IDT	interdisciplinary team
IM	Instruction Memorandum
ISSSSP	Interagency Special Status / Sensitive Species Program
KLE	Klamath East Critical Habitat Unit
KSA	Klamath Study Area
LSR	Late Successional Reserve
LSRA	Late Successional Reserve Assessment
LTC	legacy tree culturing
LUA	land use allocation
LWD	large woody debris
MCWA	Middle Cow Creek Watershed Analysis
MOU	Memorandum of Understanding
NAGPRA	Native American Graves Protection and Repatriation Act of 1990
NAIP	National Agriculture Imagery Program
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NRF	nesting, roosting, and foraging
NSO	northern spotted owl
NWFP	Northwest Forest Plan
O&C	Oregon and California Railroad Revested Lands
ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife
OHV	off-highway vehicle
OSHA	Occupational Safety and Health Administration
PA	Planning Area
PDF	project design feature
PRPA	The Paleontological Resources Protection Act
RA-10	Recovery Action 10
RA-32	Recovery Action 32
RD	relative density
REO	Regional Ecosystem Office
RMP	resource management plan
RMR	Reforestation Moisture Restricted Soils
RNV	range of natural variability
ROD	Record of Decision
ROW	Right-of-Way
RR	Riparian Reserve
RROW	Reciprocal Right-of-Way
RSMR	Reforestation Surface Rock Moisture Restricted Soils
RSTR	Reforestation Surface Rock Temperature Restricted Soils
RSW	Reforestation Surface Rock Withdrawn Soils

RT	restoration thin
RTR	Reforestation Temperature Restricted Soils
RTV	red tree vole
S&M	Survey and Manage
SDWA	Safe Drinking Water Act of 1974
SEIS	Supplemental Environmental Impact Statement
SHPO	State Historic Preservation Office
SSS	Special Status Species
SUWA	South Umpqua Watershed Analysis and Water Quality Restoration Plan
SYU	Sustained Yield Unit
T&E	Threatened and Endangered
TMDL	Total Maximum Daily Load
TPCC	Timber Production Capacity Classification
TRS	Township, Range, and Section
UCWA	Upper Cow Watershed Analysis
UR	understory reduction
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VDT	variable density thin
WQMP	Water Quality Management Plan
WQRP	Water Quality Restoration Plan
WUI	Wildland urban interface

Chapter 1 Introduction

1.1 Document Structure

The Grants Pass Field Office (GPFO) has prepared an Environmental Assessment (EA) to analyze the Upper Cow Late Successional Reserve (LSR) Project in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. This EA discloses the direct, indirect and cumulative impacts that may result from the Action Alternatives. The EA provides the decision maker, the Grants Pass Field Manager, with information to aid in the decision making process. The document is organized into four chapters and appendices:

Chapter 1, Purpose and Need: This section includes information on the location of the project, the purpose and need for the project, and the BLM's proposal for achieving the purpose and need. This section includes details on how the BLM informed the public of the proposal and provides a synopsis of the issues raised.

Chapter 2, Alternatives: This section provides a description of the Action Alternatives for achieving the stated purpose and need. Alternatives were developed in light of substantive issues raised by the GPFO interdisciplinary team, the public, other agencies, and organizations. Incorporated in this section are best management practices (BMPs) and project design features (PDFs) that avoid or reduce impacts to resources. Alternatives considered but not analyzed in detail are also presented in this section.

Chapter 3, Affected Environment and Environmental Effects: This section describes the environmental effects of implementing any of the alternatives. A description of the existing conditions for resources is provided in the beginning of Chapter 3. Effects of the alternatives are then described based on what is proposed in the No Action Alternative 1, Action Alternative 2 and Action Alternative 3.

Chapter 4, Consultation and Coordination: This section provides a list of the resource specialists that comprised the interdisciplinary team which prepared the EA analysis, and information on consultation efforts with Tribal governments and regulatory agencies.

Appendices: The appendices provide information in support of the analysis presented in this EA.

1.2 Planning Area Vicinity

The Planning Area (PA) is located in Douglas County, Oregon and is approximately 26,470 acres. The Upper Cow LSR Project units are found within the following legal descriptions, Willamette Meridian:

T30S, R4W, Sections: 31, 35

T31S, R3W, Sections: 3-10, 16-20, 29-32

T31S, R4W, Sections: 1-36

T31S, R5W, Sections: 1, 2, 11-14, 23-26, 35, 36

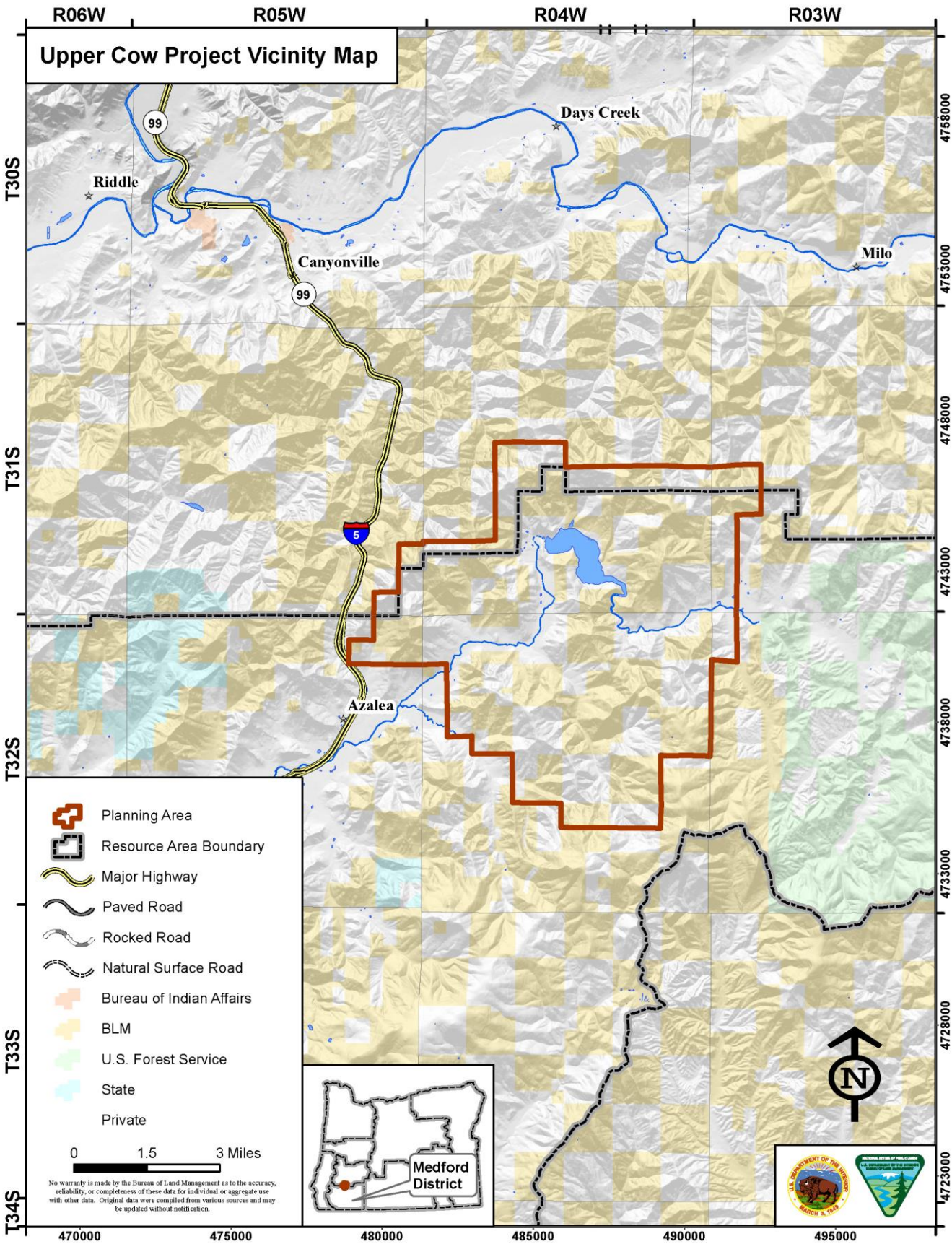
T32S, R3W, Sections: 5-9, 16-20, 30

T32S, R4W, Sections: 1-35

T32S, R5W, Sections: 1-3, 9-16, 22-25

T33S, R4W, Sections: 4-6, 8

Figure 1 Upper Cow Project Vicinity Map



The PA is within the Middle Cow Creek, Upper Cow Creek, and Days Creek-South Umpqua River Hydrologic Unit Code 10-digit watersheds (5th field). These watersheds drain into the South Umpqua River. All proposed project units are located on the BLM-managed land within the South Umpqua River/Galesville Late Successional Reserve (LSR #R0223) (LSR) Land Use Allocation (LUA). BLM lands are intermixed with private and county lands, creating a mosaic of ownership patterns. Figure 1 shows a map of the Upper Cow PA.

The Upper Cow PA is defined by administrative section lines. All proposed treatment units are contained within the PA boundary.

1.3 Purpose and Need for Action

1.3.1 Need for the Action

LSRs are areas that provide reservoirs or refuge for late-successional and old-growth associated species. The South Umpqua Galesville LSR is geographically located within an area that serves as a connectivity corridor between the Coast Range Province and the Cascade Province. This LSR lies in a critical East-West connectivity area between two large valley systems. To the south is the Rogue River Valley and to the north is the Umpqua Valley. The LSR is located at the south end of the Umpqua Valley in a landscape dominated by intermingled BLM and private lands. To the east and southeast of the LSR is a contiguous block of Forest Service managed lands. The lack of federal ownership across the I-5 corridor in most of western Oregon increases the importance of this area as a vital link between major physiographic provinces. In addition to the LSR's primary objective of providing a reservoir for late-successional and old-growth associated species, it is geographically located within a corridor of BLM-managed lands which provides connectivity and function between the Coast Range Province and the Cascades Province.

Many areas within this LSR are very uniform in forest structure and lack the species/structural diversity, snags, and large woody debris that characterize a highly functioning LSR. The proposed treatments may have short-term (0-10 years) impacts but are designed to have a long-term (11+ years) goal of improving the east-west connectivity of this vital LSR.

1.3.2 Purpose (Objectives) of the Project

This project is designed under the 1995 Medford District Resource Management Plan (RMP) and related documents which direct and provide the legal framework for management of BLM administered lands within the Medford District, GPFO. The area proposed for treatment is designated as LSR and Riparian Reserve (RR) LUAs as defined in the RMP (p. 24) and Northwest Forest Plan (NWFP) (pp. A-4, A-5).

Objectives for the LSR and the RR LUAs include:

- Protect and enhance conditions of late-successional and old-growth forest ecosystems

The proposed silvicultural action would accelerate the development of late-successional forest conditions which would accelerate the attainment of late-successional habitat conditions. The proposed treatments are designed to reduce large scale disturbance and reduce the long-term risk to stochastic events within the LSR. Many of the prescriptions focus treatments on stands that have

been previously harvested and reforested or stands that have been previously thinned. Stand management is also proposed in unentered stands that are even-aged and lack ecological structure.

This project will improve and/or maintain the vigor and growth of LSR stands allowing these areas to more quickly obtain late-successional forest legacies such as coarse woody debris, green trees, snags, and late-successional patches. These LSR legacy characteristics are beneficial for terrestrial wildlife habitat and watershed function to maintain aquatic habitat. This project will follow the guidance in the Late Successional Reserve Assessment (LSRA) for the South Umpqua River/Galesville LSR and allow the BLM to implement forest management direction as set forth in the NWFP and the Medford District RMP.

Late Successional Reserve (LSR) LUA Objectives:

- Enhance and maintain conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth forest related species including the northern spotted owl (NSO) (BLM 1995, pp. 21, 32; NWFP 1994b, p. B-1).
- Maintain biological diversity associated with native species and ecosystems (RMP, p. 21; NWFP 1994b, p B-1).
- Maintain natural ecosystem processes such as gap dynamics, natural regeneration, pathogenic fungal activities, insect herbivory, and low-intensity fire (NWFP 1994b, p B-1).
- Encourage the use of silvicultural practices (reforestation, maintenance and protection, density management, and fertilization) to accelerate the development of overstocked young plantations into stands with late-successional and old-growth forest characteristics (RMP, p. 195; NWFP 1994b, p. B-1).
- Maintain late-successional forest ecosystems; protect them from loss and reduce the risk of severe impacts resulting from large-scale disturbances (such as fires and insect and disease epidemics) and unacceptable loss of habitat (RMP, p. 33; NWFP 1995b, p B-1).
- Risk-reduction efforts will be focused on young stands, activities in older stands may be appropriate if the activities result in greater assurance of long-term maintenance of habitat, the activities are needed to reduce risk, and the activities will not prevent the attainment of LSR objectives (RMP, p. 195).
- Alternate access methods (such as helicopter logging) will be considered (RMP, p. 34).
- Permit fuel wood gathering only on existing cull decks from recently harvested timber sale units, in areas where green trees are marked for thinning, and in areas where blowdown is blocking roads (RMP, p. 34).
- Design and implement restoration treatments that improve habitat benefits for late-successional associated species (RMP, p. 63).

- Evaluate the impacts of nonnative plant species; develop plans/recommendations for eliminating or controlling non-native plant species (RMP, p. 63).
- Apply prescribed fire in a manner that retains the amount of coarse woody debris (CWD) determined to be appropriate for the site based on watershed analysis (RMP, p. 63).

Riparian Reserve LUA: Riparian Reserves (RR) are LUAs along streams, water bodies, wetlands and unstable or potentially unstable areas where special standards and guidelines apply. The RR includes the stream channel and the area extending one site-potential tree height (slope distance) from either side of the stream channel for non-fish bearing streams and two site-potential tree heights for fish bearing streams. For the watersheds in the PA site potential trees were identified in the Watershed Analysis documents for this area as 200 feet for the Upper Cow Watershed, 195 feet for the Middle Cow Watershed, and 160 feet for the Days Creek/South Umpqua Watershed as defined by that watershed analysis. For consistency, the width of the RR LUA for this project will be 200 feet on each side of non-fish bearing streams (one site potential tree) and 400 feet on each side of fish bearing streams (two site potential trees). The "no treatment" area, called the Ecological Protection Zone (EPZ), varies from 25-120 feet depending on the type of hydrologic feature being buffered and the topography of the surrounding landscape. See Chapter 2.2 and Chapter 3.6 for more details.

Lands within RRs are designated for restoring and maintaining the ecological health of watersheds and aquatic ecosystems, providing habitat for terrestrial species associated with late-successional forest habitat, and providing dispersal habitat for NSOs (RMP, pp. 22, 26).

The NWFP (p. C-32) and the RMP (p. 27) direct the BLM to apply silvicultural practices in RRs to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy (ACS) objectives. The ACS was developed to prevent further degradation and restore the ecological health of watersheds over broad landscapes across Forest Service and BLM-administered lands within the range of the NSO and the range of Pacific Ocean anadromy. The NWFP (p. B-13) states that "active silvicultural programs will be necessary to restore large conifers in Riparian Reserves." The conifer stands identified for treatment in this LUA are overstocked, resulting in simple stand structure and declining growth rates that delay development of large diameter snags and other habitat characteristics associated with late-successional forests. Specific project objectives in the RRs include:

- Maintain water quality standards (RMP, p. 41) and improve stream conditions by:
    - Maintaining effective shade for streams pursuant to BLM's Total Maximum Daily Load (TMDL) agreement with the State of Oregon (EA Chapter 3.6);
    - Using existing roads to avoid increasing the quality of water and sediment transport to streams (EA Chapter 3.6);
    - Performing road work to prevent road deterioration or failure and to prevent road generated sedimentation that exceeded Oregon Department of Environmental Quality (DEQ) standards.

- Maintain, enhance or accelerate the development of the elements listed below by applying commercial thinning treatments within the RR LUA concurrent with treatments in the adjacent LSR uplands (NWFP, p. B-31):
    - Large conifers with deep crowns and large limbs; future source material (large green trees) for CWD meeting RMP standards; future source material for large (> 15 inches in diameter and 15 feet tall) snag habitat; long-term structural, spatial and trees species diversity; multi-layered stands; and other elements of late-successional forest habitat, and
    - Habitat for Special Status…and other terrestrial species (RMP, p. 32)
- Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species (RMP, p. 22) associated with openings or young forests by creating low density thinning patches.

Project Objectives within Both LSR and RR LUAs include:

- Protect, manage and conserve federally listed species and proposed species and their habitats to achieve their recovery in compliance with the Endangered Species Act and Bureau Special Status Species policies (RMP, p. 49).

1.4 Decisions Framework

The Grants Pass Field Manager is the responsible official for deciding whether or not, and in what manner, to implement any of the Alternatives analyzed in this EA.

Actions in this decision would include:

- Timber harvest/Stewardship/Service vegetation treatments,
- Temporary route construction to accommodate harvest operations and upgrading/maintaining system roads for forest products hauling,
- The combination of logging systems to accommodate harvest operations, and
- Use of PDFs to avoid or reduce impacts to resources.

The decision will be based on a consideration of the environmental effects of implementing any of the Alternatives. The Field Manager may select any Alternative analyzed in detail, a modified Alternative, or the No Action Alternative. If the Field Manager determines that the proposal would result in significant effects, additional analysis may occur through the development of an Environmental Impact Statement.

1.5 Conformance with Law, Regulation & Policy

1.5.1 Land Use Management Plans

This EA tiers to the following land use planning documents:

- Final Supplemental Environmental Impact Statement and Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (NWFP FSEIS, 1994 and ROD, 1994)
- Final Medford District Proposed Resource Management Plan/Environmental Impact Statement, and Record of Decision and Resource Management Plan (EIS, 1994 and RMP/ROD, 1995)
- Final Supplemental Environmental Impact Statement: Management of Port-Orford-Cedar in Southwest Oregon (FSEIS, 2004 and ROD, 2004)
- Medford District Integrated Weed Management Plan Environmental Assessment (1998) and tiered to the Northwest Area Noxious Weed Control Program (EIS, 1985)
- Final Supplemental Environmental Impact Statement and Record of Decision and Standards and Guidelines for Amendment to the Survey & Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (FEIS, 2000 and ROD, 2001)

1.5.2 Relevant Statutes/Authorities

This section is a summary of the relevant statutes/authorities that apply to this project. The Action Alternatives are designed in conformance with the direction given for the management of public lands in the Medford District and the following:

- Oregon and California Lands Act of 1937 (O&C Act). Requires the BLM to manage O&C lands for permanent forest production. Timber shall be sold, cut, and removed in accordance with sustained-yield principles for the purpose of providing for a permanent source of timber supply, protecting watersheds, regulating streamflow, contributing to the economic stability of local communities and industries, and providing recreational opportunities.
- Federal Land Policy and Management Act of 1976 (FLPMA). Defines the BLM's organization and provides the basic policy guidance for the BLM's management of public lands.
- National Environmental Policy Act of 1969 (NEPA). Ensures that information on the environmental impacts of any Federal action is available to public officials and citizens before decisions are made and actions are taken.
- Endangered Species Act of 1973 (ESA). Directs Federal agencies to ensure their actions do not jeopardize species listed as "threatened and endangered" or adversely modify designated critical habitat for these listed species.
- Clean Air Act of 1990 (CAA). Provides the principal framework for national, state, and local efforts to protect air quality.

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

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

- Clean Water Act of 1972 (CWA) as amended in 1985. Establishes objectives to restore and maintain the chemical, physical, and biological integrity of the nation's water.

- Oregon BLM signed a Memorandum of Understanding (MOU) with the State of Oregon Department of Environmental Quality (BLM, 2011) that specified BLM responsibilities during project planning for managing lands to protect water quality.

- Executive Order 11988 and 11990 require Federal agencies to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of flood plain development wherever there is a practicable alternative.

- National Historic Preservation Act, 1966 (NHPA) as amended. Consideration of the effects of federally funded undertakings on cultural resources is governed by the NHPA. Regulations in 36 CFR 800 outline the process through which historic preservation is administered toward to the goal of avoiding, minimizing or mitigating impacts to historic properties that are eligible for the National Register of Historic Places.

- Native American Graves Protection and Repatriation Act of 1990 (NAGPRA). Establishes procedures for inadvertent discoveries of cultural items on Federal or Tribal lands and a repatriation process to return NAGPRA items to lineal descendants and culturally affiliated Tribes.

- The Paleontological Resources Protection Act (PRPA). The PRPA directs federal agencies to coordinate the management and protection of paleontological resources on federal lands.

1.6 Public Involvement

The Council on Environmental Quality (CEQ) directs the BLM to encourage and facilitate public involvement in the NEPA process to the fullest extent possible (40 CFR 1500.2(d), 40 CFR 1506.6). For this project public involvement has included external scoping, public notifications before and during the preparation of the EA, public meetings and a field tour, public review and two formal public comment periods.

1.6.1 Scoping

Scoping is the process by which the BLM solicits internal and external input on the issues, impacts and potential Alternatives that will be addressed in the EA. Scoping occurs early in the NEPA process and extends through the development of Alternatives.

Internal Scoping

Internal scoping is the use of BLM and consulting agencies staff to help determine what needs to be analyzed in the NEPA document. Internal scoping involves an interdisciplinary team (IDT) of BLM resource specialists. The IDT conducted internal scoping through the project planning process. Internal scoping included record searches, field surveys, review of current literature and discussion by the IDT. In the planning process the IDT considered elements of the environment that are specific to this project.

External Scoping

External scoping involves notification and opportunities for feedback from non-cooperating agencies, organizations, Tribes, local governments, and the public.

A scoping letter and map was sent to approximately 300 members of public located within and adjacent to the Upper Cow Creek PA. This project had a 30-day scoping period from January 21, 2015 to February 20, 2015.

The mailing list was generated using county tax lot information. The addresses to all residents within the Upper Cow Creek PA and one quarter mile outside of the PA boundary were included on the mailing list, along with the standard Grants Pass Field Office mailing database of interested public.

Public Meetings

The scoping letter invited the public to attend a BLM-hosted scoping meeting on January 29, 2015 at the Azalea Grange, Glendale Oregon. The BLM team of interdisciplinary specialist and the Grants Pass Field Manager were present to give a project overview and answer questions. There were approximately 12 members of the public in attendance during that meeting.

The Upper Cow IDT and the Grants Pass Field Manager were invited to attend a community-hosted scoping meeting on the evening of February 12, 2015 at the Upper Cow Creek Community House, Azalea, Oregon. There were approximately 30 members of the public in attendance during that meeting. Members of the public asked questions about the project and interacted with members of the IDT.

Prior to EA release and comment period the BLM hosted a public field tour. The decision was made to host the EA field tour prior to the release of the EA to avoid inclement winter weather and prepare the public for release of the EA. The tour occurred on Saturday November 14, 2015. There were approximately 12 attendees who participated in the tour. The BLM provided the tour participants with an illustrated EA Reader's Guide which was a succinct presentation of the information that is contained within this EA. This tour allowed members of the public to view proposed treatment units in the field. Members of the IDT were present to discuss recommended treatments and answer public questions.

Scoping Comments

The BLM received a total of 4 scoping comments. Substantive comments are incorporated into the environmental analysis. BLM responses to the scoping comments are contained within Appendix B of this document.

EA Public Comment Period

Public involvement extends through the EA process and includes a 30-day public review period for the EA and Draft Finding of No Significant Impact.

1.7 Issues

Substantive issues are directly or indirectly related to the development of the project proposal. Substantive issues assisted the IDT in shaping the Alternatives and identifying PDFs for consideration of analysis. Non-substantive issues are: 1) outside of the scope of the Action Alternatives or beyond the scope of the purpose and need; 2) already decided upon by law, policy or regulation; 3) irrelevant to the decision to be made; 4) conjectural and not supported by scientific or factual evidence. The CEQ NEPA regulations require this delineation in CFR 1501.7 "identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review."

1.7.1 Issues analyzed in detail

The IDT considered in detail the following issues and incorporated them into the design of the Action Alternative, PDFs, and analysis of the environmental effects found in Chapter 3.0:

- Wildlife: Effects of project activities on Northern Spotted Owls (NSO), NSO habitat, NSO prey species, Barred owls, red tree voles, fishers, and bald eagles.
- Soil compaction and site productivity: Effects to soil and site recovery, nutrient cycling and accelerated erosion. Potential impacts to fragile soils.
- Hydrology/Aquatics: Protection of water quality and quantity, fish and aquatic habitat. Aquatic Conservation Strategy (ACS) objectives address the physical integrity of the aquatic system, as well as sediment and in-stream flow including the timing, volume, rate, input, storage, transport and spatial distribution of peak, high and low flows as identified in the NWFP (USFS/BLM 1994a, p. B-9).
- Fuels/Fire: Risk reduction from large scale wildfires through the reduction of crown bulk density and the treatment of project created activity slash. The proposed treatments intend to create fire resilient stands by reducing surface fuels, ladder fuels, and crown density. Thinning followed by sufficient treatment of surface fuels can reduce potential crown fire activity and increase stand resiliency to unplanned events.
- Silviculture: Long-term fire resiliency and risk reduction activities. Ecological benefits from proposed treatments and legacy tree culturing.
- Invasive species: Spread of invasive species and the protection of Bureau Sensitive Species.
- Regional Ecosystem Office Review: The Upper Cow Project was designed to adhere to the guidance in the South Umpqua River/Galesville Late Successional Reserve Assessment (BLM

1999b; LSR#RO223). Certain activities described in the LSRA are exempt from further REO review while other activities are subject to REO review. See Chapter 2 for a discussion of the types of activities that are subject to REO review.

1.8 Issues considered but not analyzed in detail

This Environmental Assessment explored and objectively evaluated a range of reasonable alternatives within laws, regulations and policy. Through the planning process several alternatives where explored but eliminated from detailed analysis for various reasons. The IDT evaluated 3,264 acres within the South Umpqua River/Galesville LSR. The Action Alternatives analyzed for an economically viable proposal with consideration to environmental effects that meet the purpose and need of the project. An alternative would not be considered if:

- It does not meet the purpose and need;
- It is technically or economically infeasible; or
- It is inconsistent with the basic policy or objectives for the management of the area.

The following Issues were considered by the IDT, but not analyzed in detail.

1.8.1 Stewardship

Approximately 355 acres were dropped from the original 3,264 acre proposal. These acres were initially assessed for forest management treatments that could have been implemented with the BLM's stewardship contracting authority. During the analysis for the EA the IDT determined that the 355 acres did not require treatment at this time because the desired late successional structure was currently present.

1.8.2 Forest Stands only requiring Understory Reduction

Approximately 236 acres were dropped from the original 3,264 acre proposal. During the analysis for the Upper Cow Project the IDT determined that the 236 acres were currently meeting late successional characteristics and treatment of these acres were not needed at this time to meet the purpose and need for the project.

1.8.3 Environmental Protection Zones

Approximately 83 acres were dropped from the original 3,264 acre proposal. These acres are located directly adjacent to streams within the PA and are referred to as Environmental Protection Zones or EPZs. These areas are deferred from detailed analysis because Aquatic Conservation Strategy components were already being met or treatment would not enhance Aquatic Conservation Strategy objectives.

1.8.4 Red Tree Vole Habitat Areas

Approximately 191 acres were dropped from the original 3,264 acre proposal. These areas were deferred from treatment following field habitat evaluations and tree climbing to confirm the presences of red tree vole. For further discussion of red tree voles and their habitat, see the Wildlife Chapter 3.3.

1.8.5 Forest Stands Exhibiting Late Successional Characteristics

Approximately 433 acres were dropped from the original 3,264 acre proposal. These acres were originally proposed for treatment to improve the late successional characteristics within the PA. Following a more refined assessment of the units it was discovered that these areas would not benefit from treatment at this time as they currently display desirable late successional characteristics. While these acres displayed late successional characteristics they did not meet the definition for Recovery Action 32 stands. See below for a detailed description of Recovery Action 32 stands.

1.8.6 Northern Spotted Owl: Recovery Action 32 (RA 32)

Approximately 51 acres were dropped from the original 3,264 acre proposal. These acres were dropped following field surveys which documented complex late successional habitat.

The NSO Recovery Plan contains specific "Recovery Actions" which are near-term recommendations to guide the activities needed to accomplish recovery objectives. The Revised Recovery Plan presents 33 actions that address overall recovery through maintenance and restoration of NSO habitat, monitoring of avian disease, development and implementation of a delisting monitoring plan and management of barred owls.

Recovery Action 32 aims to retain high-quality owl habitat stands characterized as having large diameter trees, high amounts of canopy cover, and decadence components such as broken-topped live trees, mistletoe, cavities, large snags and fallen trees. Stands that were considered high-quality spotted owl habitat were deferred from treatment to reduce effects to owls because owls require well-distributed, older and more structurally complex multi-layered conifer forests. See Chapter 3.3 Wildlife, for further consistency with NSO Recovery Plan Recommendations, especially Recovery Actions 10 and 32.

1.8.7 Northern Spotted Owl: Recovery Action 10 (RA 10) Application and Critical Habitat

Approximately 540 acres were dropped from the original 3,264 acre proposal. These acres were deferred from treatment to reduce effects to northern spotted owls and their habitat.

To the extent practicable, the Relative Habitat Suitability (MaxEnt) model described in the 2011 Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011), the Medford District known owl site layer, and recent spotted owl survey data were used to determine treatment options in order to reduce effects to spotted owl sites.

The IDT followed principles in the Recovery Plan Implementation Guidance: Interim Recovery Action10 Medford Bureau of Land Management/Rogue River-Siskiyou National Forest/U.S. Fish and Wildlife Service Roseburg Field Office (USFS/BLM/USFWS 2013) while designing the proposed treatments. Northern spotted owl sites within the PA were analyzed using historic pair occupancy and reproductive success derived from protocol surveys.

Based on survey results, all the NSO sites within the PA which exhibited a high rate of occupancy and reproductive success within the last five years were categorized as high value sites. NSO sites that did not have any pairs detected within the past 5 years were categorized as low value sites. Treatments were then planned across the PA with particular attention to the spatial location of

treatments relative to these high and low value NSO sites. Table 3.3-4 in Chapter 3 includes a summary of all the NSO sites in the PA and the category each site was assigned for this exercise.

Treatments were designed to have minimal impacts to high value sites by: 1) limiting the overall amount of treatments, especially within the 0.5 mile core areas of these sites, and 2) only proposing treatments that would have minimal short-term impacts on NSO habitat (treat and maintain) within these high value sites. Conversely, the majority of the proposed treatments were focused in low value NSO sites or outside of NSO home ranges. All proposed treatments were designed and are expected to increase the quality of habitat in the long-term (>30 years). See Chapter 3.3 Wildlife for further consistency with NSO Recovery Plan Recommendations, especially Recovery Actions 10 and 32.

The total acres of treat and maintain prescriptions within the 0.5 mile core area of high priority owl sites were reduced and in some cases eliminated in order to reduce the effects to NSOs at those sites. Silvicultural prescriptions that have adverse impacts to NSO habitat were considered in areas outside of high value owl sites. The IDT focused on reducing the amount of timber harvest within the 0.5-mile core area because it is the area that provides the important habitat elements of nest sites, roost sites, and access to prey that benefit NSO survival and reproduction (Bingham and Noon 1997).

No downgrade of NRF habitat was proposed within high value sites, with the exception of small removal associated with logging systems. Since these stands were already functioning as NRF habitat, the team determined that treatments were not necessary to improve the habitat.

In limited cases, where road construction was necessary to access the proposed treatment and no other road was available, small amounts of roosting/foraging and dispersal removal would occur in the PA. The removal of small amounts of habitat from road and landing construction were considered in areas that would allow access to treatments that would have long-term benefits to NSO habitat.

The 2012 Final Critical Habitat Rule and principles in the 2011 Recovery Plan were used to inform specific prescriptions when treatment units are located within the 2012 designated critical habitat. The 2012 Final Critical Habitat Rule principles and the guidance in the South Umpqua/Galesville LSRA were very similar and treatments were designed to meet the recommendation in both documents. Adverse effects were avoided in occupied sites within critical habitat. Adverse effects in critical habitat located outside of the home ranges of known sites were only proposed in areas where the habitat could be improved in the long-term (i.e. proposed treatments in capable, dispersal, or roosting/foraging habitat within high habitat suitability according to the relative habitat suitability model); treatments would improve stand resiliency; or where the ecological needs of the stand outweighed the owl habitat needs (i.e. pine restoration on a ridge that is in low habitat suitability according to the relative habitat suitability model). Nesting/Roosting/Foraging (NRF) and Roosting/Foraging habitat are not proposed for removal within critical habitat, except for minor areas that may be associated with logging systems. For more information see the Wildlife write-up in Chapter 3.4.

1.8.9 Road Management

Road management categories define the intended use of roads by the public and for BLM administrative purposes. Many of the roads on BLM administered lands provide access to public or private lands for fire or silvicultural treatments, are encumbered under reciprocal right-of-way agreements, or provide access to private lands; and therefore will remain open or be decommissioned at the end of the project.

Efforts made to fully decommission or obliterate existing roads require the BLM to coordinate with local governments and property owners. Medford BLM has the following road management categories that will be determined for each road used by the project (not all categories will be utilized during this project):

- Open, No-Restrictions – These roads should be left in a well maintained condition appropriate for the future use. In most cases, this would require maintenance, leaving all drainage features and improving aggregate surfacing to achieve the same or better road condition as when the project began. Roads may still have seasonal restrictions for activities and use is predicated on good maintenance conditions.

- Open with Administrative Conditions – Temporary, seasonal and/or limited access would be allowed; typically closure is achieved with a gate. This may include measures to reduce erosion, such as installation of water bars, outsloping, constructing drainage dips and/or the removal of culverts; appropriate for the limited use expected in the future.

- Decommissioned – Closed to vehicles on a long-term basis and left in an erosion-resistant or "storm-proofed" condition. Typically this would require the removal of culverts and some drainage features, installation of rolling dips and/or outsloping and stabilizing the road prism.

- Fully Decommissioned – Permanent closure of roads determined to have no immediate need such as temporary roads. These roads would be sub-soiled (or tilled), seeded, mulched, physically blocked, and/or planted to reestablish vegetation.

- Obliteration (full site restoration/permanent) – Roads receiving this level of treatment have no future need and would be returned to the original contours or a stable condition that approximates the original topography.

All temporary roads constructed or reconstructed/renovated for timber harvest would be fully decommissioned after use. No increase in the open road network is proposed for this project.

Chapter 2 Alternatives

Pursuant to Section 102 (2) (E) of the National Environmental Policy Act (NEPA) of 1969, as amended, Federal agencies shall "study, develop, and describe appropriate Alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources."

2.1 Alternative 1 No Action

The No Action Alternative provides a baseline to the comparison of the Action Alternatives and describes the existing condition and the continuing trends within the PA. Under the RMP, proposed activities are scheduled to occur in the following land use allocations: LSR and RR. Selection of the No Action Alternative would not meet the purpose and need of the project (described in Chapter 1) to maintain and enhance the late successional forests in southwest Oregon, reduce risk within the LSR resulting from large-scale disturbances, and conserve federally listed species and their habitat.

Future active management treatments in this area would not be precluded and could be analyzed under a subsequent environmental analysis. Maintenance of BLM controlled roads is dependent on BLM funding or requests from Right-of-Way (ROW) holders.

2.2 Action Alternative 2

The Upper Cow LSR Project is designed to meet the BLM's obligation to implement the Medford District RMP and to address the primary needs identified within lands of the PA. The project's primary objective is to implement forest management activities that would maintain and enhance the late successional forests in southwest Oregon, reduce risk within the LSR resulting from large-scale disturbances, and conserve federally listed species and their habitats.

The RMP directs the BLM to implement the Oregon and California Railroad Revested Lands Act (O&C Act). Lands administered under the O&C Act must be managed in accordance with environmental laws such as the ESA and the CWA. The RMP SEIS/ROD designated LSR and RR as the building blocks in the development of species recovery to achieve the conservation and recovery of species (RMP, p. 18). Production of wood volume would be a by-product of the proposed treatments, not a primary objective in LSR and RR LUAs.

Alternative 2 proposes treatments in stands greater than 80 years of age and also proposes to cut trees greater than 20 inches in diameter (utilizing a 25 inch diameter cap). The South Umpqua LSRA requires these types of actions to be reviewed by the Regional Ecosystem Office (REO). The REO is a working research and monitoring group that ensures that proposed project treatments not described in the LSRA are compatible with LSR objectives. This portion of the proposal will not move forward without concurrence from the REO. The REO may concur with the proposal in its entirety, concur with a portion of the proposal, or deny the proposal. The outcome of the REO review will be reflected in the Decision Record for this project.

In response to the REO review process the IDT designed two Action Alternatives. Alternative 2 was designed with the assumption that the REO would entirely concur with the 80 year and 20 inch

exemption requests. Alternative 3 assumes that the REO may entirely deny the exemption request. The two Alternatives reflect these assumptions. For a detailed description of the differences between the two Action Alternatives see Table 2.3-1 below.

The following table outlines the activities proposed under Alternative 2 and Alternative 3:

Table 2.2-1 Action Alternatives Table

	Alternative 2	**Alternative 3**
Number of units	79	60
Treatment Type (acres)	**Alternative 2**	**Alternative 3**
Variable Density Thinning (VDT)	474	474
VDT / Understory Reduction	132	130
Density Management (DM)	182	12
DM / Understory Reduction	109	0
Restoration Thinning (RT)	143	140
RT / Understory Reduction	20	20
Legacy Tree Culturing (LTC)	7	0
LTC / Understory Reduction	4	0
Understory Reduction	302	415
Total Acres	**1,373**	**1,191**
Harvest Type (acres)	**Alternative 2**	**Alternative 3**
Ground-based harvesting	248	187
Cable yarding	602	415
Helicopter yarding	221	176
	Alternative 2	**Alternative 3**
Road Work Summary	**Approximate Amount (miles)**	
New Temporary Route Construction	0.60	0.29
Existing Temporary Route Renovation/Reconstruction	1.60	1.42
Road Maintenance	63.4	57.11

For a more in-depth description of the Treatment Types, see Appendix G: Silvicultural Prescription.

Forest Management Treatments

The Action Alternatives would treat the acres listed above in the table. Below is a description of the Action Alternatives. Appendix I and J, provides a map along with a table that describes each unit and its associated proposed treatment. Appendix H provides a summary of road work and use.

Activity fuels would be assessed following treatment. Slash may be treated using one or more of the following actions: lop & scatter, hand pile & burn, chipping, and/or biomass utilization and maintenance underburning.

The Action Alternative may contain vegetation treatments that produce woody biomass and special forest products that could be removed under service contracts, stewardship contracts, and timber sale contracts.

Forest Management Quality Control Measures

Proposed treatments within the late successional reserve were designed to meet target canopy cover and basal area requirements. These targets are based on the type of NSO habitat present prior to treatment proposals. To ensure that these targets are achieved the Upper Cow IDT silviculturist and wildlife biologist field verified the accuracy of the marking of each unit and where needed modified the mark to improve structural characteristics of habitat quality and stand variability. To ensure that canopy cover targets were retained, most silvicultural prescriptions included an additional percentage of canopy cover to mitigate impacts from logging operations such as yarding corridors and skid trails.

To reduce effects to NSOs from project implementation the team designed protection buffer areas within nesting, roosting, and foraging habitat units proposed for treatment. These protection buffers would be placed at landing sites which have 3 or more converging yarding corridors. The buffers would resemble a triangular wedge and would be placed near the landing edge to ensure that removal of nesting, roosting, and foraging habitat would not occur as a result of harvest operations. This wedge would be applied to units 35-15, 1-1, and 31-3. Trees cut within the wedge area may be removed from the site.

Description of Active Forest Management Treatments

Density Management

The Density Management silvicultural prescription is assigned to stands that are generally 80 years old or older. These stands have similar conditions described in the LSRA for mid-seral forests (single canopied, low within-stand diversity) and are being considered for potential treatment. They lack functionality for late-successional related species, regardless of age, and would continue on this trajectory without a disturbance mechanism. The disturbance tool of thinning, as opposed to wildfire, introduces a controlled intervention that reduces density and guides the stand into a developmental pathway that more safely meets late successional forest conditions. This treatment enhances or maintains stand variability by preserving clusters of trees, creating small openings, and retaining trees of represented size classes.

Legacy Tree Culturing

Legacy tree culturing involves the reduction of competing trees around large, thick-barked, dominant old growth conifers. These much older trees are considered legacy components due to their establishment as part of the original forest stand. Cultivating fire resilient species such as ponderosa pine and incense cedar would contribute to their persistence on the landscape and maintain or improve biological diversity. There would be long-term benefits to these species at both the stand and landscape level scales, as well as the short and long-term benefits of improving adaptability of the forest to fire. Radial 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.

Restoration Thinning

To improve biological diversity at the landscape scale, fire and drought tolerant species would be retained, cultured, and favored over Douglas-fir. Treatments would retain components of understory and intermediate trees to increase complex structural development. Some larger co-dominant and dominant Douglas-fir would be thinned to avoid concentrating tree removal in the understory and better distribute thinning across canopy layers and tree classes, create canopy gaps, and vary tree sizes and species. Douglas-fir, a relatively more shade tolerant species, is the dominant tree species and the proportion of fire resilient and drought tolerant ponderosa pine, incense cedar, and oak species is not only fewer, but in active decline across the landscape.

Douglas-fir possesses the competitive advantage and presents a significant inter-tree competition factor against shade intolerant tree species and shrubs as depicted in Figures 2 and 3. To improve the proportion of fire resilient species and improve species diversity, the less represented legacy ponderosa pine and incense cedar would be favored for retention over more frequently occurring Douglas-fir.

Figure 2 Unit 35-15

Figure 3 Unit 26-1

Variable Density Thinning

Variable density thinning (VDT) is proposed in stands from 30-80 years in age. These stands are primarily even-aged, overstocked, and single storied plantations, dominated primarily by Douglas-fir. Variable density thinning aims to enhance structural and species diversity which will result in a stand containing a variety of stand densities which will improve the development of late-successional conditions. A lower stand density reduces competition and accelerates the growth of leave trees, thereby shortening the period of time needed to attain large woody structure associated with late-successional forests. The treatment enhances or maintains stand variability by preserving clusters of trees, creating small openings, and retaining trees of represented size classes.

Understory Reduction

Wildfire presents the greatest risk of late-successional habitat loss in this LSR (BLM 1999b; LSRA p.65). This was exemplified in the summer of 2015 with the Stouts Creek Fire. Changing climatic conditions have increased the susceptibility of this habitat to loss from a variety of change agents.

This treatment is designed to move these dry forest stands along a path to develop and retain the resiliency in the ecosystem to adequately respond to whatever changes may occur. This treatment is intended to restore the inherent forest structure and composition to reintegrate the relationship of vegetation to the disturbance regime. Landscape fire resiliency is an important goal of ecosystem restoration efforts to increase the likelihood that spotted owl habitat will persist on the landscape and develop as part of this fire adapted community instead of risking habitat loss and subsequent reduction in owl numbers.

Treatments include slashing, hand-piling, pile-burning, chipping, lop and scattering, biomass removal, and/or underburning. Slashed material would be up to 8 inches diameter at breast height (DBH) and conifer spacing would be approximately 18 to 20 feet apart. Hardwood spacing would be 25 to 45 feet depending on hardwood size class (plus or minus 10%).

Coarse Woody Debris (CWD) Recruitment

The IDT considered coarse wood recruitment as a component of the Upper Cow project proposal. As described above, the IDT requested a REO exemption for the removal of trees from 20 to 25 inches DBH to meet treatment objectives. Trees cut to benefit silvicultural prescriptions may be removed from the unit. If, during the implementation of other project activities, such as the clearing of cable and tractor yarding corridors or the construction of new temporary or renovated/reconstructed routes, a 20+ inch DBH tree needs to be felled to accommodate these logging systems, those trees would be left on site and would beneficially contribute to CWD recruitment. Trees less than 20 inches DBH that are marked for retention within the logging systems areas described above, would be swapped with similar trees throughout the unit. The swapped trees would be retained as additional standing structure. Tree swapping accounts for future snag and coarse wood recruitment. Trees that are swapped within treatment units may be felled at a later date and left on site through a method other than the Timber Sale contracting tool. The felling of swapped trees in the future is analyzed within this document.

Additional coarse wood recruitment may occur following harvest when logs assessed at the landings are determined to be cull. These logs may be redistributed into the unit to increase coarse wood recruitment.

Stewardship Proposal

A subsection of the units proposed for treatment within the PA may use stewardship contracting authority to accomplish the active management proposal. Stewardship contracting provides the flexibility of a service contract with a product removal contract. The primary objective of stewardship contracting is to achieve the land management goals described above in the Purpose and Need section. Goals identified in the authority legislation include: Removing vegetation or other activities to promote healthy forest stands, reduce wildfire hazards, or achieve other land management goals (http://www.fs.fed.us/restoration/Stewardship_Contracting/faqs.shtml). The areas selected for stewardship would utilize the silviculture prescription listed above and employ yarding systems described below. Examples of woody biomass and special forest products that may be removed under a stewardship contract are firewood, chips/hog fuel, and small diameter poles. The proposed treatment units are analyzed within this EA.

Description of Yarding Systems

Harvest yarding systems may include the use of skyline cable yarding, ground-based yarding, and helicopter yarding. All of the yarding systems listed above would utilize whole tree yarding or yarding with tops attached to minimize impacts to retained trees and soils. This means that the trees may be yarded to the landings with tops and limbs attached or with the limbs removed but with the tops attached. The remaining processing of the logs would occur at the landing; tops and limbs would be removed and logs would be cut into desired lengths.

Skyline cable yarding systems are in a fixed position, usually attached to a yarder or a tower from which cables, carriages, and winches originate. The yarder, tower, and cables utilized in this system may require the use of tail hold and/or guylines to remain erect. The carriage is a load-carrying device from which logs are suspended and rides into the interior of the unit and returns back to the landing along the skyline cable. The tail end of the cable yarding corridors will be at least 150 feet apart; cable yarding corridors may converge near the landing. In stands identified as any part of NSO nesting, roosting, and foraging habitat, where more than 3 landings converge, a skip area was designed to limit the extent of clearing near the landing, with the intent of reducing impacts to NSO habitat from logging systems. Landings are generally ¼ acre in size when multiple yarding corridors converge, but can be smaller in size if servicing only one yarding corridor. Often no additional disturbance is created if the landing is located on a road and services one or two corridors (See Chapter 2.4: BMPs and PDFs).

Ground-based yarding systems utilize tracked or wheeled tractors to transport logs from the interior of units to landing areas. Landing areas are generally ¼ acre in size and are located outside of EPZs. The equipment utilized with this system operates on designated skid trails or existing skid trails when possible and are required to be located 150 feet apart. Operations shall generally occur on ground that is less than 35% slope. Ground-based equipment is required to utilize an integral arch which is able to suspend logs on one end. This minimizes soil disturbance and compaction.

Helicopter yarding uses a helicopter to transport logs from the interior of a unit to a landing. Trees are cut and usually limbed within the interior of the unit. A person within the unit attaches a chocker to a group tress which are then lifted and transported to a nearby landing location. Helicopter landings are generally 1 acre in size. Existing landings are used where possible but new landings may be needed. Existing disturbance areas will be utilized when possible. No landings are proposed in EPZs or Riparian Areas.

Description of Activity Fuels Treatments

Trees to be removed for commercial harvest would be whole-tree yarded or yarded with tops attached to minimize activity slash remaining within the harvest units. It is anticipated that the majority of the activity slash would be extracted from each unit by this process and piled at the landing sites. In areas utilizing ground-based logging equipment, processing of tops within skid trails may occur and the resulting slash would be driven over by the ground-based equipment. Merchantable sawlogs would be removed from yarded material, and any remaining debris at the landing sites would be machine and/or hand piled and burned at approved locations, chipped, or

removed for biomass utilization. Machine piling may occur on landings and within units that are adjacent to roads.

Activity slash within ground-based units, that occurs adjacent to roads and on landings, may be machine or hand pile/burned, chipped, lopped and scattered, retained as CWD, or underburned. Activity slash within the remainder of ground-based units may be hand pile/burned, lopped and scattered, retained as CWD, or underburned. Activity slash within cable and helicopter units may be hand pile/burned, chipped, lopped and scattered, retained as CWD, or underburned. All post implementation activity slash treatments are based upon a post-logging assessment of fuel loading.

The purpose of a lop-and-scatter treatment is to break up jackpots of material so that the slash does not increase the fire hazard. The lop portion of "lop-and-scatter" would cut slash so it would not exceed 18 inches in height from the ground and material less than 6 inches in diameter would be cut into pieces so it would not exceed 8 feet in length. Scattering would arrange slash in a discontinuous pattern across the forest floor.

If the amount of slash remaining in units results in excessive quantities of fuel loading which will appear as a lack of open space to scatter the slash, chipping or machine/hand pile and burn may be recommended for treatment. This determination would be made by the Authorized Officer as recommended by the Fuels Specialist.

Description of Riparian Thinning Treatments

Field surveys revealed that RRs within the proposed treatment units are also in need of treatment in order to better achieve ACS objectives. This project is proposing 273 acres of riparian thinning under both Action Alternatives. RR widths are determined based on a typical site potential tree height (200 feet for Upper Cow) in the PA. Based on this site potential tree height, streams are assigned a 200 foot buffer on either side of the channel for the RR. Perennial fish bearing streams are assigned a 400 foot buffer RR. Wetlands, seeps, springs and unstable soils are also considered part of RRs (RMP, p. 26).

The proposed treatments in the RR are based on field surveys and silvicultural review. Proposed treatments are designed to help accelerate the development of LSR conditions (See Chapter 1.3.1). No treatment is proposed in riparian stands meeting LSR/RR objectives, wetland areas, unstable soils, spring or seeps. Stands that exhibit conditions such as overstocking, minimal canopy layers, low species diversity, or low conifer and hardwood vigor were selected for potential treatment.

Within these stands riparian thinning is expected to benefit perennial and intermittent streams, fish habitat, and habitat for other aquatic species by promoting species diversity and resiliency to disturbance in the riparian forest stands. Ecological protection zones (EPZs) or "no-cut buffers" have been applied in all riparian zones to protect aquatic resources. The width of these buffers is based on field work and they are utilized to protect aquatic resources (See the Ecological Protection Zone section below for an explanation of buffer establishment).

Treatments are designed to enhance resiliency and sustainability to obtain ACS objectives. ACS objectives address the physical integrity of the aquatic system, including shorelines, banks, and

bottom configuration of streams. ACS objectives also address sediment and in-stream flow including the timing, volume, rate, input, storage, transport and spatial distribution of peak, high and low flows. Floodplain characteristics and health of wetland and riparian features must be considered for ACS objectives as well as the role and function of CWD in maintaining healthy productive, complex and resilient aquatic and riparian systems. Treatment may help riparian stands better recover from or withstand disturbances by promoting species diversity and forest health. The question of treatment in riparian stands must be considered in terms of both what is to be lost and what is to be gained over the long-term for aquatic resources.

The objective of riparian thinning treatments is to expedite the development of late successional, multi-story habitat conditions (RMP, p. 22) and "restore the species composition and structural diversity of the plant communities" needed to achieve ACS and RR objectives (RMP p. 26); accelerate the development of late-successional stand conditions, such as older forest stand characteristics; increase conifer growth rates; and encourage larger remnant conifers and hardwoods. Activities that are intended to enhance RR characteristics and attain ACS objectives are authorized under the NWFP following the completion of a Watershed Analysis (USFS/BLM 1994, pp. C-31-32). The Upper Cow Creek and Middle Cow Creek Watershed Analyses were used in the analysis of the PA. These documents are available for review on the Medford BLM website at http://www.blm.gov/or/districts/medford/plans/inventas.php.

Ecological Protection Zones

Treatments within the RRs would employ an Ecological Protection Zone (EPZ) or no-treatment buffers to ensure protection of water quality during and after treatments. The following paragraphs describe the application of these protection zones within the RR to maintain ACS objectives such as reducing erosion, promoting wood recruitment and maintaining stream temperatures.

To protect wetland and/or riparian characteristics, wetland areas, unstable soils, springs and seeps, these features would have a minimum 25 foot no treatment buffer.

To protect stream bank stability a minimum 35 foot no treatment buffer would be applied. These buffers are designed to be protective of the root network of typical trees in this area, potential impacts to hydric soils, and avoid sedimentation. One study found that a 95% of the erosion features from timber harvest 32.8 feet from streams delivered no sediment to stream channels (Rashin et.al., 2006). In addition to the stabilizing effect of the root network, adjacent trees also dissipate stream energy during high or overbank flows, further reducing bank erosion (FEMAT 1993). Studies have shown that "vegetation immediately adjacent to the stream channel is most important in maintaining bank integrity" (FEMAT 1993). Where topography is steep or slopes are not very stable, a no treatment buffer of 60 feet will be used for protecting intermittent streams.

Each proposed treatment unit has been visited at least once by field crews looking specifically at the soil and water resources. Field surveys occurred primarily in November 2014 to March 2015. Typical field crews were three people with extensive field experience directed and supervised by a BLM hydrologist and soils specialist. Field verification of information has occurred in most units in the field by a hydrologist and soils specialist from March 2015 up to the present.

All units in this project have been assigned site specific EPZs for streams that may be 35 feet, 60 feet, 85 feet, or 120 feet wide, depending on the characteristics and values of the stream and the riparian stand (see Figure 4: Riparian Reserve Ecological Protection Zone Widths). For example, on perennial non-fish bearing steams an 85 foot buffer was selected to maintain shade and to allow for woody recruitment. For fish bearing perennial streams a 120 foot buffer was selected to ensure wood recruitment.

The specific distance for each EPZ was developed using protection criteria for individual elements of the RR. Within this protection buffer, no timber yarding would occur and only trees in the understory less than 8 inches diameter at breast height (DBH) may be treated. For an initial protection distance determination the Ecological Protection Width Needs chart (USFS/BLM 1994, p. B-15) is used. These factors are: slope and rock type, potential surface erosion of streamside slopes, fluvial erosion of the stream channel, soil productivity, habitat for riparian-dependent species, the ability of streams to transmit damage downstream, and the role of streams in the distribution of large wood to downstream fish bearing waters.

The prescriptions for individual stands are designed to meet the desired objectives based on the existing riparian vegetation and generally tied to upper and lower limits of tree growth, stand density, and modified to account for stand configuration, and species diversity and sufficient canopy cover within the secondary shade zone to maintain or improve microclimate conditions within the riparian zone in the long-term, without any measurable increase in stream temperature in the short or long-term. This buffer exceeds the minimum distance needed to protect the primary shade zone of the stream, (ICS, 2013), and would ensure that temperature is not altered during RR treatments.

The 85 foot EPZ buffer for perennial streams is set for the protection of the primary shade zone, as described in the NWFP Temperature Total Maximum Daily Load (TMDL) Implementation Strategies (USFS/BLM 2012a, Table 4). Based on a study conducted on the Rogue River Siskiyou National Forest in 2006 a no-cut buffer of 60 feet was found to be effective in maintaining the Angular Canopy Density and therefore the effective stream shade (USFS/BLM 2012a). In some cases, a 60 foot buffer was applied to intermittent streams to protect these areas primarily from erosion but also to maintain shading. Research indicates that microclimate gradients are important for maintaining stream temperature and are the strongest near streams and diminish rapidly moving upslope. Near-stream microclimate gradients appear to be topographically controlled. Density management or thinning beyond 15 meters (50 feet) does not measurably affect microclimate (USFS/BLM 2012a).

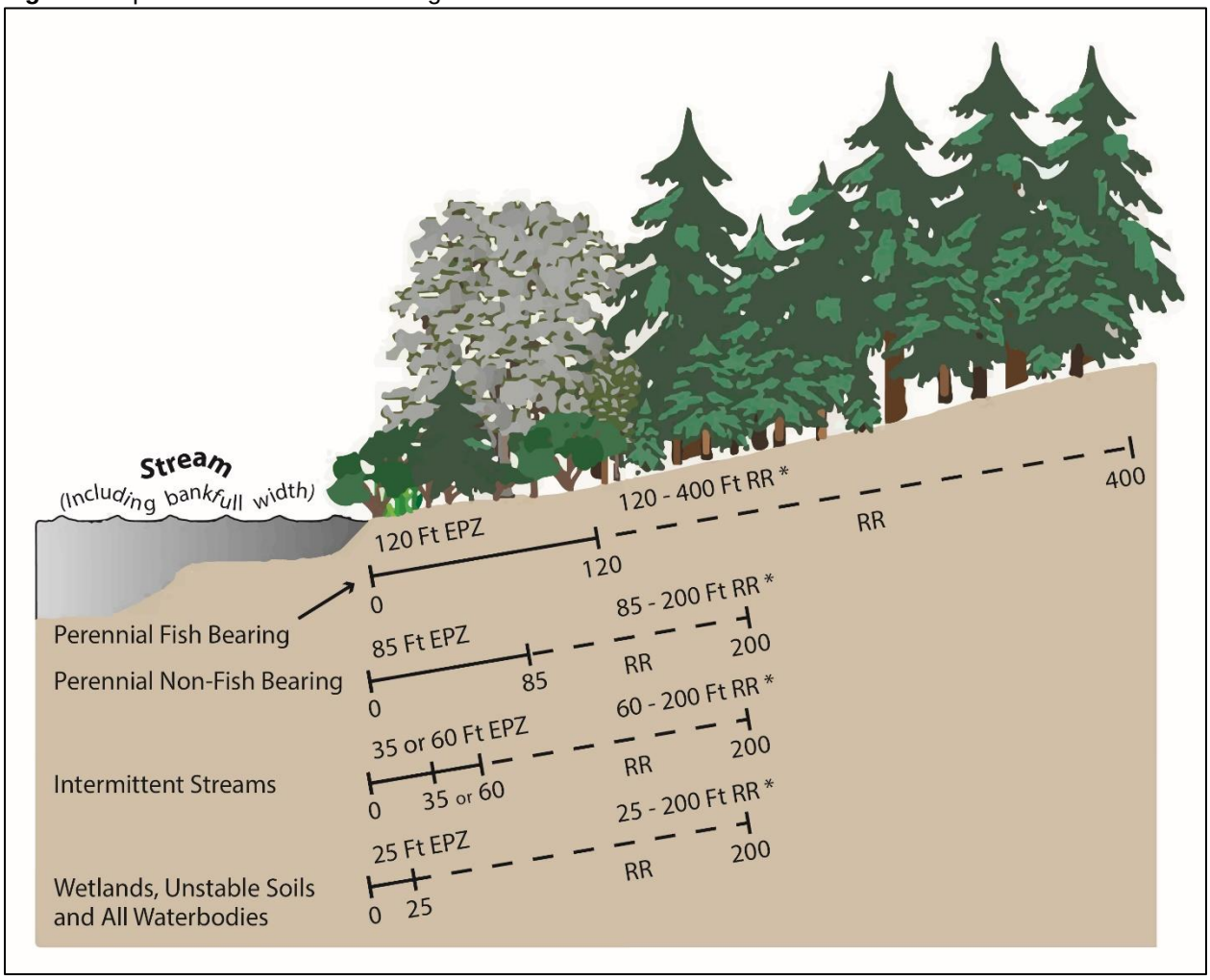
Empirical and modeling studies suggest that stream wood input rates decline with distance from the stream and the majority of in-channel wood recruitment comes from within 120 feet of the stream channel (ICS 2013: Appendix 3: Item I). Density management, or thinning, of riparian stands to benefit the aquatic and riparian environment is therefore tied to attainment of the ACS objectives when used with a no-cut buffer.

Canopy cover in the RR would remain above 40% or 60% depending on the silvicultural prescription, therefore species diversity and forest health would be maintained. Activities in the RR

would be designed to improve habitat conditions for the wildlife and plant species that use this zone in the long-term.

It was determined by the interdisciplinary team (IDT) that treatment of the RRs within some LSR units was not needed at this time because these areas contain trees that are in an older age class and the stands are already on a trajectory to achieve late successional characteristics. Of the 3,264 acres originally considered for treatments in the PA, only 1,373 acres in Alternative 2 and 1,191 acres in Alternative 3 are being analyzed within the EA. Alternative 2 analyzed 159 acres of commercial thinning and 129 acres of non-commercial thinning within the RR. Alternative 3 analyzed 138 acres of commercial thinning and 129 acres of non-commercial thinning within the RR. Below is an illustration of stream buffers distances per stream type.

Figure 4 Riparian Reserve and Ecological Protection Zone Distances



Riparian Reserve thinning may be associated with Density Management, Legacy Tree Culturing, Restoration Thinning, Variable Density Thinning, and Understory Reduction treatments. Measurements are in slope distance.

Road Work

For Alternative 2 proposed road work associated with active forest management includes 0.6 miles of new temporary route construction and 1.60 miles of existing route renovation/reconstruction. Approximately 63.40 miles of road maintenance on existing haul routes would be conducted. All road use would be consistent with existing ROW agreements.

For Alternative 3 proposed road work associated with active forest management includes 0.29 miles of new temporary route construction and 1.42 miles of existing route renovation/reconstruction. Approximately 57.11 miles of road maintenance on existing haul routes would be conducted. All road use would be consistent with existing Right-of-Way agreements.

<u>Description of Road Work Activities</u>

Road Maintenance

Road maintenance restores a road to its original design standard. Typical maintenance may include, but is not limited to: road blading and reshaping; spot rocking & surface replacement; ditch cleaning; cut-bank sluff removal; culvert inlet and outlet clearing; catch basin cleaning; culvert replacement; and removing vegetation along roadsides to improve sight distance for travel.

Temporary Routes

Immediately following the treatment of activities fuels, all temporary routes would be fully decommissioned. Road decommissioning would include blocking routes, subsoiling the road surface to allow for water infiltration, installing water bars, and applying seed and mulch. Water bars filter water runoff and direct drainage off the road surface and away from streams and into vegetation that is adequate to slow surface water and allow for the deposition of detached soil particles. Mulching helps minimize surface erosion and seeding aids in re-establishing vegetation.

- New Temporary Route Construction – (Alternative 2: approximately 0.60 miles of new temporary route construction may occur. Alternative 3: approximately 0.29 miles of new temporary route construction may occur.) This action includes short-term overland routes authorized for the development, construction, or staging of a project that has a finite lifespan. Temporary routes are not intended to be part of the permanent or designated transportation network system.

- Existing Temporary Route Renovation/Reconstruction – (Alternative 2: approximately 1.60 miles of existing renovation/reconstruction may occur. Alternative 3: approximately 1.42 miles of existing renovation/reconstruction may occur.) Renovation restores an existing unmaintained route to its original or modified design standard. Reconstruction restores a badly damaged or deteriorated route to a useable condition and design standard. Activities may include realignment, slide and slope failure repair, structure upgrades, and removal of existing stumps from the subgrade. Renovated/reconstructed routes would be decommissioned after use, which may include subsoiling, installing water bars (where needed), applying seed and mulch, and blocking routes.

- Tractor Swing Route – These routes provide temporary access to the interior of units for yarders and log skidders. These routes are not capable of accommodating log trucks. Tractor swing routes would be decommissioned after use, which would include subsoiling, installing water bars (where needed), applying seed and mulch, and blocking routes.

2.3 Action Alternative 3

Alternative 3 was developed in response to the guidance described in the South Umpqua LSRA. Alternative 3 would strictly adhere to the guidance in the LSRA and would only treat stands that are 80 years of age and younger and would not cut trees greater than 20 inches DBH. Road work and PDFs/Best Management Practices (BMPs) are the same within Alternative 2 and Alternative 3 – with the exception that Alternative 3 would not allow for wet season ground-based operations. The Legacy Tree silvicultural prescription described on page 13 may be implemented but the treatments intended purpose would be limited with a 20 inch diameter cap. All units proposed for treatment under this alternative, regardless of the age of the stand, will have the Understory Reduction prescription applied. Alternative 3 still meets the purpose and need of the project but some treatments may have limited effectiveness. PDFs and BMPs identified by the interdisciplinary team to avoid or reduce potential resource effects of Alternative 2 and Alternative 3 are identified in the EA, Chapter 2.2 and 2.3.

Below is a description of the differences between Action Alternatives 2 and 3.

Table 2.3-1 Action Alternatives 2 and 3 Comparison

Element	Alternative 2	Alternative 3
Ground Based Operations	With the proper waivers, ground based harvesting may be permitted in the wet season during dry conditions (See Section 2.4 BMPs and PDFs for a description).	No ground based harvesting in the wet season during dry conditions – October 15th through April 15th.
Hauling	With the proper waivers and the implementation of applicable BMPs and PDFs, hauling may be permitted in all seasons.	Hauling during the wet season during dry conditions and ONLY on roads with All Weather Surfacing (See Roads Table, Appendix H).
Treatment in units that are greater than 80 years old	Treatments may occur in units greater than 80 years of age (with Regional Ecosystem Office approval).	No treatments in units greater than 80 years of age.
Cutting trees greater than 20 inches in diameter at breast height (DBH)	Cutting and harvesting of trees greater than 20 inches in DBH (with Regional Ecosystem Office approval).	No cutting of trees greater than 20 inches DBH for silvicultural purposes. Trees greater than 20 inches DBH may be cut to accommodate logging systems but would remain on site.
Silvicultural prescription differences	80+ year stands may include over-story silvicultural prescription (example: Legacy Tree Culturing and Understory Reduction)	80+ year stands, silvicultural prescriptions will be altered to include only Understory Reduction (example: Legacy Tree Culturing and Understory Reduction will be altered to include only Understory Reduction Treatments)

Element	Alternative 2	Alternative 3
Differences between BMPs and PDFs	Proposal will utilize all BMPs/PDFs	Only PDF not included: wet season ground based harvesting and hauling would be limited to the dry season or all-weather roads (See Chapter 2.4 BMPs and PDFs for a description).

2.4 Best Management Practices and Project Design Features

Best Management Practices (BMPs)

BMPs are methods, measures or practices incorporated into the project to meet the requirements of the Clean Water Act (CWA) of 1972 as amended, to reduce nonpoint source pollution to the maximum extent practicable. A BMP is a practice or combination of practices that are effective and practicable in preventing or reducing the amount of pollution generated by diffuse sources to a level compatible with water quality goals (40 CFR 130.2 (m)). BMPs reduce sediment delivery from BLM roads and are incorporated into the 1995 RMP through an RMP plan maintenance action in July of 2012. The purpose of applying project BMPs is to minimize or prevent sediment delivery to the waters of the United States.

The Action Alternatives assume the proper application of BMPs for logging roads to protect soil and water resources. Proper application of these BMPs constitute BLM's compliance with the CWA of 1972, as amended to reduce nonpoint source pollution, state of Oregon water quality legislation (chapter 340), and the O&C Act which sets land ownership boundaries for the Revested Oregon and California Railroad and Reconveyed Coos Bay Wagon Road grant lands.

The strategy for managing and controlling nonpoint source water pollution from BLM-managed lands in the State of Oregon is outlined in the 2001 Memorandum of Understanding (MOU) between the State of Oregon DEQ and BLM. BMPs are the primary methods for achieving Oregon's water quality standards for non-point pollution sources, such as those that may occur on public lands. Oregon's MOU for water quality standards, including numeric standards, are designed to protect designated beneficial uses (such as salmonid spawning and rearing, resident fish and aquatic life, domestic water supplies, and water-contact recreation). The MOU specifies that the BLM would implement site-specific BMPs as specified in Management Objectives, standards, guidelines, design features, and mitigation developed in either: RMPs, RMP amendments, project level plans, and Water Quality Restoration Plans (WQRP) to meet applicable water quality standards.

BMPs are methods, measures, or practices shown to be an effective and practical means of preventing or reducing nonpoint source pollution (BLM 2011c). Although normally preventative, BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters (40 CFR 130.2, EPA Water Quality Standards Regulation).

The BMPs selected from the amended Medford RMP list demonstrate which are relevant to this project, may have already been included in project planning, in some cases have been modified to

only include actions described in the proposed alternatives, and would be implemented in this project level plan and resulting Decision Record.

1. Locate temporary roads and landings on stable locations, e.g., ridge tops, stable benches or flats, and gentle-to-moderate side slopes. Minimize construction on steep slopes, slide areas and high landslide hazard locations. [R001 modified, no new permanent roads are proposed]

2. Locate temporary road construction and permanent road improvement to minimize the number of stream crossings. [R002 modified, no new permanent roads or stream crossings are proposed]

3. Avoid locating landings in areas that can contribute to dry draws and swales. [R003 modified, no landings are proposed in wetlands, riparian management areas, floodplains and waters of the state]

4. Locate roads and landings to minimize total transportation system mileage. Renovate or improve existing roads or landings when it would cause less adverse environmental impact. Where roads traverse land in another ownership, investigate options for using those roads before constructing new roads. [R004, only temporary roads are proposed, roads and landings have been minimized and located in existing disturbance when possible]

5. Minimize fill volumes at permanent and temporary stream crossings by restricting width and height of fill to amounts needed for safe travel and adequate cover for culverts [R012 modified, culverts may be used for temporary roads]

6. On new construction, install culverts at the natural stream grade. [R014, culverts may be used for temporary roads]

7. When installing temporary culverts, use washed rock as a backfill material. Use geotextile fabric as necessary where washed rock will spread with traffic and cannot be practicably retrieved. [R018, if temporary culverts are needed for temporary roads]

8. Design roads crossing low-lying areas so that water does not pond on the upslope side of the road. Provide cross drains at short intervals to ensure free drainage. [R020, may be part of road improvements]

9. Install underdrain structures when roads cross or expose springs, seeps, or wet areas rather than allowing intercepted water to flow downgradient in ditchlines. [R022, may be part of road improvements]

10. Effectively drain the road surface by using crowning, insloping or outsloping, grade reversals (rolling dips) and waterbars or a combination of these methods. Avoid concentrated discharge onto fill slopes unless the fill slopes are stable and erosion proofed. [R023, may be part of road improvements]

11. Construct variable road grades and alignments (e.g., roll the grade, grade breaks) which limit water concentration, velocity, flow distance and associated stream power. [R027, should be incorporated in temporary road construction and road improvements]

12. Divert road and landing runoff water away from headwalls, slide areas, high landslide hazard locations or steep erodible fill slopes. Design landings to disperse surface water to vegetated stable areas. Design stream crossings to prevent diversion of water from streams into downgrade road ditches or down road surfaces. [R028-30, should be incorporated in temporary road construction, landing construction and road improvements]

13. Skew cross drain culverts 45 to 60 degrees from the ditchline as referenced in BLM Road Design Handbook 9113-1 and provide pipe gradient slightly greater than ditch gradient to reduce erosion at cross drain inlet. [R039, may be part of road improvements]

14. Clean ditch lines to provide for unobstructed flow at culvert inlets and within ditch lines during and upon completion of road construction prior to the wet season. [R044 modified, part of road maintenance]

15. Locate equipment washing sites in areas with no potential for runoff into wetlands, riparian management areas, floodplains and waters of the state. Do not use solvents or detergents to clean equipment on site. [R053]

16. During roadside brushing remove vegetation by cutting rather than uprooting. [R060, part of road maintenance]

17. Limit road and landing construction, reconstruction, or renovation activities to the dry season or dry conditions in the wet season. Keep erosion control measures concurrent with ground disturbance to allow immediate stormproofing. [R061, modified to include dry conditions in the wet season]

18. Apply water or approved road surface stabilizers/dust control additives during timber hauling when there is a visible dust trail behind vehicles to reduce surfacing material loss and buildup of fine sediment that can enter into wetlands, floodplains and waters of the state. Prevent entry of road surface stabilizers/dust control additives into waters of the state during application. [R070 modified, to be applied during hauling when necessary]

19. Prior to the wet season, provide effective road surface drainage through practices such as machine cleaning of ditches, surface blading including berm removal, cleaning inlets and outlets. [R071 modified, for all roads identified for maintenance]

20. Remove and dispose of slide material when it is obstructing road surface and ditchline drainage. Place material on stable ground outside of wetlands, riparian management areas, floodplains and waters of the state. [R073, for all roads identified for maintenance]

21. Do not sidecast loose ditch or surface material where it can enter wetlands, riparian management areas, floodplains and waters of the state. [R074, for all roads identified for maintenance]

22. Blade and shape roads to conserve existing aggregate surface material retain or restore the original cross section, remove berms and other irregularities that impede effective runoff or cause erosion, and ensure that surface runoff is directed into vegetated, stable areas. [R077, for all roads identified for maintenance]

23. Stormproof temporary roads to reduce road erosion and reduce the risk of washouts by concentrated water flows immediately after use. [R080 modified, for temporary roads]

24. Fully decommission or obliterate temporary roads upon completion of use. [R083]

25. Prevent use of vehicular traffic using existing gates to reduce or eliminate erosion and sedimentation due to traffic on roads. [R085 modified, for current gates on access roads]

26. Convert existing drainage structures such as ditches and cross drain culverts to a long-term maintenance free drainage configuration such as outsloped road surface and waterbars for roads that are administratively closed or decommissioned. [R086 modified]

27. Implement decompaction measures, including ripping or subsoiling to an effective depth. Treat compacted areas including the roadbed, landings, construction areas, and spoils sites. [R092]

28. On active haul roads, during the wet season, use durable rock surfacing and sufficient surface depth to resist rutting or development of sediment on road surfaces that drain directly to wetlands, floodplains and waters of the state. [R094]

29. Suspend commercial use where the road surface is deeply rutted or covered by a layer of mud or when runoff from the road surface is causing a visible increase in stream turbidity in the receiving stream. [R096]

30. Remove snow on haul roads in a manner that will protect roads and adjacent resources. Retain a minimum layer (2-4 inches) of compacted snow on the road surface. Provide drainage through the snow bank at periodic intervals to allow for snow melt to drain off the road surface. [R097]

31. Maintain road surface by applying appropriate gradation of aggregate and suitable particle hardness to protect road surfaces from rutting and erosion under active haul where runoff drains to wetlands, riparian management areas, floodplains and waters of the state. [R099]

The incorporation of BMPs happens during project planning as the Action Alternatives are developed, BMPs are refined through the planning process, included as stipulations in the timber project, and are guidance when actions occur on public land.

Project Design Features (PDFs)
PDFs are measures incorporated into the site specific design of the project to eliminate or minimize adverse impacts to the human environment.

Soil Productivity and Compaction
Productivity loss resulting from topsoil disturbance and soil compaction would generally not exceed a combined calculated total of 12% as described within the 1995 Medford RMP. The following measures address standard operating procedures that would generally keep productivity loss below 5% per unit. Other methods that would achieve the same or higher levels of soil protection may be utilized in place of these standard operating procedures as long as all other PDFs and BMPs for all resources are still met. To ensure resource protection additional procedures may be approved by the Authorized Officer.

Harvest Operations

- The purchaser shall not locate new landings in areas that contribute eroded fines to streams, wet areas, dry draws and swales. If these landing locations cannot be avoided, ensure that properly installed sediment control measures are placed and maintained, as needed, to keep eroded material onsite.

- Existing skid roads shall be used when possible. New skid roads shall be placed at least 150 feet apart where topography will allow. New skid roads will be located on ground generally less than 35% slope. Rehabilitate all utilized skid roads that are within 200 feet of streams.

- No yarding or loading is permitted in or through the streams, seeps, wetlands, or EPZs.

- Ground-based yarding and harvesting would generally be limited to slopes of less than 35%.

- No mechanical ground based harvesting, ground based yarding, skid trail and landing rehabilitation, machine piling, road and temporary route construction, road and temporary route reconstruction, temporary route decommissioning, or non-emergency road maintenance shall be conducted between October 15 of one calendar year and May 15 of the following calendar year both days inclusive. Purchaser may request in writing, a conditional waiver of this restriction. Waivers during the wet season will be granted after a soil moisture test is performed by comparing the wet and dry weight (gravimetric method) of a representative sample in the unit or units for the requested waiver.

- If soil moisture conditions are dry between October 15th and May 15th, a waiver may be granted for ground based harvesting, ground based yarding, skid trail and landing rehabilitation, machine piling, road and temporary route construction, road and temporary route reconstruction, temporary route decommissioning, or non-emergency road maintenance during the wet season. The waiver would be approved until the first dry season ending event, which is a precipitation event that saturates the soil profile down to 4-6 inches. Waivers would be revoked if conditions exist that the soil surface is easily displaced or if ribboning and rutting cannot be avoided with ground based operation. If impacts to soils are not acceptable during

the operations listed above, as determined by the Authorized Officer, the waiver would be revoked.

- Ground-based logging would not occur when soil moisture at a depth of 4-6 inches is wet enough to maintain form when compressed, or when soil at the surface would readily displace, causing ribbons and ruts along equipment tracks. These conditions are generally found when soil moisture at a depth of 4-10 inches is between 15-25%, depending on soil type.
- Tractors would be equipped with an integral arch to minimize soils disturbance and compaction.
- Skid trails including turning points would be 12 feet wide on average unless the Purchaser proposes an alternative harvest plan that limits soil compaction to 12% and soil productivity loss to 5%.
- To minimize soil disturbance and to keep soil organics on site, the use of blades while tractor yarding would not occur. Equipment would walk over as much ground litter as possible to reduce compaction.
- Harvest equipment used off of designated skid trails would operate on ground generally less than 35% slope, have an arm capable of reaching at least 20 feet and minimize turning. When practical, the harvest equipment must walk on a mat of existing or created slash. To prevent operations from exceeding the maximum 5% soil productivity loss or 12% compaction levels across the harvest unit, equipment use may be restricted depending on soil type, soil moisture, ground pressure of the equipment, and presence of slash to operate on.
- Whole tree yarding with tops attached to the last log would be permitted as long as the contractor can operate without causing bark slippage, girdling, broken tops, or damage to live crowns. If it is determined by the Authorized Officer that unacceptable amounts of damage is occurring, tree bucking and limbing would be required as directed by the Authorized Officer. Delivered log length would not exceed 41 feet.
- Lateral yarding would be required on all units to protect residual leave trees and existing conifer regeneration. Yarding carriages would be required to maintain a fixed position during lateral yarding to reduce damage to the residual stand.
- The number of cable yarding corridors would be minimized to reduce soil compaction and displacement. Cable yarding corridors would be located approximately 150 feet apart at the tail end.
- At a minimum, partial suspension would be required on all units to minimize soil disturbance.
- Any trees that are not designated for harvest and must be cut to accommodate harvest operations (logging system, safety, guy-line trees, etc.) outside of designated harvest areas and

on BLM managed lands would remain on the site as coarse woody material unless they need to be removed for safety reasons. This is not applicable to units 35-15, 1-1, and 31-3.

- Any trees less than 20 inches DBH that are marked for retention but need to be cut to accommodate harvest operations (logging system, safety, guy-line trees, any temporary route, etc.) within designated harvest areas must be swapped for a comparable (or larger) tree that was not previously designated for retention. In order to retain canopy cover and basal area targets.

- Any marked retention tree greater than or equal to 20 inches DBH cut to facilitate cable/tractor yarding corridors and temporary route construction or renovation/reconstruction will remain on site as coarse woody debris.

- Cable and ground based landings size shall not exceed 1/4 acre; helicopter landings shall not exceed 1 acre and all landings shall be located along existing roads, temporary routes, and/or cable-tractor swing routes or within unit boundaries where possible; and shall be approved by the Authorized Officer. Short purchaser spurs into units may be necessary to achieve one-end log suspension. Landings would be designed with adequate drainage so that they are not hydrologically connected to the ditchline of roads.

- All new landing areas outside of the road prism and existing rock quarries would be rehabilitated to reduce soil compaction, minimize sedimentation, and improve site productivity.

- The Purchaser shall, prior to October 15 of the same operating season, winterize temporary routes, landings, hydrologically connected corridors/skid trails and other areas of exposed soils that are not already reclaimed or decommissioned. Winterization would be done by properly installing and/or using water bars, berms, sediment basins, gravel pads, hay bales, straw waddles, small dense woody debris, seeding and/or mulching, to reduce sediment runoff and divert runoff water away from stream channels, headwalls, slide areas, high landslide hazard locations or steep erodible fill slopes as directed by the Authorized Officer.

- Usage of Douglas County recreation areas for operation, parking or staging of equipment would be avoided.

Activity Fuels and Prescribed Fire

- Landing piles and hand piles located on temporary routes, skid trails, or landings would be burned, chipped, or otherwise removed from these sites typically within 18 months of unit harvest completion.

- Merchantable sawlogs would be removed from yarded material, and any remaining debris at the landing sites would be piled and burned on the immediate downhill side of existing roads, chipped, or removed for biomass utilization.

- Activity slash remaining in units not needed to meet coarse woody debris requirements would be lopped-and-scattered, chipped, or hand piled and burned to prevent an increase in fire hazard.

- Firelines would be constructed by hand. No mechanical piling would occur within the interior of the units, mechanical piling may occur on landings and adjacent to roads.

- A minimum 20 feet distance on the ground would be cleared of activity slash around each landing pile to prevent escaped fire. Each landing pile would be covered with a large enough piece of 4 millimeter black plastic to ensure a dry ignition spot (generally 10 feet by 10 feet or large enough to cover 80% of the pile).

- Landing piles would not be placed adjacent to or within 15 feet of leave trees to minimize potential scorch and mortality. Landing piles would be as free of dirt as reasonably possible to facilitate desired consumption.

- Slash piles would not be allowed on roadways, turnouts, shoulders, or on the cut bank, unless approved by the Authorized Officer.

- Piles would be burned in the fall to spring season after one or more inches of precipitation has occurred. Patrol and mop-up of burning piles would occur when needed to prevent treated areas from re-burning or becoming an escaped fire.

- Hand piles would be covered with 4 millimeter black plastic large enough to ensure a dry ignition spot (generally 5 feet by 5 feet or large enough to cover 80% of the pile).Snags identified for retention (approximately 20 inches in diameter) would have all slash and duff cleared around the base prior to broadcast or underburning.

<u>Riparian Zones</u>

Harvest Operations

- A minimum of a 35 foot no-touch buffer (EPZ) would be used to protect intermittent streams to protect stream bank stability. Units are specified in Chapter 3.6: Hydrology. Unless unsafe, trees within RR boundaries (one or two site potential trees) would be directionally felled away from the stream. Upslope trees would not be felled into RRs.

- A minimum 85 foot no-treatment buffer (EPZ) from bankfull width on perennial streams would be used to protect stream bank stability and shading to maintain water temperature and reduce sedimentation. Units are specified in Chapter 3.6: Hydrology.

- A minimum 120 foot no-treatment buffer (EPZ) from bankfull width on perennial streams with the potential to support fish would be used to protect stream bank stability, shading, and course woody debris to maintain water temperature, habitat characteristics and reduce sedimentation. Units are specified in Chapter 3.6: Hydrology.

- In all units, a minimum 25 foot no-treatment buffer (EPZ) on wetland features, springs, seeps and unstable soils would be used to protect wetland function and soil stability.

- Trees in no-harvest (EPZs) portions of RRs accidentally knocked over during falling and yarding would be retained on site for fish/wildlife habitat.

- Directional falling to lead and away from streams, unit boundaries, and resource buffers would be required.

- No yarding or loading would be permitted in or through the streams, seeps, wetlands, or resource buffers.

- Upon completion of harvest, all existing skid trails utilized during harvest activities that are within RRs and hydrologically connected would be scarified, seeded, water-barred, mulched, and blocked (Units 5-4, 9-1, 9-26, 17-1C, 21-12, and 27-12).

- Any project-related activities would be suspended if conditions develop that cause a potential for sediment laden runoff to enter a wetland, floodplain or waters of the state. Sediment trapping devices would be properly installed to hydrologically disconnect sites. Operations resume when sediment control devices are in place and conditions allow turbidity standards to be met.

- All rehabilitation and decommissioning of roads shall occur within 18 months following completion of harvest, during the dry season, and after pile burning is complete.

Activity Fuels and Prescribed Fire

- Underburning operations would be allowed to back into EPZs and riparian no-treatment areas; however, no hand pile ignition would occur in riparian no-treatment areas.

- Hand pile burning operations within the EPZ would not occur concurrently with the implementation of adjacent upslope cable and ground-based yarding activities. Underburning would occur 1 season after hand pile burning operations to ensure that ground vegetation capable of trapping erosion from yarding activities is onsite.

Road Use and Maintenance

- No haul on natural surface and rocked roads that do not have an all-weather surface (i.e. are rocked or aggregate roads with good drainage features) shall be conducted on the Contract Area between October 15 of one calendar year and May 15 of the following calendar year, both days inclusive. The Purchaser may request in writing, a conditional waiver of this restriction. If the Authorized Officer determines that hauling would not result in road damage or the transport of sediment to nearby stream channels based on soil moisture conditions or rain events, the Contracting Officer may approve a conditional waiver for hauling. If soil moisture conditions or rain events are anticipated to cause impacts to roads or stream water quality resulting from said conditional waiver are not acceptable as determined by the Authorized Officer, the waiver will be revoked.

- All temporary routes would be decommissioned within 18 months after landing and hand pile burning is complete.

- Material excavated to build temporary routes would be placed in a stable site where it cannot enter streams or water bodies.

- Temporary new and reconstructed routes would be decommissioned upon completion of logging and activity fuel activities. The Purchaser shall scarify temporary roads in strips of not less than 24 inches or more than 28 inches in width to a minimum depth of 12 inches, provided that no scarification shall be required where the road traverses rock outcroppings. All natural water courses shall be opened to prevent erosion of the roadways. Inside ditches would be removed and road surface would be sloped appropriately. All culverts would be removed and rolling dips would be installed in their place. The road would be blocked at the entrance with rocks, timber and/or earthen barrier as specified by the BLM.

- Natural surface and rocked haul routes and related ditchlines that could deliver sediment into fish habitat would have barriers (e.g., hay bales, silt fence, settling ponds) installed to prevent sediment from reaching these streams. Sediment barriers would be placed by the purchaser according to specifications and locations outlined by the BLM fish biologist, engineer, and contract administrator. These barriers would be maintained and monitored (in accordance with the Oregon DEQ Erosion and Sediment Control Manual, 2005) by the purchaser and contract administrator during haul route usage. Specifically these sediment barriers would be applied to BLM roads (32-4-6.0 and 31-4-31.0 roads where they cross the West and East Fork of Russell Creek, respectively).

- To caution forest road users of potential hauling and operational activities, warning signs will be placed where appropriate to satisfy Oregon Occupational Safety and Health Administration (OSHA) standards. The proper use and maintenance of the signs will be monitored using Oregon OSHA regulations.

- During roadside brushing, vegetation would be removed by cutting. If uprooting is necessary to remove undesirable species from the ditchline or roadsides within 100 feet of stream crossings, sediment control devices would be installed and properly maintained until the site re-stabilizes.

<u>Fragile Soils</u>

- Dry condition harvesting and hauling, along with placing slash (not to exceed 18 inches) over yarding corridors and skid trails prior to use, is required in units 30-2, 11-1 and 1-2.

- Dry season harvesting and hauling, along with placing slash (not to exceed 18 inches) on all cable and tractor skid trails within all units in Section 19 is required.

<u>Spill Prevention and Control</u>

- Contractors must prepare a Spill Prevention, Control, and Countermeasure Plan for all hazardous substances to be used in the contract area, as directed by the Authorized Officer. Such a plan would include identification of the Purchaser's representatives responsible for supervising initial containment action for releases and subsequent cleanup.

- Such plans must comply with the State of Oregon DEQ OAR 340-142, Oil and Hazardous Materials Emergency Response Requirements.

- The Purchaser shall not refuel equipment, store, or cause to have stored, any fuel or other petroleum products within 150 feet of all riparian management or wet areas. All petroleum products shall be stored in durable containers and located so that any accidental releases will be contained and not drain into any stream system. Hydraulic fluid and fuel lines on heavy mechanized equipment would be in proper working condition in order to minimize potential for leakage into streams. Absorbent materials shall be onsite to allow for immediate containment of any accidental spills. Spilled fuel and oil shall be cleaned up and disposed of at an approved disposal site.

- Fire suppression foam would not be used within 150 feet of streams or wetlands.

<u>Special Status and Survey and Manage Plant Species</u>
Federally-designated Threatened and Endangered Species (T&E): The PA is outside the range and habitat of Medford District's four T&E species. The following PDFs are for Survey and Manage/Bureau Special Status Species.

Harvest Operations

- No tree or vegetation removal would occur within botanical buffers (5-200 feet in diameter, depending on the species) by heavy equipment, skidders, yarders, etc. No tree falling or yarding would occur in buffered sites. For safety reasons trees may be felled but must remain on site.

- Anchor trees would not be located within known sites. This includes anchor trees on federal land requested by private landowners.

- Generally, construction of new landings would be at least 200 feet from known sites. Use of an existing landing could occur if the location of the plant(s) is more than 100 feet away. On landings, the closest edge of a slash pile to a plant site must be 100 feet from the plant site.

- Proposed logging road locations, including temporary routes, would be surveyed and populations would be protected by a 5-200 foot buffer. Use of existing roads within 50 feet of a plant could occur.

Activity Fuels and Prescribed Fire

- Buffer sizes for activity fuels treatment would be a minimum of 5-200 feet from the occurrence boundary.

- Manual slashing (chainsaws) and brushing through buffered sites could occur during the dormancy period (July through January). No mechanical equipment would be used or placed in buffers.

- Cut material would be piled outside of buffers. Piles for burning would be placed 25 feet outside of buffers.

- Mechanical thinning/brushing (e.g. tracked vehicles) would occur 50 feet from buffers and no vehicles or heavy equipment would occur within buffers. Hand treatment could occur within buffers, as previously described.

- Activity slash may be lopped within botanical buffers but scattering of lopped material shall occur outside of the buffer, shall not exceed 18 inches in depth, and shall be scattered in a discontinuous pattern.

- Bureau Sensitive and Survey and Manage (S&M) botanical species would be protected by the no treatment buffers as described in Table 33. The minimum buffer size is determined by habitat requirements and existing habitat conditions on a case-by-case basis.

- Trees would be directionally felled away from all no disturbance buffers.

- Prescribed burns would generally occur during cool, moist weather conditions in units that contain Special Status Species (See Table 33 for specific units).

<u>Noxious Weeds</u>

All Project Actions

- Seed and straw used for restoration, replanting of bare soil, and post treatment throughout the PA would be native and certified weed free to prevent the further spread of noxious weeds.

Harvest Operations

- To prevent the potential spread of noxious weeds into the Medford District BLM, the operator would be required to clean all logging, construction, chipping, grinding, shredding, rock crushing, and transportation equipment prior to entry on BLM lands. Cleaning shall be defined as removal of dirt, grease, plant parts, and material that may carry noxious weed seeds into BLM lands. Cleaning prior to entry onto BLM lands may be accomplished by using a pressure hose.

- Only equipment inspected by the BLM would be allowed to operate within BLM lands. All subsequent move-ins of equipment as described above shall be treated the same as the initial move-in.

- Prior to initial move-in of any equipment, and all subsequent move-ins, the operator would make the equipment available for BLM inspection at an agreed upon location off federal lands.

<u>Wildlife</u>

All Project Actions

- All existing snags would be retained from cutting unless they pose a safety hazard, in which case they would be left on the ground as coarse woody debris (CWD) in the unit.

- CWD would be retained and protected from disturbance to the greatest extent possible during logging, burning and other project activities.

Northern Spotted Owl (Threatened)

The Project Design Features listed below would be applied and incorporated into the design of the Upper Cow LSR Project.

- Any of the following measures may be waived in a particular year if nesting or reproductive success surveys conducted according to the USFWS survey guidelines reveal that NSOs are non-nesting or that no young are present that year. Waivers are valid only until March 1 of the following year. Previously known well established sites/activity centers are assumed occupied unless protocol surveys indicate otherwise.

All Project Actions

- Activities (such as tree felling, yarding, temporary route construction and re-construction, hauling on roads not generally used by the public, prescribed fire, and muffled blasting) that produce loud noises above ambient levels would not occur within specified distances (Table 2-5) of any documented or projected owl site between March 1 and June 30 (or until two weeks after the fledging period) – unless protocol surveys have determined the activity center to be not occupied, non-nesting, or failed in their nesting attempt. The distances may be shortened if significant topographical breaks or blast blankets (or other devices) muffle sound traveling between the work location and nest sites.

- The action agency has the option to extend the restricted season until September 30 during the year of harvest, based on site-specific knowledge (such as a late or recycle nesting attempt) if the project would cause a nesting NSO to flush (See Table 2-5 for disturbance distance).

- The buffer distance to the prescribed area may be modified by the action agency biologist using topographic features or other site-specific information. Buffer distance for prescribed fire may be reduced if substantial smoke from prescribed fire would not enter the nest stand March 1 - June 30. The restricted area is calculated as a radius from the assumed nest site (point).

Table 2.4-1 Disturbance Distances from Various Activities for Spotted Owls

Activity	Buffer Distance around Owl Sites
Heavy Equipment (including non-blasting quarry operations)	105 feet
Chain saws	195 feet
Commercial Timber Harvest	0.25 miles
Prescribed fire/Activity fuels burning	0.25 miles

Bald Eagle

- Work activities that cause disturbance above ambient noise levels (hauling, chainsaws, helicopters) would not take place within ¼ mile (1/2 mile line-of-site) from an active bald eagle nest between January 1 and August 31. This applies to unit 33-4.

- The following measures could be waived in a particular year if surveys indicate the site is unoccupied or nesting attempts failed or until 2 weeks after the young have fledged. Waivers would only be valid until January 1 of the following year.

Raptors

- Protect any raptor nests or centers of activity as necessary to maintain the integrity of the site. Activities that produce noise above ambient levels that may disturb or interfere with nesting would be prohibited within one-quarter mile of active nesting areas between approximately March 1 and July 15.

All Project Actions

- Activities that produce noise above ambient levels would not take place within ¼ mile of active nests/roosts where there is no line-of-sight or within ½ mile where there is line-of-sight between February 1 and August 15.

Air Quality / Smoke Management

Activity Fuels and Prescribed Fire

- Local residents would be advised of prescribed burning through news releases.

- Prescribed fire burn plans would be completed and smoke clearance obtained prior to ignition.

- Prescribed burning would occur under atmospheric conditions that allow for the mixing of air to lessen the impact on air quality. All prescribed burning would be managed in a manner consistent with the requirements of the Oregon Smoke Management Plan administered by the Oregon Department of Forestry (ODF) and the regulations established by the Air Quality Division of the Oregon DEQ.

- Burning of slash piles would occur after a sufficient period of curing (generally over a year) and adequate seasonal moisture to ensure desired consumption of material and to minimize risk of fire escape. Smoke clearance(s) would be obtained prior to ignition to minimize impacts on air quality.

Cultural Sites

All Project Actions

- Analysis was completed to increase our understanding of land use patterns over time and to identify the nature and extent of cultural and paleontological resources within the PA. The scope of analysis included archival research, intensive field inventory, and assessment of potential effects to historic properties from project activities. PDFs were developed for eligible properties, where applicable, to ensure that no adverse effects would occur as a result of the undertaking.

- If during project implementation, previously unidentified cultural or paleontological resources are encountered, activities will cease immediately, and the staff archaeologist will be contacted. Any additional evaluation that may be required, as well as development of appropriate project

redesign to ensure that adverse effects to historic properties do no occur, would be completed in consultation with federally-recognized Tribes and the State Historic Preservation Office.

Off-Highway Vehicles

Harvest Operations

- If unauthorized off-highway vehicle (OHV) use is identified in areas utilizing skid trails for forest product removal, vegetation would be pulled back over skid trails and the skid trail blocked upon project completion to minimize OHV use of the area.

Activity Fuels and Prescribed Fire

- If OHV use of firelines is identified during project implementation, vegetation would be pulled back over a minimum of the first 100 feet from roads (depending upon terrain) upon completion of prescribed burning.

- To minimize use of existing unauthorized OHV routes within harvest units, burn piles, slash, and debris would be placed on these routes where practicable.

- To minimize the use of existing unauthorized OHV routes, burn piles, slash, and debris would be placed on these routes, where practicable.

Chapter 3 Affected Environment and Environmental Effects

In accordance with law, regulation, executive order, policy and direction, an interdisciplinary team reviewed the elements of the human environment to determine if they would be affected by the Alternatives described in Chapter 2.0. Those elements of the human environment that were determined not to be affected are disclosed in the Environmental Elements Table in Appendix E.

Affected Environment

The Affected Environment portion of this chapter describes the current conditions in the Upper Cow LSR Project PA. The relevant resources that could potentially be impacted are: vegetation resources, noxious weeds/sensitive plants, fire hazard, wildlife, soil resources, hydrology, fisheries and cultural resources.

Environmental Effects

The Environmental Effects portion of this chapter provides the analytical basis for the comparisons of the Alternatives (40 CFR § 1502.16) and the reasonably foreseeable environmental consequences to the human environment that each Alternative considered in detail. This analysis considers the direct impacts (effects caused by the action and occurring at the same place and time), indirect impacts (effects caused by the action but occurring later in time and farther removed in distance but are reasonably foreseeable) and cumulative impacts (effects caused by the action when added to other past, present and reasonably foreseeable future actions on all land ownerships). The temporal and spatial scales used in this analysis may vary depending on the resource being affected.

Cumulative Effects

CEQ guidance issued on June 24, 2005, points out that the "Environmental Analysis required under NEPA is forward-looking." Review of past actions is required only "to the extent that this review informs agency decision-making regarding the Proposed Action." A description of current conditions includes the effects of past actions and serves as a more accurate and useful starting point for a Cumulative Effects analysis than by "adding up" the effects of individual past actions. "Generally, agencies can conduct an adequate Cumulative Effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions" (CEQ Memorandum "Guidance on the Consideration of Past Actions in Cumulative Effects Analysis," June 24, 2005). The use of information regarding the effects of past actions may be useful in two ways according to CEQ guidance: 1) consideration of the Action Alternatives' Cumulative Effects and 2) as the basis for identifying the Action Alternatives' direct and indirect effects.

When encountering a gap in information, the question implicit in the Council on Environmental Quality regulations on incomplete and unavailable information was posed: is this information "essential to a reasoned choice among the Alternatives?" (40 CFR §1502.22(a)). While additional information would often add precision to estimates or better specify a relationship, the basic data and central relationships are sufficiently well-established that any new information would not likely reverse or nullify understood relationships. Although new information would be welcome, no missing information was determined as essential for the decision maker to make a reasoned choice among Alternatives.

The IDT weighed the scientific evidence offered through public comments, as well as that gathered by each resource specialist. Scoping for this project did not identify any need to exhaustively list individual past actions or analyze, compare, or describe their environmental effects in order to complete a useful analysis for illuminating or predicting the effects of the Action Alternatives. The following projects are described because they were needed for resource specialists to perform a complete analysis.

Past Actions for consideration within the Cumulative Effects Analysis
The following past actions define the present conditions within the PA.

Private non-industrial lands within the PA were assumed to be slated for permanent land conversion for residential homes and agricultural use. Virtually all of the private timber lands have been harvested and are dominated by recent clearcuts, hardwood stands, or second growth conifer forests 40-55 years old. State managed lands are assumed to be intensively managed for timber, but on a slightly longer rotation than industrial lands; only very limited areas will exist in stands older than 60 years old (BLM 1999, p. 69).

Since 1998, 423 acres of timber extraction on federally managed lands have occurred within the PA. These treatments were either commercial thins or density management treatments which retained on average 30-60% canopy cover per unit. These commercial vegetation management treatments were harvested using tractor, cable, and helicopter yarding methods. Since 1998, 608 acres of fuels hazard reduction projects have been implemented within the PA. These treatments consisted of slashing, hand piling and pile burning. Between the years 2001-2014, 489 acres of young stand management has been implemented within the PA. These active management entries consisted of understory reduction treatments with the purpose of releasing small conifers from competition with brush and hardwoods.

Seneca Right-of-Way Environmental Assessment
In 2006, the Glendale Field Manager proposed several management actions that were analyzed within the Seneca Right-of-Way Road Construction Project EA (#OR-118-06-007). Alternative 2 analyzed the construction of 3 spur road segments. The Whitehorse Project included 1 short spur road #32-4-9.5 located in Township 32 south, Range 4 west, Section 9. The Snow Creek Project included 2 short spur roads, 1 short spur road #32-3-6.2 and another spur #32-3-6.1 located in Township 32 south, Range 3 west, Section 6. There were two separate Decision Records published for the EA.

The Snow Creek Project was decided upon, but as of January 2016 the 774 feet of natural surface spur roads have not been constructed. Due to the length of time that has passed, the BLM does not see this portion of the project as reasonably foreseeable. If Seneca Jones was interested in pursuing the two spur roads associated with the Snow Creek Project a new NEPA analysis and USFWS Section 7 Endangered Species Act consultation would need to be performed.

The Whitehorse project was implemented in 2009. The Decision Record for the project authorized 167 feet of road construction. The construction of the road on BLM administered land is considered

a past project within the Upper Cow Creek PA and will be considered, where applicable, within the specialist Chapter 3 analysis.

Aquatic and Riparian Habitat Enhancement Environmental Assessment
This programmatic EA analyzed the effects of a suite of watershed enhancement activities needed to improve aquatic habitat. The broad purpose of the EA is to expedite watershed restoration and improve aquatic habitat. The EA covers projects located on both private and federal lands within the Medford District Area.

Between the years of 2010 and 2011 approximately 5 stream miles of restoration was completed. The projects consisted of large in-stream wood placement at multiple stream locations. All of the projects occurred on tributaries of Middle Cow Creek.

Although the Medford District BLM has the programmatic Aquatic and Riparian Habitat Enhancement EA in place, there are no foreseeable projects within the PA that would be implemented within the next 5 years.

Present Actions
Approximately 650 acres of young stand conifer release and 250 acres of pre-commercial thinning may be conducted under the 2012 Silviculture Practices - Reforestation, Young Stand Management, and Forest Condition Restoration Treatments (FY12 - FY17) (DOI-BLM-OR-M070-2011-09-CX) or a similar Categorical Exclusion. These projects are anticipated to be implemented in the next 0-5 years. These active management entries consisted of understory reduction treatments with the purpose of releasing small conifers from competition with brush and hardwoods. The Cumulative Effects of these projects are analyzed in Chapter 3 below.

Middle Cow LSR Landscape Planning Project Environmental Assessment
In 2006, the former Glendale Resource Area (now a portion of the Grants Pass Field Office) analyzed forest management activities within the Middle Cow LSR Landscape Planning Project Environmental Assessment. The PA was located on federally managed lands in portions of Township (T) 31S, Range (R) 4W, Sections 31 & 32; T32S, R4W, Sections 3, 5, 8-11, 15, 19-21, 28-32; T32S, R5W, Sections 1, 13, 23, 25, 27, 33, 35; and T33S, R5W, Sections 2, 3, 10, & 11.

The analysis resulted in 4 Decision Records: Fizzy Stew, Fuels, Snag Creation & Stream Habitat, and a Timber Sale decision. Many of the forest management activities that were decided upon have been accomplished and for the purposes of the Upper Cow LSR Project, Cumulative Effects analysis is considered within the baseline data for the PA. While much of the work has been accomplished there remains outstanding fuels work which has been decided upon but not implemented as of June 2015. The foreseeable work includes 305 acres of hazardous fuels reduction treatments. There are currently 82 acres (unit 1-1B) of hazardous fuels reduction treatments in process and by the release of this EA the work is likely to have been accomplished. Hazardous fuels reduction may include the following: slashing, hand-piling, pile-burning and/or underburning. Activity and hazardous fuels would be burned in accordance with the Oregon Smoke Management Plan administered by the ODF and the regulations established by the Oregon DEQ. The area is not located within a Class I

designated airshed or non-attainment area. The impact of smoke on air quality is expected to be localized and of short duration. Particulate matter would not be of a magnitude to harm human health, affect the environment, or result in property damage.

Reasonably Foreseeable Actions

Future actions on private and state lands are expected to maintain trends as described above in the "Present Actions" section.

Slim Jim Environmental Assessment

In 2005, the former Glendale Resource Area (now a portion of the Grants Pass Field Office) and the Butte Falls Resource Area analyzed forest management activities in the Upper Cow Creek and Evans Creek fifth-field watersheds. The PA is located in Township (T) 31 S, Range (R) 3 W, Sections 19, 29; T 31S, R 4W, Sections 25, 27, 28, 34; T 32S, R 4W, Sections 1, 3, 11, 13, 24 and T 32S, R 3W, Section 6, 7, 17, 18, 19, 30, 31.

The analysis resulted in 4 Decision Records: Hazardous fuels reduction within the Butte Falls Resource Area; Non-commercial density management, Commercial small wood removal, Hazardous fuels reduction, and Road decommissioning within the Glendale Resource Area; Slim Jim and Big Jim Timber Sales; and Slim Jim Matrix hazardous fuel reduction. Many of the forest management activities that were decided upon have been accomplished and for the purposes of the Upper Cow LSR Project Cumulative Effects analysis, are considered within the baseline data for the PA. There were acres included in the above listed decisions that were authorized but as of June 2015 had not been accomplished and will not be implemented due to decreased fuels funding with a priority on treating areas within the Wildland Urban Interface.

The Big Jim Project was authorized within the Slim Jim and Big Jim Timber Sales Decision Record. Big Jim was appealed to the Interior Board of Land Appeals due to a Survey and Manage lawsuit. To date, the Timber Sale has not been implemented and is not likely to be implemented as the Medford District has decided to reject all valid bid offers for the timber sale. The Big Jim Project is not considered reasonably foreseeable due to the circumstances described above. There are three units that were authorized under the Non-commercial density management, Commercial small wood removal, Hazardous fuels reduction, and Road decommissioning within the Glendale Resource Area Decision Record that are reasonably foreseeable. These are listed within the Decision Record as "Small Wood Removal" and could potentially be implemented through Stewardship contracting authority. These units are 28-1 (14 acres), 34-1 (37 acres), and 30-1b (28 acres). The units listed above are assigned Commercial Density Management silvicultural prescriptions and may remove merchantable size logs (up to 20 inches DBH) and would loosely resemble commercial thinning. Treatments would reduce stand densities so that the competition for light, water, nutrients and growing space is decreased on desired leave trees. Long-term stand vigor and growth (forest health) would be promoted. While wood volume would result from the treatment, production of wood volume at the present time or for the future is not a primary objective.

Eastside Hazardous Fuels Reduction Project
The Eastside Hazardous Fuels Reduction Project was a programmatic fuels EA authorized by the former Glendale Resource Area Manager. As of the release of this EA, 489 acres have been completed. There is an additional 1,033 acres that are currently authorized and may be implemented concurrently with the Upper Cow Project. Treatments include: mechanical thinning with chainsaws, hand piling of slash and hand pile burning.

Programmatic Water Source Maintenance Project: 2015 – 2019 Categorical Exclusion
The Grants Pass Field Office has this programmatic Categorical Exclusion (CX) in place which allows for the maintenance and improvement of water sources located throughout ODF and Douglas Forest Protective Association fire protection zones. The water source maintenance and improvements may occur on public and private land. The intended use is for fire engines, water tenders, and helicopters. The purpose of the project is to minimize the loss to resources and firefighter exposure through rapid wildfire suppression. Maintenance and improvement of water sources would be designed to limit disturbance within the original footprint/disturbance area of the existing water source.

With this document in place it is possible that any of the water sources within the PA could be improved and maintained until the year 2019. All proposed water source maintenance projects would apply the applicable BMPs and PDFs located within the CX on pages 1-6. When site specific water sources are identified for implementation a Project Clearance Sheet is routed around to the resource specialists. This Clearance Sheet ensures that site specific resources are protected at each water source.

Medford District Road Maintenance 2012-2016 Categorical Exclusion
There is an unknown amount of roadside brushing and road maintenance activities that may occur within the PA. These activities would only occur on BLM managed lands. The amount of each activity is based on available funding and the need for the activities, which are unknown at this time. These actions have been analyzed in the Medford District Road Maintenance CX 2012-2016 (DOI-BLM-OR-M000-2012-0001-CX). The implementation of any work under this document would include the BMPs and PDFs located on pages 2-3.

Reciprocal Right-of-Way (RROW) Permits
Much of the PA is encumbered under reciprocal right-of-way (RROW) permits. These permits allow RROW holders to use, maintain, and construct roads, landings, yarding wedges, and secure tail holds for the purpose of forest management on lands managed by the Medford District BLM. Once an area is encumbered under a RROW permit the actions that are carried out are considered non-discretionary and are not Federal actions. The BLM may only object to the request if there is a legitimate reason to object and that reason is listed in the permit. Each permit is unique and contains a specific set of objections. These types of requests are common throughout the PA but the exact locations of the activities are unknown until a request is received.

General Affected Environment

The Upper Cow LSR Project PA is located approximately 2 miles northeast of the town of Azalea, Oregon, in Douglas County and approximately 30 miles north of Grants Pass, Oregon. Project activities are proposed on federal land managed by the Grants Pass Field Office, Medford District, BLM. The PA lies predominantly within the Upper Cow Creek and Middle Cow Creek 5th level watersheds (based on the ten-digit USGS Hydrological Unit Code) within the Klamath Mountain Geographical Province. A small component (2,222 acres) of the project is within the southern edge of the Days Creek South Umpqua River watershed. Cow Creek is a tributary to the South Umpqua River.

Elevations within the PA range from 1,845 feet at Galesville Reservoir to nearly 5,104 feet at Cedar Springs Mountain. Temperatures can range from 0 degrees (F) on mountain peaks in January to 100 degrees in the interior valleys during August. Extended summer drought is common. According to the Watershed Analysis for the area, precipitation varies from near 36 inches per year in the interior eastern valleys to approximately 70 inches/year in the western portions. Approximately 20% of total annual precipitation occurs from June to September.

The Upper Cow LSR Project PA is located within a region where fire is recognized as a key natural disturbance process because it influences successional processes and creates diverse forest conditions (Atzet and Wheeler 1982). Prior to 20th century fire suppression, wildfires of varying intensities regularly burned throughout this region and selected for certain forest types and associated understory vegetation which could tolerate heat and conditions associated with wildfire events (Halofsky et al. 2011). Fires regulated stand densities, and kept meadows free of encroaching conifer species.

Frequent, low intensity fires occurred in this area resulting from lightning and Native American ignitions. Effective fire suppression has resulted in the natural development of higher stocking levels of small Douglas-fir, hardwoods, and brush. This shift in plant species composition and density in areas within the PA has generated concerns for long-term forest health: higher densities of small trees and brush may result in increased risk of large, intense fires, widespread disease, and/or insect damage.

The PA is entirely within the LSR LUA where the objectives are to enhance late successional habitat development. The land encompassed within the PA primarily consists of a patchwork of early, mid and late seral forest environments, overlain on a checkerboard ownership alternating between private and various public entities. A small proportion of the PA contains late seral vegetation, with a few stands greater than 100 acres. Several of the RRs are part of existing young plantations. Many plantations on both public and private land are present, as the area is largely utilized for timber production. Logging operations on private lands are evident, and have affected the overall appearance of the PA.

Approximately 52% (13,744 acres) of the PA is managed by the BLM. Of that, this planning effort aims to treat approximately 5% (1,373 acres) of the PA under Alternative 2 and approximately 4.5%

(1,193 acres) of the PA under Alternative 3. Both Alternatives aim to enhance late successional habitat.

Resource Specialist Analysis

Chapter 3 describes the environmental effects to resources from implementation of the Alternatives. Methodologies, assumptions, and the scale of analysis for resources are disclosed. A description of existing conditions is provided. Effects of the Alternatives are described based on the proposal contained within the No Action Alternative, Alternative 2, and Alternative 3. Projects considered for the Cumulative Effects analysis for each resource can be found at the beginning of Chapter 3 and in Appendix D.

The analysis contained within Chapter 3 has been incorporated by reference from the specialist reports contained within the Administrative Record for the Upper Cow Late Successional Reserve Project.

3.1 Vegetation

Methodology

The initial coarse scale analysis for the Planning Area (PA) was conducted through searches of BLM databases such as MicroStorms, Geographic Information Systems (GIS), forest operational inventory (FOI), LiDAR, and aerial photography. Data collection was conducted during the 2010-2013 survey seasons through formal stand exams that updated age classes, 10-year and annual growth patterns, relative densities, stocking, and species composition. Field surveys were performed from 2010-2015 to ascertain stand condition and developmental pathways. These were synthesized with wildlife habitat analyses through a process that followed USFWS guidance and associated tools in evaluating where to enhance habitat and demographic conditions for NSOs, as well as where to maintain habitat and minimize effects to NSOs, where appropriate.

Assumptions

Computer models used to simulate forest growth are not able to simulate regrowth in the understory. These growth and yield models assume even spaced conditions with data averaged across the stand. Moreover, this data is a snapshot in time and projections of growth are subject to dynamic changes that influence forest development (e.g. annual precipitation, wind events, etc.). In addition, the risk of wildfire is ever-present where a single event can alter stand conditions along a new developmental pathway. Past and future treatments reduce fire risk by directly reducing fuels and by reducing the densities that contribute to fuel buildup. However, abiotic variables also influence fire behavior and its effect on vegetation. Variables that influence size, rate of spread, and severity include but are not limited to the time of year, point of ignition, accessibility by suppression forces, temperature, wind speed, terrain, aspect, slope, position on slope, etc. Treatments are subject to the degree that these abiotic variables factor into contributing to fire growth and severity.

3.1.1 Affected Environment

The PA is located in the Upper Cow Creek, Middle Cow Creek, and Days Creek South Umpqua HUC 10 watersheds. The PA is also positioned within the mixed evergreen zone of vegetation (commonly referred to as mixed conifer and hardwood forest) and is generally characterized by an

upper layer of conifers and a lower layer of hardwoods (Franklin and Dyrness 1973, p.133). The Middle Cow Creek Watershed Analysis (BLM 1999a) explains that the portion of the Watershed where the PA resides is fragmented by clearcuts and small residential tracts. Road construction near the main travel route and communities allowed access for timber harvesting much earlier (BLM 1999a, p.34). The Upper Cow Creek Watershed Analysis (BLM 2005) compares past and current landscape conditions using the range of natural variability (RNV). It describes RNV "as a baseline for comparison with current conditions to assess the degree of past change and to better predict future vegetative succession" and "does not imply that federal lands intend to return the area to historical conditions; indeed, it is impossible to do so and may be undesirable within the context of achieving multiple-use objectives" (BLM 2005, p.27). It adds that:

> Maintaining or restoring some lands to resemble historic systems, and including some structural and compositional components of the historic landscape within actively managed lands, provides part of an ecological approach to multiple-use management. An ecosystem within its range of natural variability (RNV) provides a coarse-filter for biological diversity and meets many of the legal and regulatory requirements for maintaining viable populations of native species . . . A central assumption in the application of RNV is that species are adapted to certain environmental conditions and can tolerate a range of disturbances similar to that which influenced them over evolutionary time . . . most species will generally be adapted to disturbance regimes that have historically dominated an area (Alverson et al. 1994). Many species are known to depend on natural disturbances to complete portions of their life cycles. (BLM 2005; UCWA, p. 28)

Frequent fire return intervals served as the dominant function shaping ecological processes within each of the Upper Cow (BLM 2005; UCWA p.39), Middle Cow (BLM 1999a; MCWA p.11), and Days Creek Umpqua (BLM 2001b; SUWA 2001, p.56) Watersheds. Fire suppression has removed this mechanism from the landscape altering its ecological function and process. Since the early 1900s the introduction of fire suppression actions has removed a primary disturbance mechanism that shaped the ecological landscapes of southern Oregon. This new trajectory or pathway has resulted in an ingrowth of vegetation and a buildup of fuels outside the RNV. The Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011) describes the drier landscape of the inland northwest compared to the previous two centuries as now having reduced resiliency to disturbances, a shifted vegetation composition from grass and shrubs to shade-tolerant conifers, and homogenous stands with reduced complexity. Fire exclusion, combined with the loss of drought and fire-tolerant species has altered the disturbance regime these landscapes historically exhibited. The landscape has shifted from forest types once occupied by more fire and drought tolerant species to shade-tolerant species, representing a shift in the opposite direction in terms of forest resiliency (USFWS 2011, Section III p. 23).

Climatic conditions effect vegetation growth, vigor, and its response to disturbances. According to the National Oceanic and Atmospheric Administration (NOAA 2015) southern Oregon is experiencing a persistent hydrologic drought with ecological impacts on forests and wildlife. From November 2013 to January 2014, Oregon was the third driest state in the 1895-2014 precipitation

pattern record (NOAA 2014). These droughty conditions, especially on south facing slopes and lower productive sites, can have lasting effects on the landscape, causing widespread stress to individual trees and their ability to resist change, including drought stress, insects and diseases, and fire.

The Upper Cow PA lies 12 miles due east of the 2013 Douglas Complex Fire perimeter. This fire consumed 48,672 acres with 25,349349 of these acres on BLM lands, 4,800 of which exhibited moderate to severe fire intensity. The 2015 Stouts Creek Fire nearly missed the PA, consuming 26,448 acres only 1 mile to the northeast of the Upper Cow PA boundary. Other prominent nearby fires within the last several years consist of the 2013 Shively Creek Fire (187 acres) and the 2004 Bland Mountain II Fire (4,501 acres). Recent fires have grown in intensity and severity. Drought conditions over the last several years have only exacerbated the threat of stand replacing events in the PA. The spatial and temporal proximity of these fires to the Upper Cow PA coupled with their explosive growth presents a threat to forestland in the PA and its subsequent loss of LSR habitat due to fire.

In addition to the ever-present risk of forestland and habitat loss from fire, species composition has become increasingly less diverse. Douglas-fir and Pacific madrone are vastly dominating the landscape leaving little room for species diversity. Douglas-fir is the dominant conifer species in the PA with ponderosa pine and incense cedar only occasionally present. The more mesic areas in the PA contain western hemlock, predominantly in the understory. Sugar pine is rarely present. Of these species, Douglas-fir is found in all stand layers (top, middle, and bottom), whereas the minor conifer species appear most frequently in the top layer, making up a very small legacy component of stands. Although rare, some areas exhibit incense cedar proliferating throughout some understories while others are occupied entirely by salal. In general, very little to no understory recruitment of conifers is occurring within units, especially among shade intolerant species like pine and oak.

Of the hardwoods, Pacific madrone is the most frequently occurring species followed by canyon live oak, golden chinquapin, California black oak, and less frequently, white oak. These species are generally confined to the bottom two layers of stands. In some areas, Pacific madrone entirely dominates several sites, particularly in Township 34S- Range 4W- Sections 26 and 35 and Township 32S-Range 4W-Sections 9 and 10. This represents a successional phase in madrone where it initially dominates canopies. Because madrone vigorously initiates and dominates a site after fire or harvesting, its widespread presence creates a monoculture and delays the development of other species such as pine and oaks. However, Bennet and Shaw (2008) point out that madrone is shade intolerant, even to its own shade. Therefore, madrone will persist as a dominant component in stands for many decades until it becomes overtopped by more shade tolerant trees, such as Douglas-fir. Pine and oak species however lack the shade tolerance to initiate under a canopy of madrone and/or Douglas-fir and thereby remain a minor component on the landscape.

Douglas-fir, the most common tree species, produces conditions that favor large fire growth and intensity. Douglas-fir is self-pruning, often sheds its needles and tends to increase the rate of fuel buildup and fuel drying (Atzet and Wheeler 1982, p.8-9). Fire suppression has also allowed needles, bark, and limbs of trees to accumulate at tree bases, especially near legacy trees, raising the chances

for fires to burn more severely and reside longer which is likely to kill cambiums and roots. The condition is then set to always favor shade tolerant species for many decades, until a disturbance event, or management intervention disrupts this process. The shift in species composition to Douglas-fir has only enhanced the competitive status of shade tolerant trees, increasing its absolute cover and relative density, thereby increasing the overall fire hazard potential which can denude entire landscapes. The boom and bust cycle of unchecked fast growth in Douglas-fir followed by large wildfire conflagrations is an unprecedented shift from historical conditions. This cycle can be interrupted, curtailed, or lessened by smaller scale disturbances such as active management or less reliable natural events such as small windthrow occurrences and small fires. EA Chapter 3.2 discusses fire and fuels in greater depth including other effects on vegetation.

Vegetation patterns also differ by slope, aspect, elevation, and soils. Lower elevations and south aspects can exhibit more cover in ponderosa pine, California black oak, and seldom white oak; whereas higher elevations and more productive soil types display more tanoak, white fir, and golden chinquapin. Vegetation community subseries percentages were collated through GIS and are presented in Table 3.1-1. These areas reflect both private and Medford District BLM administered lands within the PA. The table below shows that moist Douglas-fir forests comprise half of the vegetation subseries. However, field surveys on BLM administered land display a larger presence of dry Douglas-fir forests and very small amounts of white fir forests. No detections of Jeffrey pine were recorded on BLM administered land during field surveys of the PA.

Table 3.1-1 Vegetation Classes in the Upper Cow PA

Vegetation Sub Series	Approximate BLM+Private Acres	Percentage BLM+Private	Approximate BLM Acres	Percentage BLM
Douglas-fir dry	591	3	272	2
Douglas-fir moist	11,748	50	5,785	47
Jeffrey pine	197	1	108	1
Western hemlock hyper-dry	3,566	15	1,982	16
Western hemlock intermediate	1,001	4	1,087	9
Wet non-forest	1,919	8	784	6
White fir intermediate	1,750	7	664	5
White fir warm, moist - low elevation	2,630	11	1,347	11
TOTAL	**23,402**	**99**	**12,237**	**98**

Stand Density

Stand exams were performed from March-October 2013 on over 2,050 acres of BLM administered land in the PA on stands over 40 years of age. Field data was used to produce reports on species composition, diameter distribution, commercial volume, and stand density, revealing conditions affecting forest health (e.g. damage to trees, insect and diseases, and mortality). Collected stand data was also used to compute the intensity of competition within a stand expressed as relative density (RD). At higher densities the growth rates of individual trees slow down (Davis and Johnson 1987, p.79), therefore tree vigor declines with increasing competition. Drew and Flewelling (1979)

identified the zone of imminent competition mortality occurring between 0.55 and 1.0 RD. A RD of 1.00 means that trees on the site occupy the full growing space with mortality levels equaling stand growth. Briegleb (1952) stated that the optimum densities generally will lie between 0.34 and 0.55 RD. Stand exam data indicated an average RD of 0.75, deep within the zone of imminent competition mortality.

Larsson et al. (1983) point out that ponderosa pine vigor decreases as stand density increases, suggesting that comparatively few beetles are needed to kill low vigor trees. As a general rule, stands that contain less than 150 square feet of basal area per acre are less prone to pine bark beetle attack. A RD of 0.75 with an average basal area of 239 ft^2/acre indicates that surveyed stands are not just within imminent competition mortality but also prone to beetle infestation. In addition, recent burned areas, such as the 2015 Stouts Creek Fire have provided source material for beetles to infest, breed, and populate in numbers with the potential to spread into adjoining forested lands.

Forested areas in the LSR are experiencing landscape impacts from the aggregated effects of fire exclusion and high relative densities. Trees in overstocked stands, especially during consecutive drought years as discussed above (NOAA 2015), tie up available light, water, and nutrients prohibiting an understory from developing in many cases (Figures 5 and 6) and contributing to competition induced mortality thereby increasing the fuel loads. The exclusion of fire and other intervening disturbance events that control competition, reintroduce sunlight, water, and nutrients, furthermore weakens the vigor of trees in the stand affecting its ability to recover from disturbances.

Figure 5 Unit 35-15. Excess stand densities surrounding ponderosa pine.

Figure 6 Unit 32-7S. Beetle kill of ponderosa pine and senescence in California black oak.

Pine and oak, both shade intolerant species are in decline across the landscape (Figures 5 and 6). Excessive stand densities are weakening oaks and predisposing pine to insect attack. Decreased tree vigor is magnified during periodic drought years, especially on lower elevations and on south aspects.

The current condition on the landscape is one that is prone to large scale catastrophic fire conflagrations. Overstocked stands have a greater potential for severe, stand-replacing wildfires as discussed in Section 3.2 of the Fire and Fuels Report.

3.1.2 No Action Alternative

Direct and Indirect Effects

The objective of silvicultural systems proposed for the LSR would be to develop old-growth characteristics including snags, down logs, large trees, canopy gaps, multiple layers, and diverse species composition (BLM 1999b, p.1). The No Action scenario would likely rely on the lengthy process of succession to create this complex forest structure.

Since competing trees in dense forests grow in height, but very little in diameter (Oliver & Larson 1996, p.75), this scenario results in delayed development of large woody structural characteristics. Overall stand growth could stagnate when stands are left in a dense and uniform condition (Tappeiner et al. 2007, p.124). The current average RD of 0.75 of stands in the PA signifies that they are currently deep within the zone of imminent competition mortality. Drew and Flewelling (1979) approximate crown closure, and the onset of competition as corresponding to a RD of 0.15. Alternative 1 ensures the direct and indirect effect of declining individual tree and stand vigor because if a stand is allowed to grow for many years within the zone of imminent competition mortality, mortality will occur (Drew & Flewelling 1979). Non-vigorous trees will not grow into large trees. Because competition mortality results in the death of suppressed, overtopped, and small diameter trees, the No Action Alternative interferes with the aim to grow and provide the large decadent woody structure desired in late-successional forests.

The conversion of stands from dense, even-aged, single storied Douglas-fir into complex forest with high value habitat would likely not occur until the next disturbance. Structural heterogeneity would depend entirely on the unreliable means of small or large scale disturbance events or the lengthy, many decades of competition mortality to influence stand development along a new trajectory. This would predispose the forest to vulnerabilities that threaten its progress towards achieving late-successional habitat. Threats from fire, insects and diseases, as well as the loss of fire resilient pine and oak species would remain heightened under the No Action Alternative.

The No Action Alternative would likely result in a loss in species diversity. Current competing densities threaten the persistence of species diversity on the landscape both directly by fire risk and indirectly by the effects of competition mortality from Douglas-fir. The exclusion of disturbance mechanisms, such as fire and thinning, has reduced species diversity. Ponderosa pine, California black oak, incense cedar, Oregon white oak, and sugar pine would continue being replaced by Douglas-fir. This effect contributes to an overall decline in species diversity on the landscape and the widespread proliferation of Douglas-fir reduces the effectiveness of species diversity management goals in the LSR (BLM 1999b, pp.57, 75, 80). Ponderosa pine, California black oak, and Oregon white oak will not successfully establish and thrive in the continued shade perpetuated by the No Action Alternative and would continue to decline from accentuated competition from

Douglas-fir encroachment. Development of stands in achieving the desired goals of the LSR would be delayed under the No Action Alternative.

Cumulative Effects

Fuels reduction treatments on private property, around structures and along driveways (the WUI) would likely continue within the PA.

The Eastside Hazardous Fuels Reduction Project is a continuation of programmatic fuels treatments on BLM lands within the PA. Within the PA, 489 acres of hazardous fuels reduction treatments have been completed since 1999. An additional 987 acres of fuels treatments within the Eastside Fuels Project have been field prepared for treatment. Treatments are dependent upon a fuels budget that would facilitate their completion and involve mechanical thinning with chainsaws, hand-piling of slash, and hand-pile burning. Mechanical thinning consists of cutting vegetation up to 12 inch DBH manually to reduce surface and ladder fuels. Slash would be hand piled, covered, and burned. In the wildland urban interface (WUI), low intensity under-burning may be prescribed three to five years after initial treatment to ensure desired fuel models are maintained. No logging systems would be used. Long term stand and landscape-level beneficial effects to vegetation from this project are reduced understories subsequently improving stand density, vigor, species diversity, and resiliency. These ongoing fuels reduction treatments on private and federally managed public lands within the PA boundary would continue benefitting the landscape scale effectiveness of fuels reduction treatments on these properties.

Fire suppression activities would continue on Federal and non-Federally administered lands. The BLM has a fire protection contract with Oregon Department of Forestry (ODF). This contract gives ODF the responsibility for fire protection on all lands within the PA. The contract directs ODF to take immediate action to control and suppress all fires. Their primary objective is to minimize total acres burned while providing for firefighter safety. The contract requires ODF to control 94% of all fires before they exceed 10 acres.

Under the No Action Alternative, the fuel hazard within the PA would increase as vegetation continues to develop. Surface fuels would increase due to tree mortality in dense stands as higher levels of insect and disease mortality are expected. The PA would remain in moderate to high fire hazard, resulting in a higher potential of increased fire behavior if a wildfire occurs. The potential for increased fire behavior would create a greater risk for private land, homes, and resources in the Upper Cow PA. Ongoing timber harvesting is also expected on approximately 12,725 acres of private forest industrial land within the PA. On these lands, harvest activities are generally removing the majority of the trees. These commercially managed stands would follow Oregon State Forest Practices in leaving large snags, large hardwoods, and large CWD elements. Forest operations on private land were anticipated in the landscape planning of the LSR itself and in the development of criteria for appropriate silvicultural treatments (BLM 1999b, pp.51-82).

In summary, with the exception of the fuels reduction treatments occurring within the WUI of the PA, the No Action Alternative on remaining BLM administered land of the PA would not contribute to the development of late-successional characteristics, the recovery of the spotted owl, or to the

resiliency of stands to environmental changes, including drought and catastrophic fire. There would be a cumulative adverse effect of not meeting LSR objectives as set forth in the 1995 Medford District RMP and LSRA.

3.1.3 Action Alternative 2

Direct and Indirect Effects

Silvicultural systems proposed in LSRs have two principal objectives:

- Development of old-growth characteristics including large diameter trees, large diameter snags, large diameter logs on the forest floor, large trees, and canopy gaps that enable establishment of multiple tree layers and diverse species composition.
- Reduce the risk of large-scale disturbances by fire, wind, insects, and diseases that would destroy or limit the ability of the reserves to sustain viable forest species populations.

Approximately 43% of the federally managed lands in the South Umpqua River/Galesville LSR are in late-successional stands. The management objective in the South Umpqua River/Galesville LSR is to attain and maintain 60 to 75% of the federally managed lands in late-successional stands. About 52% of the PA is under BLM ownership. Stand management in LSRs would focus on stands regenerated following timber harvesting, stands that have been thinned, or unmanaged even-aged stands. The overall criteria for silviculture treatments are that they contribute to the creation of late-successional forest conditions. Alternative 2 provides the closest opportunity to meet this goal.

Vegetation Pattern

Vegetation must expand in size to live and a tree cannot grow larger unless its growing space is increased (Oliver & Larson 1996, p.36). Trees can also increase their diameter growth in less dense stands (Tappeiner et al. 2007, p.127). This is true even in older trees. Because disturbances free up resources for use by residual trees to claim, trees would respond with increased diameter growth to develop large woody structure – a feature desired in late successional reserves (BLM 1999b; LSRA p.72-73, 75-76: RMP p.32).

Through management intervention, development of large fire resilient tree structure can be accelerated by many decades as opposed to no treatment. In lower densities ponderosa pine is expected to increase in diameter growth, including the diameter of the largest trees (Tappeiner et al. 2007, p.127). Actively managing the diversity of conifer species would contribute towards achieving species diversity goals in the LSR.

Removal of trees would be accomplished using conventional and helicopter logging systems. To facilitate operations, 0.6 miles of new temporary route construction, 1.1 miles of existing temporary route renovation/reconstruction, and 63.4 miles of existing road maintenance is proposed.

Alternative 2 would have a short term increase of fine fuels deposited on the forest floor resulting in an immediate increase in fire hazard until activity fuels are treated. Activity fuels treatments are proposed that would reduce this immediate deposition of fuels as described in Chapter 2.4: BMPs and PDFs and the Fuels write-up Chapter 3.2.

Retained trees, snags, and down logs would provide for structural and biological legacies necessary to maintain ecosystem processes throughout the management cycle (RMP 1995, p. 188). Thick-barked large diameter conifers with high canopy base heights and shaded understories may be the most fire resistant components in southwest Oregon. Through management intervention, development of large fire resilient tree structure can be accelerated by many decades as opposed to no treatment. Maintaining and enhancing species diversity through commercial and noncommercial competition reduction treatments ensures that LSR, northern spotted owl Critical Habitat Unit (CHU), and RMP species diversity goals could be met (BLM 1999b; LSRA p.1, 57, 75-80; USFWS 2011, p.III-20; RMP 1995, p. 184).

Cumulative Effects

The cumulative activities relevant for this analysis are disclosed at the beginning of Chapter 3 and in Appendix D. Impacts to vegetation are confined within the Upper Cow PA. Alternative 2 is expected to have a beneficial Cumulative Effect on 1,373 acres when considering other projects. These projects include the following: Eastside and Middle Cow Fuels Treatments Projects. In these projects, a reduction in either overstory and/or understory stand density would show increased diameter growth and vigor of residual vegetation. Residual vegetation is expected to respond to the stimulus of increased growing space and contribute to the development of large woody structure. Actions in Alternative 2 are expected to have measurable beneficial cumulative impacts because variable density thinning is designed to restore, enhance, and promote development of high value habitat and late successional structural features over the short term (0-10 years) and long term (11+ years) scales. Alternative 2 also reduces fuels to decrease the intensity and severity of future fires within the PA. The development of trees into large woody structure would contribute to the future snag and CWD components desired in the LSR for ecological functions (BLM 1999b, p.3) and per RMP requirements (RMP p.39). Legacy ponderosa pine would better withstand insect infestations, limiting the potential damage to species diversity, and prolong their presence on the landscape.

Decreased stand densities would decrease short term (0-10 years) and long term (> 11 years) resiliency. Improvements in stand and landscape scale resiliency to fire, changes in climate, and other environmental disturbance processes would likely occur with density reduction. This was demonstrated after a commercially thinned unit faced the flames from the Douglas Complex Fire (Figure 7), resulting in exhibited low fire severity and intensity as fires could not reach their canopies. These thinned stands showed a greater resiliency to survive post-fire than adjacent untreated stands. The cumulative vegetation effects from Alternative 2 would likewise increase structural and species diversity, vigor, and resiliency.

Figure 7 Douglas Complex fire resiliency examples - BLM thinning unit received little to no crown scorch while adjacent land experienced high severity fire.

3.1.4 Action Alternative 3

Direct and Indirect Effects

Alternative 3 is similar to Alternative 2 except under Alternative 3 there would be considerably less forestland restored to a condition that meets late-successional habitat. Alternative 3 was developed following the guidance in the South Umpqua River/Galesville Late Successional Reserve Assessment (LSRA) which recommends an 80 year age limit and a 20 inch diameter at breast height cap.

This Alternative developed from differentiating stand ages and tree sizes rather than identifying stand conditions and the need for treatment. Although the South Umpqua River/Galesville LSRA provides allowances to treat units in the LSR older than 80 years of age (BLM 1999b; LSRA p.77), a management decision was made to include an alternative for stands solely less than 80 years old and the removal of trees solely less than 20 inches in diameter. A total of 1,197 acres of treatments in this Alternative would affect vegetation patterns and projected growth, similar to Alternative 2. The similarities in effects are attributed to the similar stand conditions (even-aged, single canopied, overstocked stands dominated by a single species, with low within-stand diversity) and the close similarity in prescriptions that would enhance structural and species diversity. Areas exhibiting late successional habitat conditions, or that exhibit a current trajectory to late successional conditions without intervention, were deferred from treatment in both Alternatives 2 and 3. This left only those stands exhibiting the conditions, as described above, for potential treatment units including stands

over 80 years in age and trees greater than 20 inches in diameter because, as the LSRA states, the lack of functionality of these stands for late-successional related species is more important than the age of the stand (BLM 1999b; LSRA p.77). Alternative 3 eliminates 178 acres of stands that lack functionality for late-successional related species that would delay the development of these single layered, overstocked stands longer than if treated under Alternative 2. This includes foregoing 113 acres of understory reduction treatments to reduce risk of habitat loss to fire.

3.2 Fire and Fuels

Methodology

- Data on fire hazard and risk was taken from the Josephine and Jackson County Integrated Fire Plan Assessments.
- Data on FRCC (Fire Regime Condition Class) was taken from LANDFIRE data, using prioritized, and stand FRCC.
- Fuel models and expected fire behavior were determined from Standard Fire Behavior Fuels Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model by Scott and Burgan
- The BLM fuels specialist identified fuel models, fire hazard, and FRCC departure in the PA based on GIS and field data.

3.2.1 Affected Environment

The Upper Cow PA is located within 3 HUC 10 watersheds. The stands in the PA are overstocked and have high densities. Overstocked stands have a greater potential for severe, stand-replacing wildfires. Currently, the proposed treatment stands represent timber litter and timber-understory fuel types. As fuel loading increases in these fuel types, resultant fire behavior also increases.

Historically, fires are a normal occurrence and have played a key role as a natural disturbance process throughout southwestern Oregon. However, fire suppression and forest management activities have altered the historic vegetative patterns within the HUC 10 watersheds.

3.2.2 No Action Alternative

<u>Direct/Indirect Effects</u>

Under the No Action Alternative, the existing surface, ladder, and canopy fuels would not be treated. Fuels would continue to accumulate on the forest floor. Stands would remain in their current fuel type and fuel loading and fire behavior potential would continue to increase. The FRCC departure would continue to trend toward Condition Classes 2 and 3.

The fuel hazard would increase as vegetation continues to develop. Surface fuels would increase due to tree mortality in dense stands as higher levels of insect and disease mortality are expected. The PA would remain in moderate to high fire hazard, resulting in a higher potential of increased fire behavior if a wildfire occurs. The potential for increased fire behavior would create a greater risk for private land, homes, and resources in the Upper Cow PA. The departure from the historical fire regime would continue to trend toward Condition Classes 2 and 3.

Cumulative Effects

Fire suppression activities would continue on Federal and non-Federal lands. The BLM has a fire protection contract with Oregon Department of Forestry (ODF). This contract gives ODF the responsibility for fire protection on all lands within the PA. The contract directs ODF to take immediate action to control and suppress all fires. Their primary objective is to minimize total acres burned while providing for firefighter safety. The contract requires ODF to control 94% of all fires before they exceed 10 acres.

Fuels reduction treatments on private property, around structures and along driveways would likely continue. As a result of the defensible space treatments around structures, driveways, and along possible escape routes, the risk of both structural and human losses from wildfires would decrease. Ongoing fuels reduction on private and federally managed public lands would result in the beneficial effect of increasing the landscape scale effectiveness of fuels reduction treatments.

In the long-term, the fuel hazard would increase as vegetation continues to develop. Surface fuels would increase due to tree mortality in dense stands as higher levels of insect and disease mortality are expected. The PA would remain in moderate to high fire hazard, resulting in a higher potential of increased fire behavior if a wildfire occurs. The potential for increased fire behavior would create a greater risk for private land, homes, and resources in the Upper Cow PA.

3.2.3 Action Alternatives 2 & 3

The treatment of fuels within the PA would reduce surface fire behavior, and torching potential by raising the canopy base height, and potential active crown fire spread by reducing canopy bulk density. Prioritized fuels treatments would assist in the restoration and maintenance of landscapes by increasing the fire resilience of treated stands.

Direct/Indirect Effects

The majority of cut vegetation would be extracted from the thinning units. The remaining slash within the units may cause a shift from a timber type fuel model to a slash/blowdown fuel model. The BLM would conduct a fuels assessment within each unit following harvest activity. This assessment would determine the fuel hazard and fire risk based on surface fuel loading, aspect, slope, access, and location of each unit. The fuel management specialist may modify the fuels treatments to meet the objective of fuel hazard reduction. The majority of fuels treatments would begin within 90 days after completion of harvest activities. Prescribed fire treatments may take another year to complete due to the environmental parameters required for implementation. Immediately following forest management activities and prior to slash disposal, fire behavior potential could increase from the current condition due to increased surface fuels. Following slash disposal treatments, a reduction in potential fire behavior would occur due to the reduction in surface fuel loading and change in horizontal and vertical fuel arrangement.

Forest management activities generally increase the surface fuels within a stand. However, whole tree harvesting with disposal of the tops at the landings is the most effective method of preventing surface fuel increases within the residual stand (Agee and Skinner 2005). At the landings, slash would be piled, chipped, removed for biomass, sold for firewood, or burned. Slash remaining within

the stands would be lopped and scattered or hand piled and burned, broadcast burned, or underburned. Surface fuel loads would be reduced because a majority of the slash would be removed from the unit. Any large diameter cull logs that are returned to the unit to benefit CWD recruitment would not increase surface fire behavior or result in increased crown fire behavior. Because many of the cull logs would be large they would not likely be consumed in broadcast burning treatments. Additionally, hand piles are deliberately constructed in locations away from larger diameter CWD.

During the implementation of the Alternatives 2 or 3, 20 inch diameter trees that are cut to facilitate logging systems (yarding corridors, skid trails, tailhold/guyline trees, tractor swing routes, and any temporary routes constructed) would remain on-site as CWD. These retained ecological structures are not expected to have a direct or indirect effect on increased fire hazard. These types of large features do not contribute to crown fires because of their location on the forest floor. They also do not contribute to flashy, fast moving ground fires, because they do not respond to fire like smaller fast burning fuels.

Lopping and scattering would reduce the vertical height and horizontal continuity of the fuel bed. However, it would temporarily increase the surface fuel loads. This would put the stand into a slash fuel model resulting in higher predicted flame lengths, fire duration, and intensity. In 5 to 10 years after lopping and scattering, the effect of the slash on fire behavior would be overcome by the effects of decomposition and new vegetation growth.

Hand piling and burning would decrease fuel loading of material up to 6 inches in diameter by 85 to 95%. Fuels greater than 6 inches in diameter contribute to the CWD load and would be left on the surface. This treatment would move stands from a slash fuel type into a timber fuel type, resulting in a reduced rate of fire spread and average flame length.

Underburning or broadcast burning would remove at least 60% of slash less than 3 inches in diameter and a lesser amount of larger fuel size classes in timbered stands. This treatment would move the stands from a timber understory to a timber litter fuel type, resulting in lower predicted flame lengths, fire duration and intensity.

The proposed fuels treatments would reduce fire behavior such as flame length, rate of spread, and fire duration. With the reduction of flame length and fire duration, the chance of a crown fire initiating in these stands would be reduced. The reduction in fire behavior would lessen the potential damage from a wildfire initiated within or adjacent to the PA and would increase tactical opportunities for firefighters to limit fire spread and damage to residential homes during a wildfire. FRCC departure from the historical fire regime would continue to trend toward Condition Classes 2 and 3, except in prescribed broadcast or underburn units.

Cumulative Effects

The cumulative fire hazard for Alternatives 2 and 3 would be reduced by 1,375 acres or 1,196 acres, respectively.

For the fuels resources, the differences between the two Action Alternatives are less distinct than the differences for other resources. For the fuels resource Alternative 2 would have a greater benefit because more acres would be treated under this Alternative.

The Action Alternatives could restore and maintain the landscape thereby increasing the fire resiliency of vegetation within the PA. A fire-resilient forest has characteristics that allow it to readily recover from a fire event. Fire resiliency can be increased by managing surface fuels to limit the flame length, removing ladder fuels to keep flames from burning into tree crowns where trees have no defense against fire, decreasing crown density, and retaining larger diameter fire resistant (Agee and Skinner 2005). Fire hazard and risk within the watershed would be reduced. Over the last ten years, fuels treatments on approximately 800 acres of private and federally-managed public lands have resulted in increasing the landscape-scale effectiveness of fuels reduction treatments.

Any initial, short-term increase in fire hazard would not cause significant effects requiring an EIS because these activities would be mitigated soon after project activities through slashing, hand piling, pile burning, chipping, lop and scatter treatments, and broadcast burning. The analysis is consistent with the conclusions provided in the 1995 Medford RMP/EIS.

3.3 Terrestrial Wildlife

This section discusses terrestrial wildlife habitats and the potential impacts to wildlife species from the Action Alternatives as described in Chapter 2 of this document.

The present-day composition and distribution of vegetation within the PA is influenced by site characteristics (soil types, aspect, and topography), natural disturbance (wildfires, insects, disease, etc.) and anthropogenic activities, including historical mining, rural residential development, agricultural activities, timber harvest, fuels reduction projects, fire suppression & exclusion, and road building.

For a discussion of the predominant vegetation contained within the PA see the Chapter 3 Vegetation Section 3.1. The vegetation in the PA provides various habitat conditions for a wide array of wildlife species. Table 3.3-1 below illustrates the acres of each vegetative condition class found within the PA, and a list of some of the typical wildlife species that are commonly associated with these vegetative condition classes.

Table 3.3-1 Vegetation Condition class of BLM lands within the Upper Cow PA

Vegetation Condition Class	Acres	Representative Species
Grass, Shrubs, Non-forest Land	90	Gopher snake, California ground squirrel, western meadowlark
Hardwood/Woodland	19	Western fence lizard, ringneck snake, wrentit, Acorn woodpecker, dusky-footed woodrat, western gray squirrel
Early -Seedlings/Saplings	5,346	Northwestern garter snake, mountain quail, pocket gopher
Poles (5-11 inches DBH)	874	Southern alligator lizard, Golden-crowned kinglet, porcupine
Mid (11-21 inches DBH)	1,931	Ensatina, Stellar's jay, mountain lion

Vegetation Condition Class	Acres	Representative Species
Mature (>21 inches DBH)	5,474	Northern spotted owl, northern flying squirrel, pileated woodpecker, pacific fisher

Scale of Analysis

For the purpose of this analysis, this EA section will hereafter refer to two reference scales: the Project Area and the Planning Area. The Project Area is defined as the footprint of all proposed treatments, such as areas where forest management or transportation management activities are proposed. The Planning Area is a geographically contiguous area surrounding the Project Area which is used to narrow the focus of the planning effort to a size and scope that allows the BLM to reasonably evaluate the area for possible management needs.

Only federally listed (Threatened & Endangered or Candidate), Survey and Manage, or Bureau Sensitive species known or suspected to be present within the Grants Pass Resource Area **and** are affected by the Action Alternatives are addressed in this EA. Table F-1 in Appendix F includes the complete list of all such species that may occur within the Grants Pass Resource Area. The following subset of species in Table 3.3-2 below are those that are known or suspected to occur within the PA and have the potential to be affected by the Action Alternatives and are therefore evaluated in more detail:

Table 3.3-2 Wildlife Species Known or Suspected to occur within the Upper Cow PA

Wildlife Species Known, Suspected or Habitat Occurs in the PA			
Common Name	**Scientific Name**	**Status**	**Occurrence**
northern spotted owl	***Strix occidentalis caurina***	FT	Known
bald eagle	***Haliaeetus leucocephalus***	SEN/EPA	Known
Oregon red tree vole	***Arborimus longicaudus***	S&M	Known
Pacific fisher	***Martes pennanti***	C-T&E	Suspected

Status:
- FT – Federally Threatened
- SEN – Bureau Sensitive Species
- C-T&E – Candidate Threatened and Endangered
- S&M – Survey and Manage Species
- EPA – Bald and Golden Eagle Protection Act

Occurrence:
- Known – Species is known to occur in the PA
- Suspected – Species has not been formally documented to occur within the PA, but reasonable potential to exist based on habitat.

3.3.1 Affected Environment– Northern Spotted Owl

Range-wide Status and Trends

Northern spotted owls (NSO) are a federally listed threatened species and are closely associated with old forests for nesting, foraging, and roosting throughout most of their range (Forsman et al. 1984; Carey et al. 1990; and Solis and Gutierrez 1990). The ideal NSO habitat consists of large trees in the overstory, smaller trees of varying sizes and species in the lower and middle story, large standing and fallen dead trees, and patchy shrub and herb communities (Spies and Franklin 1991).

The BLM, Forest Service (USFS), and U.S. Fish and Wildlife Service (USFWS) have conducted a coordinated review of four reports containing information on the NSO. The reviewed reports include the following:

- Scientific Evaluation of the Status of the Northern Spotted Owl (Sustainable Ecosystems Institute, Courtney et al. 2004);
- Status and Trends in Demography of Northern Spotted Owls, 1985-2003 (Anthony et al. 2004);
- Northern Spotted Owl Five Year Review: Summary and Evaluation (USFWS 2004); and
- Northwest Forest Plan – The First Ten Years (1994-2003): Status and trend of northern spotted owl populations and habitat, PNW Station Edit Draft (Lint 2005).

Anthony et al. (2004) published meta-analysis of owl demographic data collected in 14 demographic study areas across the range of the northern spotted owl. Four of the study areas are in western Washington, six are in western Oregon, and four are in northwestern California. Although the agencies anticipated a decline of NSO populations under land and resource management plans during the past decade, Anthony identified greater than expected NSO population declines in Washington and northern portions of Oregon, and more stationary populations in southern Oregon and northern California. The most recent metadata analysis, published in 2016 (Dugger et al. 2016), found that fecundity, the number of female young produced per adult female, is declining. Dugger et al. (2016) concluded that fecundity, apparent survival, and/or populations were declining in most study areas, and that increasing numbers of barred owls and loss of habitat were partly responsible for these declines. The 2016 metadata analysis found these declines are occurring in more study areas than indicated in the last 2011 metadata analysis (Forsman et al. 2011). The 2016 data indicates that competition with barred owls may now be the primary cause of northern spotted owl population declines across their range.

These reports listed above did not find a direct correlation between habitat conditions and changes in NSO populations, and they were inconclusive as to the cause of the declines. Even though some risk factors had declined (such as habitat loss due to harvesting), other factors had continued, such as habitat loss due to wildfire, potential competition with the barred owl, West Nile virus, and sudden oak death (USFWS 2004; Lint 2005). The barred owl is present throughout the range of the NSO, so the likelihood of competitive interactions between the species raises concerns as to the future of the NSO (Lint 2005).

In more recent reports (Davis et al. 2011, Forsman et al. 2011), it has become more evident that the barred owl population is increasing across the range of the northern spotted owl. Forsman et al. (2011) indicates that the spotted owl populations have declined across most of the range, with the most significant declines occurring in Washington where the barred owl has been present the longest. Although analysis within the nearest NSO demography study (Klamath Study Area, or KSA) to the PA indicates a stable NSO population during the study period, the recent data shows the beginning of a trend towards a declining population (Davis et al. 2011). Davis et al. (2011) states that:

there is mounting evidence that barred owls are negatively impacting spotted owl population within the KSA. This is illustrated by several population trends beginning about 2003, which is when barred owl detections within the KSA exceed 10% of the sites. Spotted owl detections have been steadily decreasing since 2002 and reached the lowest point in 2010, the same year barred owl detections reached their highest level. Fecundity rates appear to be declining during the past 8 years and in only 1 of those 8 years was the rate above average. Fecundity rates for sites with known barred owl presence were lower than at other sites. If these trends continue a combination of lower occupancy and reduced fecundity, there may be cause for concern regarding the spotted owl population.

On June 30, 2011, the USFWS released the Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011). This Revised Recovery Plan recommends achieving recovery of the spotted owl through:

1. the retention of more occupied and high-quality habitat,
2. active management using ecological forestry techniques, both inside and outside of reserves,
3. increased conservation of spotted owls on State and private lands, and
4. the removal of barred owls in areas with spotted owls.

The Revised Recovery Plan also included a number of "Recovery Actions" that are near-term recommendations to guide the activities needed to accomplish the recovery objectives and achieve the recovery criteria included in the Revised Recovery Plan. Of the 33 Recovery Actions (RA) included in the Revised Recovery Plan, two were specifically considered and applied to the Upper Cow project: RA10 and RA32. These two RAs are discussed at other points in this document, including Chapter 2 and later in this section.

<u>Project Specific Spotted Owl Information</u>

For the purposes of this analysis, the vegetation within the Upper Cow PA was typed into habitat categories pertinent to the NSO. These habitat types are distinct and not over-lapping and are used throughout this document to describe and quantify habitat conditions across the landscape. These habitat categories are as follows:

Nesting, Roosting, and Foraging (NRF) Habitat for the spotted owl consists of habitat used for nesting, roosting, and foraging. NSO NRF habitat also functions as dispersal habitat. Generally, this habitat is multistoried, 80 years old or more (depending on stand type and structural condition), and has sufficient snags and down wood to provide opportunities for nesting, roosting, and foraging. The canopy cover generally exceeds 60%, but canopy cover or age alone does not qualify a stand as NSO NRF habitat. Other attributes of NRF habitat include: a high incidence of large trees with various deformities (e.g., large cavities, broken tops, mistletoe infestations, and other evidence of decadence); large snags; large accumulations of fallen trees and other woody debris on the ground; and sufficient open space below the canopy for spotted owls to fly (Thomas et al. 1990).

NRF habitat can be further divided into two habitat categories: roosting & foraging habitat and nesting, roosting & foraging habitat. Roosting & foraging habitat has an average canopy cover greater than 60% and canopy structure is generally single layered. Overstory trees are generally greater than 16 inches in diameter, and the presence of snags and down wood are not considered a requirement. Nesting, roosting & foraging habitat has high canopy cover (> 60%), a multilayered structure, and large overstory trees >21 inches in diameter. Deformed, diseased, and broken-top trees, as well as large snags and down logs, are also present. Nesting/roosting/foraging habitat meets all NSO life requirements. While these two habitat types are combined for the purposes of this analysis, the Unit Table in Appendix I includes the specific habitat type for each treatment unit.

NSO NRF habitat in southwest Oregon is typified by mixed-conifer forest, recurrent fire history, patchy habitat components, and a relatively high incidence of woodrats (a high quality spotted owl prey species in the Klamath Province) (Forsman et al. 1984, 2004; Ward et al. 1998; Hamer et al., 2001).

Forsman et al. (1984) described some of the differences in NRF habitat within the Klamath Mountains Province that are typical of large parts of the Medford District:

> …Eighty-one percent of all nests in northwestern Oregon were in cavities, compared to only 50 percent in the Klamath Mountains. These differences appeared to reflect regional differences in availability of the different nest types. Dwarf mistletoe infections in Douglas-fir (and numerous debris platforms that were associated with dwarf mistletoe infections) were common in the mixed coniferous forests of the Klamath Mountains and the east slopes of the Cascades, but did not occur in western Oregon.

Forsman et al. (1984) documented the range of nest trees for platform nests (n=47) as 36 to 179 cm (14.2 to 70.5 inches) DBH averaging 106 centimeters (41.7 inches) DBH. Mistletoe is occasionally used as a nesting substrate in southwest Oregon, which sometimes makes smaller trees suitable as nest trees. For spotted owls, features that support nesting and roosting habitat typically include a moderate to high canopy (70-90%); a multistoried, multi-species canopy with large overstory trees (greater than 30 inches DBH); a relatively high incidence of larger trees with various deformities, including mistletoe, large snags, large accumulations of fallen trees and wood on the ground; and flying space (Thomas et al. 1990). NRF habitat also functions as dispersal habitat.

Structurally complex habitat, as defined by Recovery Action 32 (RA32) in the 2011 Revised Recovery Plan for the Northern Spotted Owl is a sub-set of NRF habitat. Under the NSO Recovery Plan, the USFWS recommends that agencies "maintain substantially all of the older and more structurally complex, multilayered conifer forests on federal lands" (USFWS 2011). These forests are characterized as having large diameter trees; high amounts of canopy; and decadence components such as broken-topped live trees, mistletoe, cavities, large snags and large coarse wood. Stands proposed for management in the Upper Cow PA were evaluated to determine if any areas met the structurally complex habitat definition. Through field evaluations, 51 acres were determined to meet RA32 stand conditions and were withdrawn from consideration for treatment. All areas proposed for noncommercial treatments (Understory Reduction) would be assessed to determine if RA32 stand

conditions are present prior to implementation. Any areas identified as RA32 would be dropped from treatment. The initial RA32 screening did not yield a high amount of structurally complex habitat within the potential treatment pool of stands because the majority of older and more complex stands were already dropped from consideration due to the RA10 screening process described in more detail in Chapter 2, Section 1.8.7.

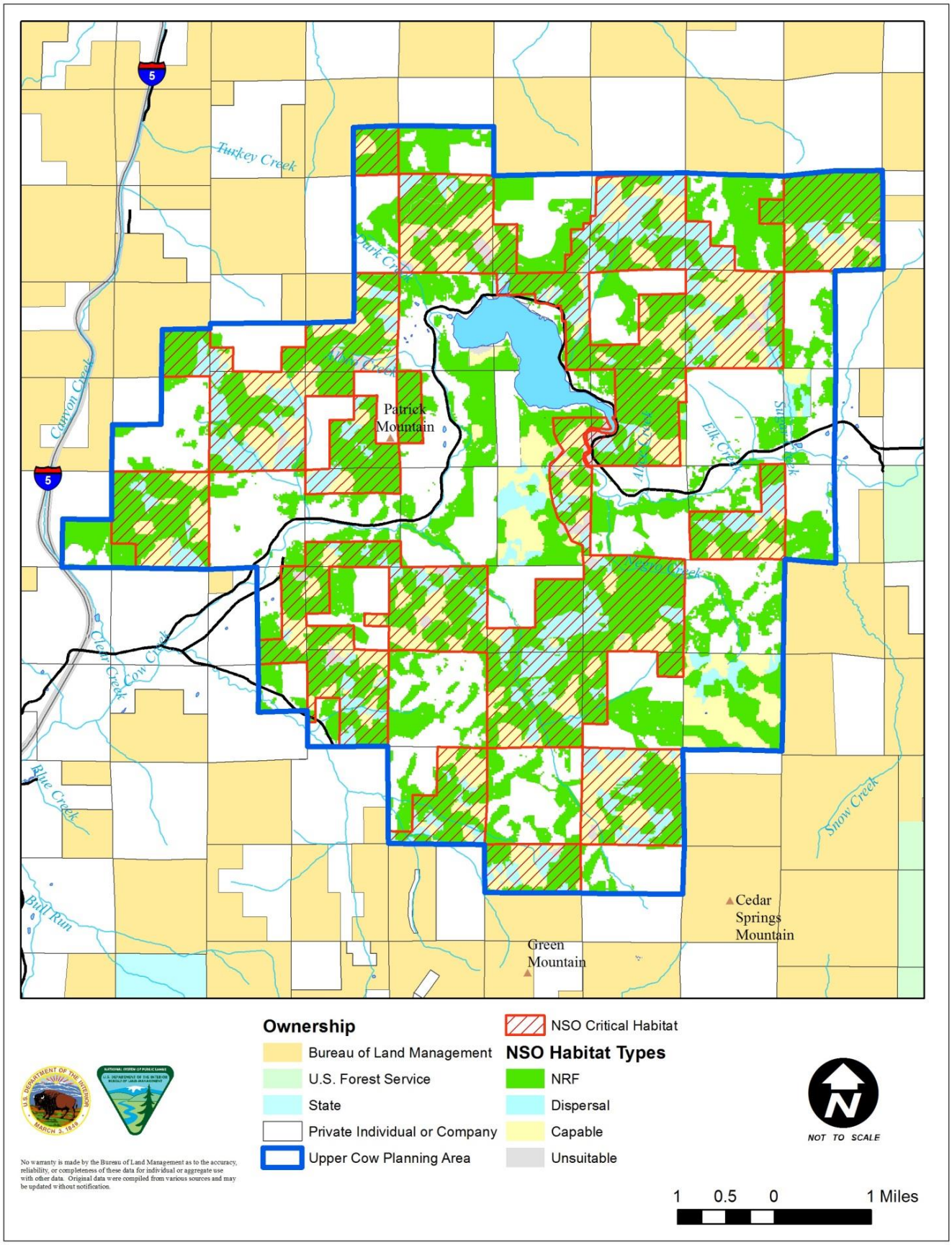
Dispersal-Only Habitat is a subcategory of all dispersal habitat for northern spotted owls. Thomas, et al. (1990), defined dispersal habitat as forested habitat more than 40 years old, with canopy cover greater than 40%, an average tree diameter greater than 11 inches, and flying space for owls in the understory but does not provide the components found in NRF. It provides temporary shelter for owls moving through the area between NRF habitat and some opportunity for owls to find prey, but does not provide all of the requirements to support an owl throughout its life. Dispersal will be used throughout this document to refer to dispersal-only habitat.

Unsuitable Habitat for the NSO is forest land that currently does not meet either the NRF or Dispersal definitions. Lands classified in this condition are made up from two sub-classifications: 1) lands capable of becoming suitable habitat in the future but are currently not functioning as habitat (i.e. young plantations) or 2) non-habitat lands are site limited and will never provide habitat (i.e. meadows, open oak woodlands, agricultural fields, human habitations).

All existing habitat within the PA was categorized into one of the three categories of NSO habitat described above. The habitat values were derived from two sources: 1) in areas that do not have proposed commercial treatments, habitat values were obtained from a BLM GIS (Geographical Information Systems) dataset representing NSO habitat values across BLM lands, and 2) in areas that are proposed for commercial treatments, field visits were conducted by BLM wildlife technicians and biologists to further identify and delineate the habitat values within those areas.

Habitat on lands other than BLM administered lands were only categorized into NRF or not NRF, and thus areas identified as not NRF were assigned into an unclassified category composed of either dispersal only or unsuitable habitat quality. Table 3.3-3 below provides information on the types and amounts of habitat by land ownership within the PA.

Figure 8 NSO Habitat Types and 2012 Critical Habitat within the PA



Although the PA is within the South Umpqua River/Galesville LSR, it has been heavily managed in the past and the existing habitat is moderately to highly fragmented into small blocks, mostly confined to sections (<640 acres) of BLM administered lands. The majority of the private land within the PA has been clear-cut and provides little habitat value for species associated with late-successional habitat. It is expected that private timber lands would be managed primarily for timber production and harvested on a 50-80 year rotation. As a result, NSO habitat within the Upper Cow PA is expected to be mostly limited to federally administered lands. Private lands within the PA currently contain 34% of the total existing NRF habitat within the PA, while BLM lands contain 66% of the existing NRF habitat present across the PA. On the BLM lands within the PA, approximately 54% of the BLM lands meet the minimum habitat standards of NRF habitat, 18% are dispersal and 28% is unsuitable. See Figure 8.

Table 3.3-3 Acres of NSO Habitat Types within the Upper Cow PA

Habitat Type	Ownership		TOTAL
	BLM	Private	
Nesting, Roosting & Foraging (NRF)	7,460	3,879	11,339
Dispersal Only Habitat	2,446	*	2,446
Unsuitable Habitat	3,828	*	3,828
* = Unclassified (not NRF)	0	8,857	8,857
TOTAL	**13,734**	**12,736**	**26,470**

Specific to the Upper Cow PA, there are 23 NSO territories with at least a portion of their home range (1.3 mile radius from the center of activity) that overlaps with the general PA (Figure 9). Table 3.3-4 includes a list of the NSO sites within the PA that are within 1.3 miles of proposed management activities. The Upper Cow PA is located with the larger Klamath Demographic Study Area; a network of study areas dedicated to the long-term monitoring of population trends across the range of the NSO (Davis et al. 2011). Consequently, all the known and historic NSO territories within the Upper Cow PA are surveyed on an annual basis following the Demographic Study Area protocol (Lint et al. 1999).

During the development of the Action Alternatives, the IDT followed principles in the Recovery Plan Implementation Guidance: Interim Recovery Action 10 Medford Bureau of Land Management/Rogue River-Siskiyou National Forest/U.S. FWS Roseburg Field Office (USFS/BLM/USFWS 2013) while designing the proposed treatments. The occupational and reproductive histories of all the NSO sites within the PA were assessed based on the results of protocol surveys (Lint et al. 1999). Based on these survey results, all the NSO sites within the PA which exhibited a high rate of occupancy and reproductive success within the last five years were categorized as high value sites. NSO sites that did not have any pairs detected within the past 5 years were categorized as low value sites. The ranking of these NSO sites were then used during alternative development to inform treatment locations and intensity consistent with recommendations

included in the "Restoring Dry Forest Ecosystems" section of the Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011, Section III, pp. 32-38). Table 3.3-4 included in this section list the NSO sites found within the PA and their value ranking, and Figure 9 displays the location of these NSO sites in relation to proposed treatments.

Table 3.3-4 Northern Spotted Owl Sites within the Upper Cow Planning Area and Value ranking.

NSO SITE NAME	PAIR IN LAST 5 YEARS?	YOUNG IN LAST 5 YEARS?	BARRED OWL IN LAST 5 YEARS?	SITE "VALUE"
AZALEA PEAK B	NO	NO	YES	LOW
AZALEA PEAK O	NO	NO	YES	LOW
BLACKJACK A	YES	YES	NO	HIGH
BLACKJACK O	YES	NO	NO	HIGH
FIZZLEOUT A	NO	NO	YES	LOW
FIZZLEOUT O	NO	NO	YES	LOW
GALESVILLE	NO	NO	YES	LOW
MEADOW CREEK A	NO	NO	NO	LOW
NEGRO CREEK O	YES	NO	YES	HIGH
OSHEA CREEK A	YES	NO	YES	HIGH
POWER TRANSMISSION O	NO	NO	YES	LOW
RUSSELL CREEK A	NO	NO	NO	LOW
RUSSELL CREEK O	YES	YES	YES	HIGH
SHIVELY FORKS A	NO	NO	YES	LOW
STARVED BULL B	NO	NO	NO	LOW
STARVED BULL O	NO	NO	YES	LOW
STOUTS 17 A	NO	NO	YES	LOW
SUGAR MAMA O	NO	NO	YES	LOW
THINHORSE A	NO	NO	YES	LOW
THINHORSE O	YES	NO	YES	HIGH
TURKEY CREEK A	NO	NO	NO	LOW
UMP COW O	YES	YES	NO	HIGH
WEST STOUTS B	YES	YES	NO	HIGH

Barred Owls

Barred owls (*Strix varia*) are native to eastern North America, but have recently colonized the Western US. The barred owl's range now completely overlaps that of the NSO (Gutierrez, et al. 2004). Barred owls (BO) are considered generalists and make use of a variety of vegetation and forage species (Wiens et al. 2014). Existing evidence suggests barred owls compete with NSOs for habitat and prey with near total niche overlap. Interference competition (Dugger et al. 2011) (Van Lanen et al. 2011) is resulting in increased NSO site abandonment, reduced colonization rates, and likely reduction in reproduction (Olson et al. 2005) (Dugger et al. 2011) (Forsman et al. 2011) (Wiens et al. 2014), ultimately resulting in probable range-wide population reductions (Forsman, et

al. 2011). BO effects on NSO survival and colonization appear to be substantial and additive to effects of reduction and fragmentation of habitat in NSO home ranges. The magnitude of the BO effect may increase somewhat as habitat quantity decreases and fragmentation increases (Dugger et al. 2011).

It has been established that activities that reduce the quantity of older forests adjacent to NSO activity centers reduce the probability of continued occupancy, survival, and reproduction (Franklin et al. 2000, Olson et al. 2004, Dugger et al. 2005, Dugger et al. 2011, Schilling et al. 2013). When BOs are present, the effect of such activities on NSO pair survival (estimated as probability of extinction of a single territory and termed "extinction probability") may be exacerbated by 2 - 3 times (Dugger et al. 2011). Some NSOs appear to be able to successfully defend territories and reproduce when barred owls are present, (Dugger et al. 2011, Wiens et al. 2014), but the mechanism that allows them to persist is currently unknown.

BO surveys are not required, but BOs are detected opportunistically while conducting NSO surveys. While the BLM did not specifically survey for barred owls, a study in the Oregon Coast range suggests that over the course of a season, NSO surveys to protocol (> 3 visits) allow approximately 85% of the barred owls present in the area to be detected (Wiens et al. 2011). Additionally, the USFWS's Protocol for Surveying Proposed Management Activities That May Impact Northern Spotted Owls allows for a reasonable assurance that NSOs in an area will be detected, even where barred owls are present (USFWS 2012a). The USFWS and cooperators conducted analyses of historical NSO survey data, leading to estimates of detection rates for NSOs that account for the effects of BO presence. Within the Upper Cow PA, NSO surveys have detected a number of breeding pairs of BOs and resident singles.

Spotted Owl Critical Habitat

The Upper Cow PA overlaps a portion of the Revised 2012 Critical Habitat for the NSO, specifically a portion of the KLE 2 Subunit of the Klamath East Habitat Unit (Figure 8). This subunit is expected to function primarily for east-west connectivity between subunits and critical habitat units, but also for demographic support. This subunit facilitates northern spotted owl movements between the western Cascades and coastal Oregon and the Klamath Mountains.

Approximately 12,072 acres of the KLE 2 Subunit are within the Upper Cow PA boundary, encompassing approximately 88% of the federal lands within the PA.

For a more detailed description of NSO Critical Habitat see the Wildlife Specialist Report contained within the Administrative Record.

3.3.2 Environmental Effects on Northern Spotted Owl and its Habitat

No Action Alternative

Direct/Indirect Effects

For an analysis of forest and fire/fuels processes within the PA under the No Action Alternative see the fire hazard and vegetation portions of this EA (Sections 3.2 and 3.3, and Appendix 4), and the Wildlife Specialist Report Contained within the Administrative Record.

The No Action Alternative would not alter the current habitat conditions across the Project Area, and the NSOs that inhabit and utilize the Upper Cow PA would not be impacted from any loss of habitat or project-related disturbance. NSOs would be expected to behave and utilize the habitat within the Project Area in the same fashion as they have in the past.

Under the No Action Alternative, no loss of NRF or dispersal habitat would be expected across the PA from active forest management. Estimating the potential loss of NRF or dispersal habitat due to wildfire or other disturbance events is difficult to determine. The recent trends in southwest Oregon illustrate that fire has been converting mature forest structure at a higher rate than harvest, making the retention of these types of forests problematic in dry forested ecosystems (Courtney et al. 2004; Spies et al. 2006). This was exemplified in the summer of 2015 with the Stouts Creek Fire, which burned approximately 26,500 acres within the Galesville / South Umpqua LSR and occurred to the northeast of the PA.

In general terms, wildfire would remain the most immediate hazard to late-successional forest habitat (NRF) and its associated species (Courtney et al. 2004), including the NSO. High severity fires could be expected to remove or downgrade habitat in a stochastic pattern across the landscape, setting back forest succession and development, and likely resulting in the loss of large tree structure critical to late-successional forest habitat dependent species. High severity fires resulting from these dense stand conditions would cause more severe impacts to soils, which may prolong the recovery and colonization of mycorhizzal processes, and macroinvertebrate and small mammalian prey food webs important to suitable foraging areas for NSOs.

BLM standard road maintenance, including activities such as road surface, ditch, road bank and fills, hazardous tree removal, culvert replacement, would occur and not downgrade the spotted owl habitat. Temporary and permanent ROW construction would continue on private lands and potentially on BLM-managed lands consistent with RROW agreements to allow private harvesting, resulting in the potential for removal of suitable and dispersal habitat.

<u>Action Alternatives 2 and 3</u>

Direct/Indirect Effects to NSO and its Habitat from Vegetation Management - Common to both

As detailed in Chapter 2 of this document, a suite of management activities are proposed under Alternative 2 that are designed to achieve multiple objectives, including: reduction of vegetation density, reduced risk of high-severity fire, increased growth and vigor of residual trees, and increased heterogeneity in terms of stand and species composition across the landscape. Table 3.3-5 below describes the proposed treatments and what NSO habitat type they would occur in across the PA. For a more detailed description of the effects to vegetation from the Action Alternatives see the Vegetation portion of this EA (Sections 3.1 and Appendix 4), and the Wildlife Specialist Report Contained within the Administrative Record.

The effects of habitat modification activities and the duration of those effects on NSOs depend upon the type of silvicultural prescriptions used and the location of the harvest relative to habitat. When discussing changes to spotted owl habitat, the following definitions are used to describe the

anticipated effects of the activities associated with the Action Alternatives to the NSO habitat types within the Upper Cow Project Area:

1. A Treat and Maintain of NRF or dispersal habitat means an action or activity would occur within NRF or dispersal habitat but would not change the habitat classification post-treatment. The NRF stand would retain an average of 60% canopy cover post-treatment, large trees, multistoried canopy, standing and down dead wood, and diverse understory adequate to support prey; and may have some mistletoe or other decay. Dispersal habitat would continue to provide at least 40% canopy cover, flying space, and trees 11 inches DBH or greater, on average.

2. A Downgrade of NSO habitat means to alter the function of spotted owl NRF habitat so the habitat no longer supports nesting, roosting, and foraging behavior, but would retain enough tree cover to support NSO dispersal. Downgrade is defined when the canopy cover in a NRF stand drops to 40-60% at the stand level, and when conditions are altered such that an NSO would be unlikely to continue to use that stand for nesting, roosting and foraging. Downgraded NRF continues to provide dispersal habitat.

3. A Removal of NRF or dispersal habitat results when management activities within NRF or dispersal habitat remove high levels of canopy cover and basal area, so the habitat no longer functions as NRF or Dispersal habitat post-harvest. Removal drops canopy cover to less than 40% and otherwise changes the stand so it no longer provides any habitat value for NSOs.

All of the treatments proposed under the Action Alternatives can be assigned into one of the general effect types listed above, and are presented in table 3.3-5 below. These classes of effects are used to assess the treatment impacts to the existing habitat present within the PA. Canopy cover is used as one of the critical habitat thresholds because it is highly important to NSO nest site selection and general habitat use because increased levels of canopy afford protection from predators, and regulate temperature extremes (Courtney et al. 2004). However, canopy cover alone is not the only important habitat element to NSOs. Other important components are structural diversity (vertical layering and mistletoe clumps, crown structure and complexity), decadence features (including snags, down logs, cavities and broken top trees), sufficient space for easy flight beneath the overstory, and access to prey.

Figure 9 Northern Spotted Owl Sites within the Upper Cow Planning Area

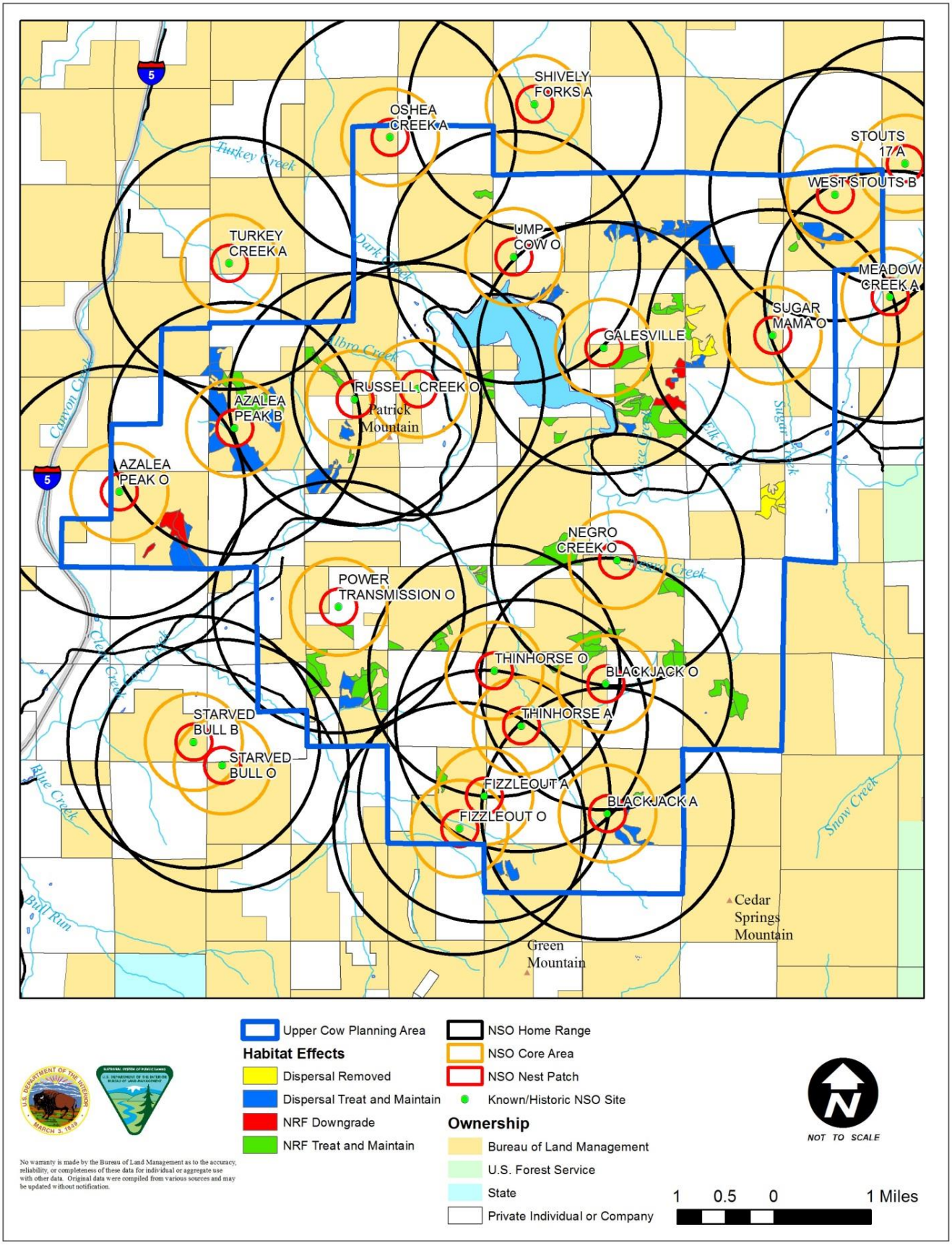


Table 3.3-5 Acres of Proposed Treatment Types within NSO Habitat

ALTERNATIVE 2				
Treatment Type	**NRF**	**Dispersal**	**Unsuitable**	**Total**
Variable Density Thinning (VDT)	135	344	0	474
VDT / Understory Reduction	15	115	0	132
Density Management (DM)	165	16	0	182
DM / Understory Reduction	109	0	0	109
Restoration Thinning (RT)	94	49	0	143
RT / Understory Reduction	17	3	0	20
Legacy Tree Culturing (LTC)	0.3	6	0	7
LTC / Understory Reduction	4	0	0	4
Understory Reduction	222	80	0	302
Grand Total	**762**	**613**	**0**	**1,373**
ALTERNATIVE 3				
Treatment Type	**NRF**	**Dispersal**	**Unsuitable**	**Total**
Variable Density Thinning (VDT)	135	344	0	474
VDT / Understory Reduction	15	115	0	130
Density Management (DM)	12	0	0	12
DM / Understory Reduction	0	0	0	0
Restoration Thinning (RT)	92	49	0	140
RT / Understory Reduction	3	17	0	20
Legacy Tree Culturing (LTC)	0	0	0	0
LTC / Understory Reduction	0	0	0	0
Understory Reduction	335	80	0	415
Grand Total	**592**	**605**	**0**	**1,191**

When analyzing the impacts to spotted owls from timber harvest and other vegetation treatments, the amount, intensity and duration of the harvest are not the only factors to consider. A critical factor to consider is the spatial distribution of the habitat found across the landscape and where the proposed treatments would occur in relation to known NSO nest sites. The areas surrounding a NSO nest site can be delineated into three concentric circles. A Nest Patch is the area within a 300-meter radius (70 acres) around a known or likely nest site. A Core Area has a radius that captures the approximate core use area, defined as the area around the nest tree that receives disproportionate use (Bingham and Noon 1997). The Medford District uses a 0.5 mile radius (~500 acre) circle to approximate the core area. The Provincial Home Range is an approximation of the median home range size used by spotted owls in the Klamath Mountains Province. Medford District uses the median home range estimated for southwestern Oregon of 3,400 acres or a circle with a radius of 1.3 miles.

These concentric circles represent three scales of use during the course of breeding and non-breeding season. Map 3-4 depicts graphically the known NSO sites and the associated circles representing the

above described areas of use for each site across the PA. These three areas of use represent how NSOs utilize the forest environment around their nest sites, and the importance of the habitat located within each spatial scale to a given NSO pair. They also provide a better understanding of how habitat altering treatments may affect NSOs life functions depending on where the treatment would occur in relation to known NSO nest sites. For a more complete definition of the areas of use which includes the Nest Patch, Core Area, and Provincial Home Range see the Wildlife Specialist Report Contained within the Administrative Record.

As described in Chapter 2, Section 1.8, during the development of the Action Alternatives the IDT followed principles in the Recovery Plan Implementation Guidance: Interim Recovery Action 10 Medford Bureau of Land Management/Rogue River-Siskiyou National Forest/U.S. FWS Roseburg Field Office (USFWS 2013) while designing the proposed treatments. Specifically, the following recommendations were used to reduce and minimize impacts to NSO in the PA:

- No treatments of any type would occur with the Nest Patch area of any NSO site;
- No habitat downgrade within any high value owl sites;
- Limit the total amount of treatments (all types) to <30% of the available NRF in any 0.5 mile core area;
- Where habitat downgrades are proposed, they are proposed to occur in only "low value" owl sites (See Table 3.3-4) and the treatment is designed to emphasize dry forest habitat restoration, consistent with "Restoring Dry Forest Ecosystems" section of the Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011, pp. III-32-38).

The combination of the intensity of harvest (habitat effects) and spatial location of treatments are assessed below by alternatives in order to evaluate the relative differences between the Action Alternatives and the No Action Alternative.

Effects to Northern Spotted Owl from Roads

No new permanent roads would be built under either Action Alternative. A number of short spurs of a temporary design would be constructed. After implementation is completed, these temporary routes would be fully decommissioned. Assuming a maximum of 20 feet total width for all temporary routes (including tractor swing roads), a total of 5.5 acres of habitat would potentially be removed, including 1.5 acres of NRF and 3 acres of dispersal with the remaining occurring in unsuitable habitat.

There are landings associated with ground-based, cable, and helicopter yarding systems. Many of the landings are located within existing road prisms and temporary routes. Due to the uncertainty of the exact location of landings the analysis will focus on the amount of potential vegetation alteration associated with the NSO habitat types within which the landings occur. The combined impact of all landings could potentially result in the removal of 22.7 acres of NRF habitat and 32.4 acres of dispersal. These values are predicted maximums, and actual treatment impacts after implementation is complete are expected to be lower than presented here.

The effects of this road work and associated landings to the NSOs present in the PA are anticipated to be minimal. The total amount of habitat impacted is low (0.3% of the existing NRF in the PA, federal lands only) and occurs in very small isolated pieces scattered across the PA, with the largest individual impact from potential helicopter landings at 2.8 acres. Edge effects from this construction would not be expected because all construction would occur within units proposed for timber extraction or in locations already impacted by previous road construction.

Effects to Northern Spotted Owl Prey

Treatments associated with the Action Alternatives that would treat and maintain NSO habitat may impact NSO foraging by changing habitat for NSO prey species. Effects to NSO prey species would be expected to occur due to Action Alternative treatments. Quantifying those impacts is somewhat problematic due to limited information on prey species abundance for the PA. Studies have shown variations of prey availability across different stands within the range of the NSO, which is likely reflected locally within the PA.

Edges created from harvest can be areas of good prey availability and potentially increased prey vulnerability (i.e., better hunting for owls) (Zabel et al. 1995). Prey animals may be more exposed in the disturbed area or could move away from the disturbed area for the short-term. Changes in prey availability occur as cover is disturbed and prey species move around in the understory. As a result, they can become more vulnerable and exposed. The disturbance could attract other predators such as hawks, other owls, and mammalian predators. This may increase foraging competition for owls in the treatment area, but the exposure of prey would also improve prey availability for NSOs.

Bingham and Noon (1997) reported that an NSO core area (closest to the nest) is the area that provides the important habitat elements of nest sites, roost sites, and access to prey, benefiting NSO survival and reproduction. Rosenberg and McKelvey (1999) reported that NSOs are “central place” animals with the core area being the focal area. Several studies (Wagner and Anthony 1998; Dugger et al. 2005; Zabel et al. 2003; Bingham and Noon 1997) indicate the core area size for the Klamath province is 0.5 miles from the nest site (or 500 acres). Therefore, effects to prey species are most critical at the nest patch and core areas.

Within the Upper Cow Project, there would be no treatment within the nest patches of any known NSO sites and all treatment within core areas would treat and maintain the existing habitat. Due to the spatial distribution of the proposed treatments under the Action Alternatives, adequate and sufficient prey habitat would remain within the core areas and would continue to provide suitable foraging opportunities within the home range.

All of the treatments proposed under the Action Alternatives were designed to help reduce any negative effects to NSO prey species by incorporating untreated pockets (leave “islands” or “skips”) throughout the treatment areas, with a goal of one acre left untreated for every six or seven acres treated (or approximately 15 %). This strategy is expected to provide unaltered portions of the stand throughout the PA that have the potential to serve as refugia for NSO prey species during project implementation. Residual trees, snags, and down wood retained in the thinned stands would provide

some cover for prey species over time, and would help further reduce any negative effects to spotted owl prey species.

Effects of Noise Disturbance to Northern Spotted Owls
Mandatory PDFs would be incorporated into the Proposed Action activities. Nesting owls are confined to an area close to the nest, but once the young fledge, they can move away from noise and activities that might cause them harm. Since all projects would follow mandatory PDFs that restrict activities to outside of the breeding season and beyond recommended disturbance distance thresholds, as established by the U.S. Fish and Wildlife Service, no harm to nesting owls, or their young, is expected from project-related noise or activities.

Effects of Barred Owl Competition with Northern Spotted Owls (Alternatives 2 and 3)
Available evidence suggests that the presence and distribution of barred owls may affect habitat quality for NSOs (Wiens 2012; Yackulic et al. 2013). Additionally, many studies suggest that the two species compete for resources and maintaining older, high quality forest habitat may help spotted owls persist, at least in the short-term. There are no known forest conditions that give spotted owls a competitive advantage over barred owls. While not common, Wiens (2012) did find NSOs and barred owls occupying the same territories concurrently. It is also not known if forest habitat removal directly results in a range expansion of barred owls (USFWS 2013).

Although NSO populations have been declining for many years, the presence of barred owls exacerbates the decline. Recent studies (Olson et al. 2005, p. 918; Forsman et al. 2011a, pp. 69-70, 75-76) have established negative relationships between barred owl presence and declines in spotted owl population performance across the range of the subspecies.

Removal or downgrade of habitat reduces the overall amount of available habitat and can therefore increase competition between these two species as habitat becomes increasingly limited. The effect of the vegetative treatments included under Alternate 2 is expected to have an extremely limited effect on competitive interactions between these two species because at most a very small amount (106 acres, or 0.8%) of the overall available NRF habitat would be lost (removed or downgraded) as a result of project implementation. The effect would be further reduced because the habitat loss is spread throughout the PA in many small non-contiguous locations.

<u>Direct/Indirect Effects to NSO and its Habitat from Vegetation Management - Specific to Alternative 2</u>
Specific to Alternative 2, a total of approximately 82 acres of NSO NRF (foraging) habitat would be downgraded by the combined effects of all timber harvest treatments (VDT, DM, RT, LTC). In addition, the construction of temporary routes and landing construction required to facilitate harvest operations would remove an estimated 1.5 acres and 22.7 acres of NRF habitat, respectively. Table 3.3-6 illustrates the type of habitat where these treatments are proposed, and the potential effect to each habitat type that would result under full implementation of Alternative 2. All of the density management and understory reduction treatments proposed under the Upper Cow Project are anticipated to result in a treat and maintain effect to the habitat type where these activities are implemented, or are expected to have no effect in unsuitable habitat.

Table 3.3-6 Treatment Effects to each NSO habitat type on BLM lands in the Upper Cow PA

ALTERNATIVE 2						
Habitat Type	**Pre-Project Acres (%)**	**Treat and Maintain**	**Downgrade**	**Removal**	**Post-Project Acres (%)**	**Percent change (PA)**
NRF	7,460 (54.3%)	624	82	24	7,354 (53.5%)	-0.8%
Dispersal-only	2,446 (17.8%)	531	NA	114	2,414 (17.6%)	-0.2%
Unsuitable	3,828 (27.9%)	0	NA	NA	3,966 (28.9%)	+1.0%
Total	**13,734**	**1,155**	**82**	**138**	**13,734**	**NA**
ALTERNATIVE 3						
Habitat Type	**Pre-Project Acres (%)**	**Treat and Maintain**	**Downgrade**	**Removal**	**Post-Project Acres (%)**	**Percent change (PA)**
NRF	7,460 (54.3%)	531	75	16	7,369 (53.7%)	-0.6%
Dispersal-only	2,446 (17.8%)	495	NA	79	2,442 (17.8%)	0.0%
Unsuitable	3,828 (27.9%)	0	NA	NA	3,923 (28.6%)	+0.7%
Total	**13,734**	**1,026**	**75**	**95**	**13,734**	**NA**

In their entirety, the treatments proposed under Alternative 2 would result in a total loss of 106 acres of NRF habitat across the PA (harvest areas plus the additional potential effects of new temp route construction and landings), or a reduction of 0.8% of the NRF habitat on federal lands within the PA. An additional 624 acres of treatments in NRF habitat throughout the PA would result in the treatment and maintenance of 8.4% of the existing NRF habitat on federal lands.

Approximately 645 acres of proposed treatments would occur within dispersal-only habitat, which would directly impact 26.4% of the dispersal-only habitat on BLM lands, or 6.3% of all dispersal habitat (combined NRF and dispersal-only) on BLM lands. Treatments included under Alternative 2 would result in the removal of 114 acres of dispersal habitat, resulting in the reduction of 1.2% of all available dispersal habitats on federal lands.

Implementation of treatments that downgrade NSO NRF habitat have the potential to reduce nesting, roosting, and foraging opportunities in treated stands. The downgrading of NRF habitat is likely to result in some adverse impacts to NSOs by decreasing flying squirrel abundance by removing mid-story and overstory structure from those acres (Wilson 2010, Manning et al. 2011) which could reduce NSO foraging opportunities. Also, reducing canopy cover below 60% would likely increase predation risk to NSOs in these stands, and introduce ecological edge effects to the affected stands as

well as to adjacent stands of NRF habitat, extending the area of impact beyond the treated areas. Harvest prescriptions that result in the downgrade of NRF habitat may remove some key habitat elements, including large diameter tree with potential nesting cavities or platforms, multiple canopy layers, adequate forest cover, as well as hunting perches used by NSOs.

The remaining treatments associated with Alternative 2 would treat and maintain the existing habitat where treatments are proposed and would primarily impact NSO prey and foraging opportunities. These treatment effects are considered short-term negative effects to prey and are discussed in more detail under Section 3.3.2: Effects to Northern Spotted Owl Prey.

Under Alternative 2, no management activities of any kind are proposed in the Nest Patch of any known or historic NSO sites located within the PA.

Within the Upper Cow PA, there are 23 cores (0.5 mile radius) that are associated with known NSO sites that overlap the PA. Of these 23 cores, 12 have treatments proposed within a portion of the core. All proposed treatments in these core areas are designed to treat and maintain the existing habitat type where implementation is to occur. In total, 347 acres (181 in dispersal and 166 in NRF) would be treated across all 12 core areas, including: 140 acres of VDT, 72 acres of DM, 37 acres of RT, one acre of Legacy Tree Culturing, and 97 acres of Understory Reduction.

Within the Upper Cow PA, there are 23 Provincial Home Ranges (1.3 mile radius) that are associated with known NSO sites that overlap the PA. The Proposed Action would take place within at least a portion of the home range of all 23 historical NSO sites. The majority of the proposed treatments are designed to treat and maintain the existing habitat type where implementation is to occur; with stand level treatments that result in the downgrade of NRF habitat occurring in only 3 “low value” NSO territories (Table 3.3-6).

While the implementation of this project under Alternative 2 would result in the downgrade of 82 acres of NRF habitat to dispersal-only habitat, these treatments would have long term beneficial effects to the forest structure and overall forest health. Treatments under Alternative 2 would reduce competition and increase the vigor of the residual trees left in the stand (Latham and Tappeiner 2002), while simultaneously reducing ladder fuels and decreasing the stand fire hazard rating. A specific goal of the prescription is to leave the largest and oldest trees in the stand, and retain all large hardwoods and snags. A substantial portion of the physical structure of the habitat in the treatment areas would still be present after implementation. Therefore, the treatment effects to habitat are mostly related to changes in canopy cover and the understory composition.

Overall, the spacing, timing and the retention of key habitat features as called for under the PDFs for this project (Chapter 2.4) are likely to avoid adverse impacts to NSOs with respect to prey availability; although localized, short-term changes in prey species distribution and abundance are likely to occur within treated stands. The dispersion of treatment sites over a large area is especially important in maintaining NSO prey populations within the PA. Residual trees, snags, and down wood retained in the treated stands would provide some cover for prey species over time and would help reduce harvest impacts to some prey species, such as dusky-footed woodrats. Treatment

implementation would be spread out temporally and spatially within the Project Area, leaving untreated areas available for NSO foraging, reducing the impact of these effects at the project level.

The long term (>30 year) effects of the Action Alternatives would likely increase the health and vigor of the residual stands post treatment. All of these treatments are expected to have long term beneficial effects by reducing fuel loads and overstory tree competition, thereby reducing the risk of high-severity fire occurring in these treated areas (Gaines et al. 2010), and increasing growth and vigor of the trees remaining within the treated areas (Roberts and Harrington 2008). It is likely that the treated stands would develop into more complex, structurally diverse forests in the long-term in comparison to the No Action Alternative. In fact, thinning dense stands may be necessary in order to achieve old-growth forest characteristics in the absence of natural disturbance events (Tappeiner et al. 1997). Thinning younger forest stands may provide growing conditions that more closely approximate those historically found in developing old growth stands (Hayes et al. 1997). Many of the treatments as proposed under Alternative 2, especially those that would occur in dispersal quality habitat would have long-term beneficial effects to NSOs by increasing growth rates of the residual stand and accelerating the development of late-successional old growth characteristics within the treated areas than would occur if left untreated.

Direct/Indirect Effects to NSO and its Habitat from Vegetation Management - Specific to Alternative 3

Specific to Alternative 3, a total of approximately 75 acres of NSO NRF (foraging) habitat would be downgraded by the combined effects of all timber harvest treatments (VDT, DM, RT, LTC). In addition, the construction of temporary routes and landing construction required to facilitate harvest operations would remove an estimated 1 acre and 15 acres of NRF habitat, respectively (Table 3.3-6).

In their entirety, the treatments proposed under Alternative 3 would result in a total loss of 91 acres of NRF habitat across the PA (harvest areas plus the additional potential effects of new temp route construction and landings), or a reduction of 0.6% of the NRF habitat on federal lands within the PA. An additional 531 acres of treatments in NRF habitat throughout the PA would result in the treatment and maintenance of 7.1% of the existing NRF habitat on federal lands.

Approximately 574 acres of proposed treatments would occur within dispersal-only habitat, which would directly impact 23.5% of the dispersal-only habitat on BLM lands, or 5.8% of all dispersal habitat (combined NRF and dispersal-only) on BLM administered lands. Treatments included under Alternative 3 would result in the removal of 95 acres of dispersal habitat, resulting in the reduction of 1.0% of all available dispersal habitats on federal lands in the PA.

Conclusions

In summary, Alternatives 2 and 3 would have minimal adverse impacts to the NSOs found within the PA given that:

- No treatments would occur within the nest patch area of any known NSO site;

- A maximum of 106 acres of NRF habitat would be downgraded within two "low value" NSO sites at the home range scale;
- A very small amount (0.8%) of the total NRF habitat located within the PA would be negatively affected (downgrade or removal);
- The majority (89.8%) of existing NRF habitat within the PA would not receive any treatments; and
- The majority of the proposed treatments (84%) are designed to treat and maintain the functionality of the habitat where the treatment occurs and would not reduce the overall amount of NRF or dispersal-only habitat found within the PA.

The Action Alternatives are expected to result in long-term beneficial effects to the NSOs found within the PA by:

- Reducing the risk of high-severity fire occurring within the treated areas and/or reducing the risk of high-severity fire occurring in high value habitat areas;
- Increasing growth and vigor of the trees and vegetation remaining within the treated areas; and
- Ultimately accelerating the development of the treated stands into more complex, structurally diverse forests in comparison to the No Action Alternative.

3.3.3 Environmental Effects to Northern Spotted Owl Critical Habitat

No Action Alternative

Direct/Indirect Effects to NSO Critical Habitat

Under the No Action Alternative, the current stand conditions within the Project Area would likely develop into less complex stand structures and species compositions than that of late-successional stands (Sensenig 2002), or at the very least, would require a much longer time scale to develop (Tappeiner et al. 1997). Untreated stands would remain at a higher risk of stand-replacing fire than if the stands were treated.

Under the No Action Alternative, no treatments would occur within any NSO Critical Habitat Units. Similar to the description given for the No Action Alternative for NSOs (Section 3.6.2.1) forest stand conditions within the 2012 NSO Critical Habitat would continue to develop along the general current trends toward higher density stand conditions, especially in the understory, than what was historically present in the area. Habitat conditions would remain generally unchanged at the Critical Habitat Unit scale in the short term unless a major disturbance such as fire, wind throw, insect infestation, or disease occurred.

At longer time scales, the growth of late-successional forest habitat or of young stands toward late-successional forest habitat under this alternative is uncertain. Second-growth stands with high tree densities and single canopy layering may not develop the large crowns and diameters and vertical and horizontal layering and spacing created by fire (Sensenig 2013). Fire hazard would continue to

increase and be the highest threat of Critical Habitat loss in forest stands where the density of hardwood and conifer stems and fuel ladders is high.

Alternatives 2 and 3

Direct and Indirect Effects to NSO Critical Habitat

Under the Action Alternatives, a mixture of activities are proposed to occur within the Revised 2012 Critical Habitat for the NSO. All of these activities would occur within the KLE 2 Subunit of the Klamath East Habitat Unit. Table 3-11 below describes the sub-set of the proposed treatments that would occur within the Revised 2012 Critical Habitat and what NSO habitat type they would occur in. As approximately 88% of the federal lands in the PA are designated NSO CH, the majority, but not all of the proposed treatments would occur within NSO CH.

Table 3.3-7 Acres of Proposed Treatment within the Revised 2012 Critical Habitat for the NSO

ALTERNATIVE 2				
Treatment Type	**NRF**	**Dispersal**	**Unsuitable**	**Total**
Variable Density Thinning (VDT)	117	343	0	460
VDT / Understory Reduction	15	115	0	130
Density Management (DM)	151	16	0	167
DM / Understory Reduction	66	0	0	66
Restoration Thinning (RT)	91	49	0	140
RT / Understory Reduction	17	3	0	20
Legacy Tree Culturing (LTC)	0.3	6	0	6
LTC / Understory Reduction	4	0	0	4
Understory Reduction	161	79	0	240
Grand Total	**622**	**611**	**0**	**1,233**
ALTERNATIVE 3				
Treatment Type	**NRF**	**Dispersal**	**Unsuitable**	**Total**
Variable Density Thinning (VDT)	117	343	0	460
VDT / Understory Reduction	15	115	0	130
Density Management (DM)	12	0	0	12
DM / Understory Reduction	0	0	0	0
Restoration Thinning (RT)	88	49	0	137
RT / Understory Reduction	17	3	0	20
Legacy Tree Culturing (LTC)	0	0	0	0
LTC / Understory Reduction	0	0	0	0
Understory Reduction	231	79	0	310
Grand Total	**480**	**589**	**0**	**1,069**

Alternative 2

Under Alternative 2, a total of 1,233 acres of various treatment types would occur within designated NSO CH (Table 3.3-7). Approximately 622 acres of various treatment types are proposed to occur within NRF habitat type located within CH, of which 78 acres are anticipated to result in a NRF downgrade. Approximately 611 acres of various treatment types are proposed to occur within dispersal-only habitat type located within CH, of which 78 acres are anticipated to result in the removal of dispersal-only habitat. All other treatments proposed to occur under Alternative 2 within NSO CH are specifically designed to treat and maintain the existing habitat condition where the treatments occur, and would not alter the amount of habitat available within the CH Unit, nor adversely modify any of the Primary Constituent Elements within these treated areas.

The activities proposed in NSO CH under Alternative 3 are similar to those proposed under Alternative 2, but there would less DM (decrease of 139 acres), slightly less RT (3 acres) and an increased amount of UR (70 acres). As the treatments are so similar, the effects discussed here are specific to Alternative 2, but similar effects are anticipated for Alternative 3, only at a slightly reduced level.

The 78 acres of NRF downgrade are spread among four treatment units: 1-1, 26-1B, 35-2 and 35-15. These stands are comprised of mixed conifer and hardwoods, including Ponderosa pine and black oak tree species that are relatively scarce within the PA. These stands are reaching high stocking levels that form a dense overstory with many trees having poorly developed crowns (stem-exclusion phase). The increased density of Douglas-fir has created increased completion for resources and is negatively affecting the pine and oak component of these stands (for more discussion on this subject see the Vegetation ChapterSection 3.1).

The proposed RT and VDT prescriptions that would thin treated forest stands to a wider spacing, leaving the most vigorous individuals of the stand remaining, emphasizing the retention of pine and oak species. The VDT approach would employ a system of skips and gaps (described in more detail in Section 2.2; and Appendix G Silviculture Prescription) that would work to increase the structural variation across the treatment area. Both the general thinning and the skips and gaps would work to improve habitat quality in the long term by increasing growth rates of the remaining trees in thinned areas (Miller and Emmingham 2001, Roberts and Harrington 2008), and creating variable habitat conditions across the stand including pockets of high density and small openings that provide improved access to prey species (Harrington et al. 2005).

The downgrading of 78 acres of NRF habitat within NSO CH would likely result in some short-term adverse impacts to this NRF habitat by decreasing flying squirrel abundance by removing mid-story and overstory structure from those acres (Wilson 2010, Manning et al. 2011), which could reduce NSO foraging opportunities. Also, reducing canopy over below 60% would likely introduce ecological edge effects to the affected stands as well as to adjacent stands of NRF habitat, extending the area of impact beyond the treated areas. However, even with the downgrade of 78 acres of NRF habitat and removal of 78 acres of dispersal-only habitat within the NSO CH, the Action Alternatives

would negligibly affect the intended conservation function of the KLE 2 Subunit of the Klamath East Habitat Unit because at the most (under Alternative 2), the proposed treatments would only result in a reduction of 0.14% and 0.09% of the available NRF and dispersal habitat respectively within the CH sub-unit KLE 2. In total, the maximum impact of all treatments proposed under any Action Alternative would impact 1.2% of the KLE 2 Subunit.

Even though some adverse impacts are anticipated where NRF habitat is downgraded, the Proposed Action Alternatives are expected to result in long term beneficial effects to NSOs and the Revised 2012 CHU because the thinning treatments (VDT, DM and RT) would accelerate the development of the relatively homogeneous stands toward late-successional habitat faster than if the stands were left untreated (Hayes et al. 1997). The proposed treatments would also increase survivability and vigor of more drought- or fire-tolerant species (pines, cedars, hardwoods) on ridge tops and in areas where site conditions do not favor Douglas-fir, or Douglas-fir is suppressing the occurrence of pines. The activities proposed under the Action Alternatives, especially the Understory Reduction treatments, would help reduce the likelihood of high severity fire occurring within the CH. The Fire Hazard Chapter (3.2) provides a detailed explanation and analysis on this topic. Specific to NSOs, this approach is supported by complex modeling procedures that indicate that active management of sites with high fire hazard was more favorable to NSO conservation over the long term (75 years) compared to no management (Roloff et al. 2012).

A great deal of planning and forethought was used during the development of Alternatives 2 and 3 in terms of the spatial location and magnitude of the proposed treatments in relation to known NSO sites and current habitat conditions across the landscape. Where the downgrade of NRF habitat is proposed, the vegetative community is comprised of species assemblages (pine and oak) that require lower canopy cover and densities to persist at longer time scales. The proposed suite of management activities included under Alternatives 2 and 3 is consistent with both the Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011) and the 2012 Final Revised Critical Habitat for the NSO (USFWS 2012b) management recommendations of active management using ecological forestry techniques, both inside and outside of reserves.

Cumulative Effects on NSO and its Critical Habitat

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

Fire suppression, road building, and timber harvest throughout the PA have resulted in habitat modification and fragmentation, and have changed the distribution and abundance of wildlife species surrounding the PA. Timber harvest has occurred on BLM lands in the Upper Cow Planning Area since 1950. The associated habitat loss has negatively affected late-successional forest habitat

dependent species by reducing stand seral stage and changing habitat structure. However, species associated with younger forested conditions have benefited from these changes due to the increased acres of young stands.

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

For those species dependent on early seral habitat, private forest lands do not always provide quality habitat as competing vegetation that includes flowering plants, shrubs and hardwood trees are regularly sprayed with herbicides to reduce competition with future harvestable trees.

A detailed synopsis of the future foreseeable projects that are expected to occur within the PA is included in Appendix D. Projects such as young stand management and fuel reduction treatments are expected to result in long-term beneficial effects through habitat development and risk-reduction. These types of treatments would not change the current habitat types or amounts present in the PA. Other future foreseeable projects like road maintenance or water source maintenance would not have any direct effect to NSOs or NSO habitat. Construction of new roads on BLM lands through the Reciprocal Right-of-way agreements held with private industrial forest landowners have the potential to remove or downgrade small patches (<10 acres) of NRF or dispersal habitat within the PA. Although this potential exists, there are no current requests for new ROWs on BLM lands, and thus a more detailed analysis is not possible. If one assumes 10 acres of NRF habitat loss to ROWs on a decadal basis, this would equate to a loss of 0.1% of the existing NRF within the PA per decade.

Non-Federal lands are not expected to provide demographic support for spotted owls across and between physiographic provinces (Thomas et al. 1990). The Medford BLM assumes these past management practices would continue and reduce the amount of NRF habitat for spotted owl on non-Federal lands in the future. The amount of private land harvest at the watershed level would not preclude NSOs or other late-successional forest species from dispersing within or through the Upper Cow PA.

After considering the potential impacts from other projects that are likely to occur within the planning area in addition to the Action Alternatives, it is unlikely these cumulative impacts would appreciably reduce or diminish the survival or recovery of the NSO, due to the small percentage of habitat this would affect at the provincial and the range-wide levels. Additionally, with the small level of harvest, this project would not preclude NSOs occupying viable territories and continuing to reproduce in the PA.

3.3.4 Candidate Threatened and Endangered

The Pacific fisher (*Pekania pennanti*) was petitioned for listing as endangered or threatened under the Endangered Species Act on December 12, 2000. In 2003 the USFWS released their notice of 90-day petition finding and initiation of status review (USFWS 2003) and in 2004 published their Notice of 12-month petition finding, concluding that listing fishers as threatened was warranted, but was

precluded by higher priority listing actions (USFWS 2004). Most recently, The U.S. Fish and Wildlife Service issued a proposal to list the West Coast Distinct Population Segment (DPS) of fisher as a threatened species under the Endangered Species Act (USFWS 2014). Until the final listing is issued by the USFWS in 2016, fishers remain a Candidate Species and a BLM Bureau Sensitive Species.

Pacific Fisher

Affected Environment

See the Wildlife Specialist Report in the Administrative Record for a detailed description of the Affected Environment for Pacific fisher. The report includes typical fisher habitat, life cycle, and habitat usage in the Rogue Valley.

The northern spotted owl NRF habitat-type described above adequately describes suitable fisher denning and resting habitat because there is a direct correlation of key habitat features used to assess NSO habitat and fisher habitat (high canopy cover, multi-storied stands, large snags, and large down trees on the forest floor). Using northern spotted owl habitat as a surrogate for fisher habitat has been accepted by the courts as a reasonable practice (KS Wild v. US BLM, Case No. 06-3076-PA, Order and Judgment 9/10/2007).

Based on the NSO habitat analysis, approximately 7,460 acres of suitable fisher denning and resting habitat exist on BLM-administered lands within the Upper Cow PA. However, all of these acres may not provide optimal fisher habitat because past harvest practices and land ownership patterns have resulted in fragmented habitat. BLM "checkerboard" ownership may be one of the primary factors limiting the ability of BLM-administered lands to provide optimal habitat for fishers.

Conclusion

The Medford BLM has conducted fisher surveys using baited camera stations over multiple survey seasons and has placed a total of nine camera stations (survey stations) within the immediate Upper Cow PA, and a total of 69 cameras stations within a 10 mile radius of the Upper Cow PA. None of these surveys have yielded positive detections of fisher within the PA. The closest photo documented fisher detection is over 30 miles to the southwest of the PA. The absence of detections from camera surveys, hair tubes, and reported potential sightings from BLM field personnel, indicates it is highly unlikely that a resident population occurs in the PA; therefore effects to this species from the Upper Cow project will not be analyzed in further detail.

3.3.4 Survey and Manage Species

The species included as part of the NWFP Survey and Manage (S&M) program have changed over the lifespan of the program. The current direction and list of species included as Survey and Manage is given in Instruction Memorandum No. OR-2014-037 (USDI 2014). The only wildlife species currently included on the Survey and Manage species list that occurs within the PA is the red tree vole. Some of the species previously included as S&M (i.e. *Helminthoglypta hertleini*) remain on the BLM's Special Status Species List and are considered in that section below.

Red Tree Vole

Affected Environment

The red tree vole (*Arborimus longicaudus*) is an arboreal rodent species with very low dispersal capabilities. Red tree voles (RTVs) depend on conifer tree canopies for nesting, foraging, travel routes, escape cover, and moisture (Carey 1991). Douglas-fir needles provide the primary food and building materials for nests (Huff et al. 2012). The broad management objective for this species under the S&M program is to retain sufficient habitat to maintain its potential for reproduction, dispersal, and genetic exchange (USFS/BLM 2000).

Surveys for RTVs were conducted across the Upper Cow PA in locations that have management activities proposed that would trigger the need for pre-disturbance surveys and contain suitable habitat for RTVs (Huff et al. 2012). A total of 406 acres were surveyed for the presence of RTVs across the Upper Cow PA. These surveys detected 28 active RTV nests and 33 inactive nests throughout the survey areas. Stands that are aged <80 years old do not require surveys (BLM 2014b).

No Action Alternative

Under the No Action Alternative, none of the proposed harvest activities would occur, and the forested stands in the PA would continue to develop along their current pathways. Therefore, none of the potential RTV habitat found within the PA would be altered. Stand replacement fire would remain the greatest risk to the existing RTV habitat found within the PA.

Alternative 2

Affected Environment

All known active and associated inactive RTV nests located from protocol survey efforts have been buffered according to the RTV management recommendations (USFS/BLM 2000). These buffers (Habitat Areas) removed approximately 191 acres from potential commercial harvest treatments.

Direct/Indirect Effects

No direct impacts to RTVs are anticipated as a result of implementing the actions included under Alternative 2. Outside of these buffered Habitat Areas, Alternative 2 proposes commercial treatments across approximately 540 acres of currently unoccupied RTV habitat. The various thinning treatments (DM, VDT, RT) would be expected to remove some individual trees from the overstory and midstory, particularly those with suppressed crowns or the less fire-resistant individuals that could provide RTV nesting structure. The commercial treatments would reduce the overall cover and inter-connectivity of the canopy remaining in the residual stand, reducing the habitat quality for RTVs in these treatment areas.

The non-commercial treatments (UR) proposed under Alternative 2 would remove primarily vegetation from the understory or the smaller components of the midstory. This would have minimal effects on RTV habitat, as the trees removed by this type of treatment are rarely used by RTVs and do not provide high quality nesting habitat. These treatments would potentially reduce the

connectivity of the canopy, but adequate arboreal pathways would remain throughout the treated areas for RTVs to travel and disperse.

Conclusion

Assuming that the NSO habitat category of NRF equates to suitable RTV habitat, a small amount of the suitable RTV habitat present on BLM administered lands in the PA (7.2%) would be impacted by the activities proposed under Alternative 2. Additionally, all known active RTV sites and associated inactive nest sites would be protected in accordance with current management guidelines (USFS/BLM 2000). Therefore, the activities proposed under Alternative 2 would minimally affect the RTV population within the PA. Undiscovered nests located outside of the buffer areas may be negatively affected due to reduced canopy cover by isolating nests and reducing dispersal capability. Some undiscovered nests may also be lost through removal of nest trees. However, the likelihood of undiscovered nests and associated effects would likely be low because RTV surveys are designed to ensure detection of RTV nests where the most viable populations exist within the stands. Additionally, even with the loss of some RTV nests, RTVs would persist in the watershed because known RTV sites would be protected and habitat would be retained throughout the PA and watershed.

Alternative 3

Affected Environment

Alternative 3 defers treatments in stands greater than 80 years of age which would exempt the remaining stands from surveys per the Pechman Exemption (BLM 2014b). The Upper Cow Project Wildlife Biologist chose to survey some stands that were less than 80 years of age because the habitat conditions were adequate to support RTV populations.

All known active and associated inactive RTV nests located from protocol survey efforts have been buffered according to the RTV management recommendations (USFS/BLM 2000). These buffers (Habitat Areas) removed approximately 120 acres from potential commercial harvest treatments. Therefore, no direct impacts to RTVs are anticipated as a result of implementing Action Alternative 3.

Direct/Indirect Effects

Outside of these buffered Habitat Areas, Alternative 3 proposes commercial treatments across approximately 270 acres of currently unoccupied RTV habitat. The commercial treatments would reduce the overall cover and inter-connectivity of the canopy remaining in the residual stand, reducing the habitat quality for RTVs in these treatment areas.

The non-commercial treatments (UR) proposed under Alternative 3 would potentially reduce the connectivity of the canopy, but adequate arboreal pathways would remain throughout the treated areas for RTVs to travel and disperse.

Conclusion

Assuming that the NSO habitat category of NRF equates to suitable RTV habitat, a very small amount of the suitable RTV habitat present on BLM administered lands in the PA (3.6%) would be impacted by the activities proposed under Alternative 3. Additionally, all known active RTV sites and associated inactive nest sites would be protected in accordance with current management guidelines (USFS/BLM 2000). Therefore, the activities proposed under Alternative 3 would minimally affect the RTV population within the PA.

3.3.5 BLM Bureau Sensitive Species

For a detailed analysis of other S&M species and species covered by federal acts and Executive Orders that may occur within the PA such as mollusks and Neotropical migratory birds, see the Wildlife Specialist Report contained within the Administrative Record. A table containing Special Status Species in the Grants Pass Resource Area can be found in Appendix F.

Bureau Special Status Species (SSS) are species listed or proposed for listing under the ESA and species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA. The SSS list was most recently updated in January 2012. This list has two categories: Sensitive and Strategic. Medford 1995 RMP guidance states, "Manage for the conservation of Federal candidate and Bureau-sensitive species and their habitats so as not to contribute to the need to list, and to contribute to the recovery of the species." Per BLM Manual 6840 (Section .06), Bureau sensitive species will be managed consistent with species and habitat management objectives in land use and implementation plans to promote their conservation and to minimize the likelihood and need for listing under the ESA or other provision of BLM Manual 6840.02. The RMP requires that the BLM manage, over time and across the landscape, so as to not contribute to the need to list a species, and not for every action, to contribute to the recovery of the species. Project implementation will adhere to the requirements set forth in Section 6840.2.C. According to BLM SSS Management (BLM 2008), only Sensitive species are required to be addressed in NEPA documents. All Sensitive species were considered and evaluated for this project, and only those that could be impacted by the PA are discussed in more detail.

General Direct/Indirect Effects

The actions proposed under Alternative 2 are likely to impact a limited assortment of habitat components important to the SSS species present in the PA. Generally, these impacts would be limited to the reduction of the existing snags present across the treatment area, and would primarily affect the woodpecker and bat species that utilize snags for foraging and roosting (primarily Lewis' woodpecker, white-headed woodpecker, fringed myotis and pacific pallid bat). Although the PDFs in Chapter 2 require the retention of snags and CWD whenever feasible, it is sometimes necessary to fall some snags during commercial harvest operations due to safety concerns.

Alternative 2 proposes 1,373 acres of commercial thinning treatments where there would be the potential need to fall snags for safety concerns. This represents approximately 10% of the federal lands within the PA. Most existing snags should remain present within these treated areas. This small reduction in the quantity of the existing snags across the PA would result in a minimal and

inconsequential reduction in the available habitat for those species that rely on snags as a primary habitat feature, and would not result in a loss of species viability or create significant trends toward federal listing for any Special Status Species.

Bald Eagle

Affected Environment

On August 8, 2007, the USDI Fish and Wildlife Service removed (delisted) the Bald Eagle (*Haliaeetus leucocephalus*) from the Federal List of Threatened and Endangered Wildlife (Federal Register Vol. 72, No. 130, July 9, 2007, 37346 -37372), but they remain a Bureau Sensitive species. Bald eagles nest in large trees, usually within one mile of large bodies of water. Suitable nesting habitat is present within the PA adjacent to the Galesville Reservoir. A single Bald Eagle territory and nest are known to occur within the PA; approximately a quarter of a mile from the Galesville Reservoir on BLM administered lands southwest of the reservoir. The main stem of Cow Creek and the Galesville Reservoir are the primary source of foraging opportunities for bald eagles within the PA.

No Action Alternative

Under the No Action Alternative, management activities would not remove or alter suitable habitat within the PA and habitat would continue to develop along current successional pathways. The development of key late-seral and old-growth forest stand conditions would be the same as described above for the NSO. Particularly to bald eagles, the greatest risk of No Action is the potential wildfire related loss of large live remnant conifers needed to support bald eagle nesting structures.

Alternatives 2 and 3

Action Alternatives

Direct/Indirect Effects from Alternatives 2 and 3 Vegetation Management – Common to all

For this analysis on effects to Bald Eagles, only those treatments that would occur within 1 mile of suitable foraging habitat (the Galesville Reservoir) were considered, as all mature forest habitat within one mile of the river is considered suitable habitat, and thus treatment activities within that zone could potentially have negative impacts to eagle habitat. Typically, eagles nest within 1 mile of suitable foraging areas (USFWS 2007).

All proposed activities that would occur within close proximity to the one known bald eagle nest site or any future occupied nest location within the PA would be limited by seasonal restrictions (see PDF, Chapter 2.4, which would preclude disturbance in the vicinity of active nest sites. Bald Eagles typically roost and nest in super-dominant trees (generally >36 inches DBH) with large crowns that protrude above the majority of the canopy. Trees that provide this type of habitat are not being considered for harvest under any Action Alternative. In general, very little impact to eagle habitat would occur from the implementation of either Action Alternative because the project is designed to minimally affect the treatment areas and is limited to the removal of trees ≤ 25 inches DBH at the maximum.

Direct/Indirect Effects from Alternative 2

Alternative 2 proposes 159 acres of commercial harvest within one mile of foraging areas identified within the PA. The treatments are limited to removal of trees less than 25 inches DBH, and in most cases, 20 inches DBH, and are designed to retain the largest, most developed trees in any treatment area. Therefore, the proposed treatments would have a negligible impact to Bald Eagle habitat because these treatments should not directly affect any super-dominant trees that Bald Eagles typically use for Nest or Roost trees. Additionally, seasonal operating restrictions (see PDF, Chapter 2.4) would preclude disturbance near any active nest sites, thereby eliminating any effects to Bald Eagles during the breeding season from project activities.

Direct/Indirect Effects from Alternatives 3

Alternative 3 proposes 96 acres of commercial harvest within one mile of foraging areas identified within the PA. Alternative 3 is more restrictive, and would remove trees less than 20 inches DBH, and are designed to retain the largest, most developed trees in any treatment area. Therefore, the proposed treatments would have a negligible impact to Bald Eagle habitat for the same reasons given in Alternative 2.

Cumulative Effects for all Wildlife Species from the implementation of Alternatives 2 and 3

Cumulative Effects for wildlife species and habitat are primarily discussed at the HUC 10 watershed level. However, in some cases, multiple HUC 10 watersheds, as well as portions of adjacent watersheds, are used in order to capture the varying habitats, species home ranges, and varying degrees of species mobility. A summary of ongoing and foreseeable actions on federal lands within the Upper and Middle Cow Creek HUC 10 Watersheds is provided in Appendix D of this EA.

There is no evidence that current forest practices on Federal land immediately threaten any terrestrial wildlife species in Oregon. Even though the Action Alternatives may potentially adversely disrupt local individuals of sensitive wildlife species and may cause the loss of habitat in some cases, this project is not expected to affect long-term population viability of any Bureau Sensitive or former S&M wildlife species known to be in the area. Additionally, this project combined with other actions in the watershed would not contribute to the need to federally list any Bureau Sensitive or S&M wildlife species, because of the small scope of the Proposed Action and the presence of a diversity of habitat within the Upper Cow and Middle Cow Creek HUC 10 Watersheds. If the maximum acres are treated (under Alternative 2) the Proposed Action would only treat 10% of the federally administered lands within the Upper Cow PA.

3.4 Soils – Productivity and Compaction

3.4.1 Affected Environment

The Middle Cow Creek Watershed Analysis (BLM 1999a, p.5) describes soils in the watershed as primarily derived from metasedimentary rock types, with metavolcanic derived soils in the upper portions of Quines, Starvout and Whitehorse Creeks. Soils associated with metasedimentary rocks tend to be deeper and have more nutrients available. Some areas have serpentine-derived soils which are low in calcium and high in magnesium and other minerals which preclude Douglas-fir and many

other plant species which are adapted to calcium-based soils. Some soil types are considered to be sensitive to management activities such as timber harvest, road construction and broadcast burning, including shallow soils (less than 20 inches deep), soils derived from granite or schist, and soils derived from serpentine or peridotite. In the north trending valley bottoms in the eastern portion of the watershed, soils are moist and deep, with a riparian influence (BLM 1999a, p.7).

The Upper Cow Creek Watershed Analysis (BLM 2005, p.21) describes the most productive soil types occurring on soils derived from metasedimentary rock types. These contain a greater proportion of Douglas-fir with greater size and growth rates than in metavolcanic derived soils. Granitic soils tend to support mixed conifers and are relatively productive if organics are undisturbed. Site-specific vegetative community analysis needs to be assessed during prescription surveys since the area is geologically and geographically very complex. The nutrient content of both Vermisa and sandstone and granitic derived soils is dependent upon organic matter, therefore consumption of organic matter during broadcast burning is of some concern. These shallow, low nutrient content soils are susceptible to nutrient depletion if the soil becomes hot enough, as is often the case in broadcast burning. Hand pile and burning is less likely to cause nutrient depletion for Vermisa, sandstone, and granitic soils since burning activities are localized at specific points instead of across an entire landscape.

Soil Productivity

Soil productivity, in a forested setting, is primarily the soil's capacity to support plant growth over time as reflected by some index of biomass accumulation. Losing a soil's plant growth capacity also means losing the site's ability to sustain a level of timber production. There are five major ecosystem functions of forest soils that influence forest productivity: 1) water storage, 2) nutrient accumulation, 3) carbon storage, 4) structural support, and 5) habitat for organisms. Forest soil maintenance is a key factor for sustaining productive forests. Some soils have high erosion hazard under bare mineral soil conditions where slopes are steep and very steep (greater than 35% slope). In the Middle Cow Creek Watershed, the most productive lands occur on deeper soils in the north and east portions (BLM 1999a, p.52). Some BLM lands have been administratively withdrawn from timber harvest through the Timber Productivity and Capability Classification (TPCC) based on rocky soils, fragile slopes, high water tables and other factors.

Timber Production Capacity Classification (TPCC)

The TPCC is a land classification system used to partition all public lands within the Sustained Yield Unit (SYU) boundary of BLM administered lands (BLM 1986a). Portions of the Upper Cow PA are classified as having TPCC fragile soils or reforestation limited soils under the TPCC Handbook (BLM 1986a). The reforestation TPCC classifications in the PA are captured in the following Table:

Table 3.4-1 Reforestation TPCC Classifications

TPCC Category	Classification	Units Affected
FGR/RMR	Fragile Gradient Restricted / Reforestation Moisture Restricted	1-2, 11-1, 15-19, 27-4S, 3-1, 3-1A, 35-3, 9-22
FGR/RTR	Fragile Groundwater Restricted / Reforestation Temperature Restricted	11-26, 11-6, 14-3, 29-1

TPCC Category	Classification	Units Affected
FWR/RMR	Fragile Groundwater Restricted / Reforestation Moisture Restricted	31-2W
RMR	Reforestation Moisture Restricted	1-1, 1-2, 11-25, 11-6, 13-37, 17-1, 17-1A, 17-1D, 17-1E, 17-4, 19-3, 19-4A, 19-9, 21-12, 21-2, 23-1, 23-10, 23-2B, 23-6N, 24-1, 25-12, 25-1B, 25-37, 25-7, 26-1, 26-1B, 26-3, 27-4S, 29-1, 3-1, 3-1A, 30-2, 31-2, 31-2S, 31-2W, 31-3, 31-6, 32-4, 32-7S, 34-1, 35-15, 9-19, 9-22, 9-24
RSMR	Reforestation Surface Rock Moisture Restricted	29-1, 31-2, 31-2NW
RSTR	Reforestation Surface Rock Temperature Restricted	11-1, 11-25, 11-6, 15-19, 24-3, 29-1, 31-2NW, 31-2S, 35-1, 35-1B, 35-5
RSW	Reforestation Surface Rock Withdrawn	1-1, 1-1B, 11-34, 11-6, 26-1B, 29-1, 35-15, 35-1B, 35-2
RTR	Reforestation Temperature-Restricted	1-1, 1-1B, 1-2, 11-26, 13-37, 13-4, 14-3, 17-1, 17-1A, 17-1B, 17-1C, 17-1D, 17-1D, 17-4, 19-3, 19-4, 19-4A, 19-9, 21-12, 21-2, 23-1, 23-10, 23-2, 23-2B, 23-3N, 23-7SA, 23-8, 24-1, 24-3, 25-37, 26-1, 26-1B, 26-3, 26-3A, 27-12, 27-4S, 3-1A, 31-2, 31-2NW, 31-2S, 31-3, 32-12, 32-4, 32-7S, 33-4, 35-1, 35-15, 35-15A, 35-1F, 35-2, 35-3, 35-5, 35-5A, 35-7, 5-4, 8-6, 9-1, 9-19, 9-22, 9-24, 9-26

Sites categorized with the reforestation TPCC classification of Non Suitable Woodland were deferred from treatments in the PA. Sites classified as reforestation problem sites are those where environmental, physical, and biological factors have the potential to reduce the survival and/or growth of commercial tree seedlings. These factors include light, temperature, moisture, frost, surface rock, animals, and disease. These classifications in the PA are listed in Table 3.4-1 above. These TPCC reforestation classifications could have limitations for establishing new trees within 5 years due to temperature, moisture, and surface conditions (i.e. rocky) without further management, rather than have impacts to the physical structure and stability of the soils.

Though TPCC withdrawn lands are not included as part of the Annual Sale Quantity (ASQ), timber harvest could occur as part of strategies to enhance other resources (RMP p.72). There are 9 units with portions of TPCC reforestation withdrawn areas classified as RSW (Table 3.4-1). These TPCC classifications were made from the years 1981-1986. Information is compiled broadly and is not based on site-specific field review. The Upper Cow Watershed Analysis (BLM 2005, p.22) suggests that site-specific vegetative community analysis needs to be assessed during prescription surveys since the area is geologically and geographically very complex. The field data collected ultimately determines the specific areas where timber management is suitable. These areas would be assessed during site-specific field review and intensive stand exam data would ultimately determine the specific areas for suitable timber management. Nevertheless, the treatments proposed in TPCC withdrawn areas would occur as part of a strategy to enhance late successional habitat and are therefore appropriate in RSW land (RMP p.72).

Fragile sites refer to those areas where the timber growing potential is easily reduced due to inherent soil properties and landform characteristics. These are soils having critical soil moisture supplying

capacities, severe nutrient problems, critical slope gradients, mass movement potential, severe surface erosion potential, and high groundwater levels.

Fragile Gradient Restricted (FGR) sites consist of steep to extremely steep slopes that have a high potential for debris type landslides. Gradients commonly range from 60-100%+. Classifications are based on geology, geomorphology, physiographic position, climate (especially precipitation), soil types and other factors. These sites are less fragile than the Nonsuitable areas but are subject to unacceptable soil and organic matter losses from surface erosion or mass soil movements as a result of forest management activities, unless mitigating measures (best management practices - BMPs) are used to protect the soil/growing site. Implementing Best Management Practices (BMPs) and minimizing disturbance of fragile areas would minimize losses. More detailed TPCC classifications for fragile soils and its analysis can be found in EA Chapter 3.5 Sensitive and Fragile Soils.

Soil Compaction

Soil productivity is affected by soil bulk compaction, soil displacement, and by changes in soil nutrients. Soil compaction is the packing together of soil particles by physical pressure at the soil surface that results in an increase in soil density and a decrease in pore space. A decrease in soil pore space results in restricted movement of water, nutrients, air, and plant roots, and generally decreases site productivity in most soil types. Soil compaction increases soil resistance to root growth and penetration, reducing plant growth rates. The most common types of disturbances effecting soils and associated long term soil productivity are displacement and compaction. Litter, humus, soil wood, and certain key properties of the surface mineral layers of forest soils are most easily and commonly disturbed by yarding activities, yet they are crucial to forest productivity. Minimizing the amount of soil displacement, compaction, and topsoil loss will generally maintain stand development.

Tractor yarding, cable yarding, and helicopter yarding are the harvest methods proposed for use in this project. Tractor yarding causes the most compaction and helicopter yarding, the least. Tractor yarding effects can be mitigated using the PDFs described in Chapter 2.4 causing less than 12% compaction of logged areas. Cable/skyline yarding suspends logs above the ground avoiding most physical abrasion of the forest floor and mineral soil. Utilizing PDFs described in Chapter 2.4 for cable yarding would cause no more than 7% compaction of logged areas under the Northwest Forest Plan and Medford District RMP. These percentages are based on research by Adams and Froehlich (1981) and Clayton (1981). Helicopter yarding removes logs aerially and greatly reduces soil impacts by minimizing movement of logs along the ground. Chapter 2.4 describes PDFs to limit soil compaction and effects to soil productivity.

The amount of soil compaction and productivity loss is based on percentages per unit. The scale of analysis is per harvest unit, as it is the affected area for soils to support tree establishment and growth on BLM managed land. Specifically, soil productivity calculations are based on acres of compaction/displacement representing a 35% growth/productivity loss per acre (Productivity losses of 30 and 40% for displaced and compacted acres respectively, are based on the Medford District PRMP vol. 3 calculations, p.18-20). These two productivity loss factors were averaged at 35% for this analysis, based on estimated percentages of compaction and displacement within each cable yarding corridor and tractor skid trail being in roughly equal proportions. The acres of

compaction/displacement were then multiplied by the projected loss of 35% growth divided by the unit area to determine the reduction in productivity. The calculations take into account compaction/displacement associated with temporary routes, landings, skid trails, and cable yarding corridors.

3.4.2 No Action Alternative

Direct/Indirect Effects

On BLM lands, timber productivity and management is closely tied to natural plant series (see Section 3.1) and site productivity. Soil productivity in areas not affected by past disturbance would continue along existing productivity patterns. Soil productivity would decline with the continued decline in growth potential. The yield in productivity diminishes as all the growth factors are tied with high stand densities. The current average of 0.75 RD would remain in, or continue to creep deeper into the zone of imminent competition mortality (Chapter 3.1) until the next disturbance. Stands should be managed, for the most of their post establishment development, in the RD range between 0.15 and 0.55 (Drew & Flewelling 1979). Leaving stands with these densities predisposes them to catastrophic fire. Fire would greatly reduce forest productivity.

In the PA on non-federal lands, compaction may increase if the rate of logging and development on private lands increases. However, in the next 20 years compaction levels should remain moderate (<12% of compacted area). Existing compaction/displacement within past harvest areas would continue to ameliorate. Fine roots of current vegetation would continue to loosen compacted soil. Leaf fall and other vegetation would continue to add organic material to the soil. The effects of freeze and thaw and plant growth would continue to reduce compaction in undisturbed areas. However, depending on site conditions, this may take decades instead of years. There would be no increase of compaction in undisturbed areas. However, in areas that would remain roaded and would have regular harvest activity, compaction would not be reduced.

Cumulative Effects

In the PA on private industrial forestland, compaction may increase as the rate of logging and development on private lands increases. On these lands, harvest activities are generally removing the majority of the trees. These commercially managed stands would follow Oregon State Forest Practices in leaving large snags, large hardwoods, and large coarse woody debris (CWD) elements. Reduced biological and structural diversity is expected in private industrial forestland which can continue long term if harvested stands are planted with a single crop tree species.

Future federal timber sale projects may be considered at a later date if stand conditions warrant treatment. In the next 20 years, compaction levels should remain moderate on BLM lands (<12% of compacted area). There would be no increase of compaction in undisturbed areas. However, in areas that would remain roaded and would have regular harvest activity, compaction would not be reduced.

3.4.3 Action Alternative 2

Direct and Indirect Effects

Alternative 2 proposes 1,373 acres of commercial extraction activities, 0.6 miles of new temporary route construction, 1.60 miles of existing temporary route renovation/reconstruction, and 63.4 miles

of existing road maintenance. Best Management Practices (BMPs) in the 1995 RMP (p. 166) describe the use of designated skid roads within stands to limit horizontal soil compaction to less than 12% of the harvest area. These activities would result in an estimated 62.5 acres of soil compaction and displacement over new and existing footprints and would reduce soil productivity by an estimated 1.4% in the PA. Total compaction/displacement associated with new and existing temporary routes, tractor skid trails, landings and cable yarding corridors would account for an average of approximately 4.5% per unit (based on horizontal distance). Each proposed Upper Cow Project harvest unit would be below 12% compaction and 5% productivity loss as analyzed in the 1994 Medford District FEIS RMP. Units proposed for Understory Reduction would not contribute to soil compaction or productivity loss, since no extraction is proposed for these units.

With the implementation of Alternative 2, soils would return to the same productivity range within 3-5 years following BMP guidelines. Rehabilitation of skid trails would accelerate restoration of productivity.

In the projects mentioned above, a reduction in either live overstory and/or live understory stand density would show improved growth and vigor of residual vegetation. Residual vegetation is expected to respond to the stimulus of increased growing space and to the newly available growth factors necessary for survival (increased availability of water, nutrients, and sunlight) which would help improve site productivity. Decreased stand densities would improve short-term (0-10 years) and long-term (> 11 years) resiliency at multiple scales. Improvements in stand and landscape scale resiliency to fire, climate change, and disturbance processes would likely occur with density reduction and protect site productivity from losses incurred from potential catastrophic fire, whereas soil productivity in untreated areas would be greatly reduced if burned.

Alternative 2 proposes 1,071 acres of commercial extraction activities and 0.60 miles of temporary route construction. Best Management Practices (BMPs) in the Medford District Resource Management Plan (BLM 1995, p.166) describe the use of designated skid roads within stands to limit horizontal soil compaction to less than 12% of the harvest area. These activities would result in an estimated 153.98 acres of soil compaction and displacement over new and existing footprints and would reduce soil productivity by an estimated 1.49% in the PA. Total compaction/displacement associated with temporary routes, tractor skid trails, landings and cable yarding corridors would account for approximately 9.2% of the project Activity Area. Each proposed Upper Cow Project harvest unit would be below 12% compaction and 5% productivity loss as analyzed in the 1994 Medford District FEIS RMP. The specific elements of Action Alternative 2 that would affect the physical, chemical, or biological properties of soils in proposed harvest units are described below.

Soil Productivity

Harvesting is not proposed in lands classified as Nonsuitable Woodland. Nonsuitable Woodland classifications include all fragile nonsuitable forestland and sites that are not biologically and/or environmentally capable of supporting a sustained yield of forest products (BLM 1986a, p.6).

Timber harvest activities cause forest soil disturbance that have implications for site productivity (Bockheim et al. 1975). The Medford District RMP provides the guidance to apply BMPs during all

ground and vegetation-disturbing activities to improve or maintain soil productivity (RMP p.44). Implementing BMPs and minimizing disturbance of fragile areas will keep losses in soil productivity to a minimum (RMP p.44). Practices incorporating BMP guidelines are listed in Chapter 2.4.

On TPCC withdrawn lands unavailable for scheduled forest management, timber harvest could occur to meet the needs of nontimber allocations made on these lands (RMP p.72). These lands unavailable for planned forest management activities are "withdrawn" from the scheduled timber production base because they lack the physical and biological capability to support and produce a predictable flow of forest products on a sustained yield basis. Timber harvesting from these lands are not included in the Allowable Sale Quantity (ASQ). Treatments are intended to lower risk of future fire intensities at the stand and landscape scale and are applicable to all land use allocations to reduce risks of large-scale disturbances (RMP p. 90). The proposed treatments on the reforestation suitable restricted and withdrawn classification would not have effects to productivity beyond those as described in Section 2.4. These treatments would occur in 17 separate units from 0.8 to 16 acres in size classified as:

- RSW - Reforestation Problem/Surface Rock/Withdrawn (Suitable Woodland)

Table 3.4-2 Withdrawn TPCC land in the PA

Unit	Unit Acres	Logging System	TPCC Acres	Symbol
1-1	48	Cable	16.2	RSW
1-1B	44	Cable	9.7	RSW
11-34	2	Cable	2.2	RSW
11-6	39	Helicopter	20.8	RSW
26-1B	18	Cable	5.9	RSW
29-1	24	Helicopter	10.6	RSW
35-15	21	Cable	2.8	RSW
35-1B	11	Helicopter	4.4	RSW
35-2	6	Cable	1.7	RSW

Soil Compaction/Displacement

Roads & Temporary Routes

Temporary routes are not intended to be part of the permanent or designated transportation network system. Temporary route construction would occur on 1.7 miles of BLM administered land, approximately 11.18 total acres. Temporary routes would be decommissioned after harvesting and fuels treatments are completed. Road decommissioning for this project would involve blocking roads, sub-soiling the road surface to allow for water filtration, installing waterbars, and applying

seed and mulch. Waterbars would filter water runoff and direct drainage off the road surface and away from streams and into vegetation that is adequate to slow surface water, and allow for deposition of detached soil particles. Mulching helps minimize surface erosion and seeding helps to establish vegetation re-growth. Sub-soiling road surfaces on all BLM managed temporary routes (1.7 miles) would reduce soil compaction to improve soil productivity on these 9.04 acres of land. There would be some short-term loss of soil productivity where the temporary route was constructed due to displacement of soil organics. Soil productivity would recover within 1-3 years as disturbed sites become revegetated. Sub-soiling road surfaces would occur to aid in site recovery. Manual revegetation with native species may occur to further accelerate rehabilitation. There would be an increase in soil productivity within the unit along these temporary routes in areas where the organics were deposited (e.g., fill-slopes). Sub-soiling road surfaces of temporary routes would ameliorate compaction.

Landings, Skid trails, and Cable Yarding Corridors

Landings, and other areas of exposed soils resulting from this activity, would be winterized by properly installing and/or using water bars, berms, sediment basins, certified weed-free hay bales, wood straw, small dense woody debris, seeding, and/or mulching, as directed by the Authorized Officer. All new landing areas would be rehabilitated to reduce soil compaction, minimize sedimentation, and improve site productivity. Landings outside of existing road prisms would additionally be planted with conifers following use.

Existing skid trails would be utilized whenever practical. New skid trails would be pre-designated and approved by the Authorized Officer. Skid trails including turning points would be 12 feet wide on average. Tractors would be equipped with an integral arch to minimize soil disturbance and equipment would walk over as much ground litter as possible to reduce compaction (Figure 10). Utilized skid trails would be rehabilitated upon completion of harvest. Ground based equipment would be limited to slopes less than 35% and yarding equipment would be limited to designated skids. To minimize soil disturbance, blades would not be used while ground-based yarding. At a minimum, one-end suspension would be required on all ground-based and cable units to minimize soil disturbance. Full suspension would be required if yarding is needed to cross unstable areas or stream draws. The figure to the right shows example of a tractor yarding unit where tops and limbs are left for equipment to walk over and mix into soil for nutrient cycling.

Figure 10 Tractor Yarding Corridor with Debris

Cumulative Effects

In the PA on private industrial forest land, compaction may increase as the rate of logging and development on private lands increases. On these lands, harvest activities generally remove the

majority of the trees even in low severity fire areas. These commercially-managed stands follow Oregon State Forest Practices in leaving large snags, large hardwoods, and large CWD elements. Reduced biological and structural diversity is expected in private industrial forestland which can continue long-term if planted with single crop tree species.

Future federal timber sale projects may be considered at a later date if stand conditions warrant treatment. In the next 20 years, compaction levels should remain moderate on BLM lands (<12% of compacted area). There would be no increase of compaction in undisturbed areas. However, in areas that would remain roaded and would have regular harvest activity, compaction would not be reduced.

The proposed silvicultural treatments would increase the long-term (after 3-5 years) productivity of residual trees by effectively increasing their access to additional light, water and nutrients. Thinning would improve or maintain stand vigor and growth rates. Many of these stands are currently showing reduced growth rates as a result of overstocked conditions for light, soil nutrients, and water. Action Alternative 2 would reduce competition among the retained trees for light, nutrients, water, and growing space. These would in turn, develop into large woody structure desired in LSRs.

3.4.4 Action Alternative 3

Direct and Indirect Effects

Alternative 3 is similar to Alternative 2 except considerably less forestland would be restored to a condition that meets late-successional habitat. This Alternative developed from differentiating stand ages rather than identifying stand conditions and the need for treatment. Alternative 3 proposes 1,017 acres of commercial extraction activities, and 3.23 miles of temporary route construction. Best Management Practices (BMPs) in the Medford District Resource Management Plan (RMP, p.166) describe the use of designated skid roads within stands to limit horizontal soil compaction to less than 12% of the harvest area. These activities would result in an estimated 145.41 acres of soil compaction and displacement over new and existing footprints and would reduce soil productivity by an estimated 1.21% in the Activity Area. Total compaction/displacement associated with temporary routes, tractor skid trails, landings and cable yarding corridors would account for approximately 8.7% of the project Activity Area. Each proposed Upper Cow Project harvest unit would be below 12% compaction and 5% productivity loss as analyzed in the 1994 Medford District FEIS RMP. The specific elements of Action Alternative 3 that would affect the physical, chemical, or biological properties of soils in proposed harvest units are described below.

Cumulative Effects

Cumulative Effects of Action Alternative 3 would be similar to those described for Action Alternative 2. Because Alternative 3 proposes to treat fewer acres and employ more seasonal restrictions, Cumulative Effects from Alternative 3 are anticipated to be less than those described for Alternative 2.

3.5 Soils – Sedimentation and Erosion

Methodology

- A more comprehensive analysis with background on soil erosion and sedimentation is given in the Upper Cow LSR Project Hydrology/Soils Resource Report; please refer to this report as needed to support this analysis.

- Soils deemed sensitive to fuels treatments (prescribed fire) were evaluated using USDA – NRCS web soil survey (NRCS 2015). Fragile soils from the Timber Production Capability Class (TPCC) layer, Medford District GIS data, and Map 6 from the Medford RMP were used to evaluate the potential for effects to soils.

- The soils analysis focuses on accelerated erosion (above natural and/or background levels described for the affected environment) resulting from the implementation of the action alternatives. Accelerated erosion is defined as erosion that is a consequence of human activity and outside of an assumed natural sediment balance. Soils value for timber productivity is discussed in the silvicultural section as it relates to TPCC assessments (Section 3.4).

- Proposed treatment units were evaluated for indications of slides or slumps in the field and by using LiDAR imagery (described in the analysis) based on areas that have documented slides nearby.

- Each proposed treatment unit has been visited at least once by field crews looking specifically at the soil and water resources. Field surveys occurred primarily in November 2014 to March 2015. Typical field crews were three people with extensive field experience directed and supervised by a BLM hydrologist and soils specialist. Field verification of information has occurred in most units in the field by a hydrologist and soils specialist from March 2015 up to the present.

- The geographic scale of the analysis area for soil direct/indirect and cumulative effects is the PA and units proposed for treatment. The assumed potential disturbance area for soils includes landings, temporary roads with a 30 foot buffer off the centerline to account for cuts and fills, and 15 feet for tractor swing routes and skid trails.

- An assumption for analysis is that the BLM designed logging systems will be similar to those eventually implemented by contractors. Logging systems were designed for each of the proposed treatment units by a BLM forester according to the needs of the prescription. Logging systems include the location of landings, temporary routes and tractor routes. Implementation by commercial harvesters, service, stewardship, or other contracts will include the flexibility to modify the location of these logging systems, but should not result in substantial changes to the methods or intensity described, or the resulting disturbance assumed for this analysis.

3.5.1 Affected Environment

Soils in the Upper and Middle Cow Creek watersheds are derived from metasedimentary, metavolcanic and granitic parent material. Soils associated with metasedimentary rocks tend to be deeper and have more nutrients available (BLM 2004a and 2004b).

Soils developed from metavolcanic rock types tend to be shallow and have less nutrients and soil development than sedimentary rock types. Soils are typically poorly developed on granitic rock areas and are prone to extreme erosion if disturbed. Soils defined in this classification prone to accelerated erosion within this PA include: FGR and FNR. FGR (Fragile Gradient) areas consist of steep to extremely steep slopes. FNR (Fragile Nutrient) areas are sites inherently low in nutrients or have a nutrient imbalance that inhibits tree growth. None of the proposed timber units include any of these sensitive soils (See Chapter 3.4).

Soil types that are considered to be fragile and are sensitive to management activities such as timber harvest, road construction, and broadcast burning are shallow soils (less than 20 inches deep, none proposed for treatment) are soils derived from granite or schist, and soils derived from serpentine or peridotite. Soil infiltration capacities are generally high in undisturbed forest soils and soil moisture is seasonal in the PA, with saturated conditions during the wet season.

Slide areas (areas prone to mass wasting or slumps due to unstable soils) have been documented in Forest Service Managed land east of the PA in the Snow Creek Watershed (Oregon, 2015). An inventory of aerial photographs from 1959 to 1972 in the nearby Willamette River basin showed that landslides associated with roads and in clearcuts were 27 and 23 times more frequent, respectively, than in undisturbed forested areas (Lyons and Beschta, 1983). There were several documented debris flows along the Hauck Ranch road and above Snow Creek due to intense storms in January 2015; one slope failure is in the PA on private land.

Interpretation based on LiDAR imagery, aerial photography (2014), and field verification surveys revealed widespread soil compaction from past activities and some slide areas in the PA. Many of these compacted areas are old mining sites, skid trails, areas with poor soils, and primitive roads that are partially or wholly re-vegetated with grasses, brush, and trees.

3.5.2 No Action Alternative

Direct/Indirect Effects

Under the No Action Alternative there would be no direct or indirect effects associated with this project. The activities described in Chapter 2.2 and 2.3 would not occur. Under the No Action Alternative, roads associated with timber haul for this project would not receive maintenance therefore may result in effects due to failed drainage systems and deteriorating road surfaces.

Cumulative Effects

The Cumulative Effects area considered for soils is the BLM administered land within the PA boundaries. As described in the Affected Environment, past timber extraction on BLM managed lands within the PA have left areas of disturbance and compaction that can contribute to accelerated erosion and unstable soils. In some cases this may result in higher than background erosion rates, but

effects are likely to diminish and may be unmeasurable after vegetation reestablishes.

Timber harvest, road use, silvicultural treatments, prescribed burning and other activity fuels treatments would be expected to continue on non-federal lands under the No Action Alternative. These activities will utilize roads on BLM managed lands and would have some direct effects such as the use of tailhold trees (trees or stumps that are used to anchor suspension lines used for yarding timber harvested on private lands). Most of this use is the result of reciprocal agreements that are often non-discretionary and results in minor effects to soils within the PA.

Virtually all of the private timber lands have been harvested and are dominated by recent clear-cuts and second growth conifer forests 40-50 years old. There are no Oregon State managed lands or lands managed by the USFS in the PA or close enough to BLM administered land to affect soils within the PA. Increases in peak flows and changes in groundwater flow characteristics due to the management of private timber lands have the potential to increase accelerated erosion and sedimentation on BLM administered lands and may contribute to water quality conditions downstream.

Under all Alternatives, erosion from land management actions across ownerships within the PA would be expected to remain consistent with current levels, and accelerated erosion due to past and present activities is expected to occur in localized areas. While some new roads could be constructed based on ROW agreements other roads may be closed and storm proofed (fully decommissioned), therefore accelerated erosion from roads is likely to remain at current levels or similar to that described above in the Affected Environment section of this write-up.

There some locations with small slumps due to rotational slope failures and additional slumps are likely in the PA. Steep slopes, surface geology, timber harvest and likely localized intense rainfall were all likely factors in causing this slope failure. These extreme storm events are more likely to occur in January-February and in some cases may be part of a rain on snow melt event. The most intense storms are likely to be localized to the sub-watershed or tributary scale.

Under all Alternatives BLM intends to undertake projects to enhance aquatic and riparian habitat on BLM administered lands. BLM aquatic habitat projects may include storm-proofing decommissioned roads, improving aquatic passage in existing culverts, placing large wood in stream channels, removing non-native vegetation and other actions. These projects may result in soil disturbance over the short-term (1-2 years), but would be designed to improve watershed function and health over the long-term (50+ years). These activities will occur as funding and time allows.

Regular passenger and all-terrain vehicle use of road systems and non-system OHV trails within this PA may be used by the public under all Alternatives, and the corresponding erosion from this use would be expected to continue at current rates. Soil erosion effects as a result of all federal projects are consistent with the effects analysis and conclusions provided in the Medford RMP.

3.5.3 Common to Action Alternatives 2 and 3

Direct/Indirect Effects

Soil Effects Common to all Road Use and Temporary Construction Activities

Road systems used for timber hauling have direct effects to soils, such as accelerated erosion at different levels depending on the surface type, location, design features, maintenance timing and frequency, and moisture levels of the road surface during use. Hauling may be whole logs or chips depending on the material generated by the treatment. Roads modify hydrology both through interception of precipitation on the road surface, and through interception of subsurface flow. Poorly located roads that channelize flow on hillslopes are recurrent sources of accelerated surface erosion, and in some cases mass wasting (Wemple and Jones, 2003). Unsurfaced, poorly surfaced, and/or poorly located roads open for use during wet conditions can be chronic sources of erosion and sedimentation.

The Action Alternatives include proposed new temporary route construction, and temporary route renovation/re-construction to access proposed timber treatment units. Temporary routes would be utilized primarily on or near ridges. All temporary routes would be fully-decommissioned after use. Temporary route decommissioning for this project involves blocking the entrance to the road with boulders, logs and/or soil berms, installing waterbars and then rolling dips, removing ditches and outsloping the tread of the road, sub-soiling the road surface to 18 inches or bedrock to allow for water infiltration, and/or applying seed and mulch. Temporary routes may have waterbars installed to control water on the route surface during use and before being decommissioned. For a summary of the road activities planned for Action Alternatives 2 and 3 see Appendix H, Road Work and Use.

Direct effects from constructing or reconstructing temporary routes are primarily mixing soils types, compaction during use and limiting productivity through these direct impacts. Long term impacts can come from limiting vegetation growth and recovery on sites. Road building changes soil physical properties including depth, density, infiltration capacity, water holding capacity, and gas exchange rate, nutrient concentrations, and microclimate. Although more than 50% of reclaimed temporary routes may be reforested within 8 years, they are likely to have reduced growth rates for trees and lower productivity in general (Gucinski et.al., 2001). Limiting vegetation growth and recovery would make soils more prone to erosion in some places.

All roads can contribute to accelerated erosion at different levels. The use of natural surface roads for timber hauling during wet periods generally yields the highest rates of soil displacement and erosion. Even roads with rocked surface types can quickly deteriorate when used under wet conditions. According to Reid (1981) and Reid and Dunne (1984), forest roads can be a major contributor of fine sediment to streams, through down cutting of ditch lines and erosion of unprotected road surfaces by overland flow.

The Action Alternatives assume that system roads that are needed for haul will have adequate maintenance before and after use. If weather conditions would result in road damage or accelerated erosion regardless of the season the Authorized Officer (AO) for the BLM has the authority to

restrict road use until conditions improve. Maintenance would not occur during the wet season unless drainage systems are failing and intervention would reduce resource impacts.

Soil Effects Common to All Harvest Methods

Direct effects to soils from timber thinning include soil displacement and compaction from forest management activities.

Direct effects occur when mechanized harvesting or yarding equipment is driven over soils or when timber is yarded across poorly vegetated, weak, bare, or wet soils. When soil displacement occurs, soil horizons become mixed, essential soil nutrients, water, and soil organisms may be rearranged or removed, and topsoil may become rutted. These alterations to the soil profile or soil characteristics can decrease productivity, cause complaction and may result in accelerated erosion and soil displacement from mechanized equipment.

Soil displacement can alter hillslope hydrology, increasing the potential for surface erosion (Page-Dumroese, et.al. 2010). Disturbed soils (soil displacement) that are not heavily compacted can display evidence of localized surface erosion over the short term, but this effect greatly diminishes within 1-3 years after disturbance in response to the regrowth of vegetation, and eventually a reduction of erosion from these soils. Where compacted soils are subsoiled and reclaimed they would still experience an increase in erosion due to rills and gullies that form on compacted and unmaintained skid trails. These acres would likely reestablish full hydrologic and soil functions within 40-80 years, depending on soil type and condition at the time of harvest (Wert and Thomas 1981).

Fragile soils identified by soil surveys and mapped recently by the Medford district that identify soils composed of colluvium, alluvium, and/or residuum derived from mica schist, granitics, serpentine, and/or perodite have been evaluated in the field. Units 1-2, 11-1, 30-2, and the units in Section 19 were evaluated in the field and under both Action Alternatives 2 and 3 would have seasonal restrictions that would not permit harvest during dry conditions in the wet season. This measure would likely reduce the risk of damage to these soils and consequently the potential from erosion or slope failure.

All treatments would utilize a minimum of a 35 foot buffer to protect intermittent streambank stability and a minimum of a 25 foot buffer to protect wetland features. These buffers are designed to be protective of the root network of typical trees in this area and potential impacts to hydric soils, and avoid sedimentation. Rashin et al. (2006) found that 95% of erosional features that were 10 meters (33 feet) away from stream channels did not deliver sediment, well within the minimum buffer of 35 feet proposed under the Action Alternatives for all treatment units.

All harvest methods may pile logging slash and burn it to reduce activity fuels. A BLM fuels specialist makes a determination about the amount of fuel loading after harvest. If activity fuels would negatively impact fire behavior, slash will be piled and burned when soil moisture and risk of

fire spreading is low (during the wet season). Burn piles are typically constructed by hand and allowed to dry for few months or a season before they are ignited.

3.5.4 Action Alternative 2

Direct/Indirect Effects

Soil disturbance to build landings, skid trails and temporary routes is estimated to be 23 acres, based on logging systems predicted by a BLM Forester. Actual locations and amounts of disturbance may be different during implementation, but should not vary in scope or effects. The assumptions for calculating acres of disturbance are likely to be an over-estimate for soil effects from surface disturbance, since many of the landings will be constructed in existing disturbance as per BMP requirements. Below is a description of the harvest methods and the treatment that would not utilize extraction:

- **Thinning with Cable Yarding** *(2.75 acres of surface disturbance for landings with more than two corridors)*
  The amount of harvest will be determined by the prescription and would include yarding corridors and landings where trees will be delimbed and stacked to be loaded on haul trucks. As required by BMPs, the use of existing disturbance (old landings or roads) will occur to the maximum extent possible; therefore the entire disturbance assumed would not necessarily be new disturbance.
- **Thinning with Helicopter Yarding** *(18 acres)*
  In general, helicopters need larger areas for landings, but do not require yarding corridors. Half of these landings will likely be located on private lands.
- **Thinning with Ground Based Equipment** *(43 acres for skid trails and 12 acres for landings)*
  This activity would only occur on lands that are generally less than 35% slope and would require landings, skid trails and the use of temporary route.
- **Understory Reduction Thinning**
  This activity does not require hauling and would involve the use of passenger vehicles and ground crews. Therefore no specific locations for disturbance are assumed. Piles made by the removal of less than 8-inch DBH material would be burned in the winter and would result in soil disturbance at the location of the burn piles.

With the proper waivers and the implementation of applicable BMPs and PDFs, hauling maybe permitted on all road surface types in all seasons. Therefore, it is more likely under Alternative 2 to use roads for haul in the wet season that have not been brought up to all-weather surfacing due to poor conditions. Use of roads that are in poor maintenance can result in rutting of the road surface and concentration of surface runoff on the road surface. This can result in road failure and localized erosion.

This action includes 2.2 miles of temporary routes constructed or reconstructed (See Appendix H: Road Work and Use). All temporary routes would be fully-decommissioned after use. Direct

impacts include mixing of soil horizons and changes in hillslope drainage patterns. With the application of the practices listed above (PDFs and BMPs), there are no anticipated indirect or long-term effects to soils from the construction and use of temporary routes.

Thinning with Suspension Logging Systems
Under Alternative 2 a total of 602 acres will utilize thinning with suspension logging systems and require an estimated 7 landings that would serve 3 or more yarding corridors. Direct soil disturbance in timber harvest units stems from yarding corridors and landings. The greatest disturbance would occur on landings and within 100 to 150 feet of landings where individual yarding corridors merge. Allen et al. 1999 found that areas of exposed and rutted soil were small with suspension logging systems, discontinuous and usually occurred within 150 feet of the landing, which similarly alleviates concerns about potential erosion and sedimentation problems due to the abundance of slash after processing.

Application of appropriate PDFs and BMPs limits the extent of ground affected, and would be dependent on site conditions, such as: volume of timber and method of yarding over any given cable corridor, topography, and operator/equipment factors. With the application of the practices listed above (PDFs and BMPs), there are no anticipated indirect or long-term effects to soils from the construction and use of temporary routes.

Thinning with Helicopter Logging Systems
A total of 221 acres of treatment with helicopter yarding is proposed under Alternative 2. Typical landing size is larger than cable yarding (1 acres is assumed for analysis), but is generally more flexible in location, so more likely to use existing disturbance. Landings that are constructed in undisturbed ground will be drained to stable surrounding vegetation during use and be subsoiled and planted after use to reduce soil compaction and begin the reestablishment of soil productivity according to BMPs and PDFs.

Thinning with Ground-based Logging Systems
Under Action Alternative 2 ground-based harvest could occur during the wet season under dry conditions. Dry conditions are common at the beginning of the wet season (Oct. 15 to Nov. 15), but may occur at any time during the wet season. Ground-based harvesting would not occur in the wet season without a waiver and will require a soils test. Assuming the implementation will adhere to this PDF, ground-based harvest could occur during the wet season when soils are moist but not saturated. These wet soils still are more susceptible to compaction and displacement as compared to dry soils with the same use. However, extremely dry conditions can also result in proportionally more soil damage and will be identified and mitigated on a case-by-case basis.

Ground-based harvest and yarding acres total approximately 248 acres. Units identified for ground based harvest would employ BMPs and PDFs to reduce the severity and spatial extent of compaction, displacement, and associated erosion. Ground-based harvesting will use low-impact routes within units (skid trails). In areas where multiple passes are made and especially at pivot points within these

routes, soil compaction and/or displacement would occur. Limiting the number of passes, operating upon a mat of slash/litter would be done where feasible, and utilizing these routes only during the dry season would lessen the effects (see Chapter 2.4, PDFs for ground-based harvest).

Understory Reduction Treatments (565 acres of treatment)
Understory reduction treatments include slashing, hand-piling, pile-burning, chipping, lop and scattering, biomass removal, and/or under burning. This work would be done with hand crews and result in minor and localized soil disturbance due to heating under the burn piles. 15 Units will have thinning treatments and understory reduction treatments. This treatment is intended to restore the inherent forest structure in dry forest stands and put these stands on a path to develop and retain the vegetation resiliency to the expected disturbance regime. In some locations this treatment may reduce long-term effects to soils from catastrophic wildland fire.

Cumulative Effects
There would be no changes to current slope stability or risk of slope failure. The potential for periodic slope failures within the range of natural variability would still remain in association with areas exhibiting an historic disposition to soil movement, particularly in the event of a major storm.

BMPs, and specific associated PDFs identified in Chapter 2.4, would result in no direct or long term input of sediment to streams and thus no Cumulative Effects to sensitive soils.

It is estimated that proposed activities would result in 62.5 acres of soil compaction and displacement over new and existing footprints and would reduce soil productivity by an estimated 1.4% in the PA. Total compaction/displacement associated with new and existing temporary routes, tractor skid trails, landings and cable yarding corridors would account for an average of approximately 4.5% per unit (based on horizontal distance). Each proposed Upper Cow harvest unit would be below 12% compaction and 5% productivity loss as analyzed in the 1994 Medford District FEIS RMP. Productivity loss and compaction both increase the risk of erosion. But likely erosion would be localized, typical of background conditions and therefore not likely to result in an increase in cumulative effects to soils.

For this project, it was determined that little to no erosion would occur from individual units, landings, and crossings along haul routes in the direct/indirect effect analysis and no long-term or indirect effects were identified. In other words, no measureable sedimentation would occur above natural background levels described for the No Action Alternative for soils.

3.5.5 Action Alternative 3
Direct/Indirect Effects
The difference in acres of treatment is 182 acres between Action Alternatives 2 and 3. The direct and indirect effects described in Action Alternative 2 would be the same under this Alternative, except effects ascribed to thinning treatments would not occur in units that are over 80 years old. A

corresponding decrease in direct effects to soils from forest harvest activities in these areas would be expected proportional to the acres treated (decreased by about 23%).

Ground-based harvesting would not occur during the wet season under this alternative. Risks to soils and potential effects described in the analysis for Action Alternative 2 to soils would be reduced due to a reduction in activities when soils are wet.

All commercial thinning operations will use system roads for timber hauling. No new permanent roads would be built and all temporary routes would be fully decommissioned after use, therefore there would be no increase in road density under Alternative 3 after implementation. Effects from logging systems to both soil and water resources would be similar with lower acres of treatment and less use of the road system for timber hauling.

Cumulative Effects

Effects would be similar to those described for Action Alternative 2. There would be slightly less disturbance to soils and water resources and a higher potential risk for catastrophic disturbance (wildfire, insects and/or disease) in addition to the effects described for the No Action Alternative. This higher risk for disturbance is based on the assumption that the treated stands will be more resilient and resistant to future disturbance as compared to untreated stands.

3.6 Hydrology

Methodology

- A more comprehensive analysis with background on hydrology, water quality and other water resource topics is given in the Upper Cow LSR Project Hydrology/Soils Resource Report; please refer to this report as needed to support this analysis.

- Where data is available, this analysis will be quantitative and make use of Geographical Information System (GIS) and scientific research. The analysis will describe watershed dynamics in the Middle Cow (1710030207) and Upper Cow watershed (1710030206), 5th level Hydrologic Unit Codes (HUCs). A portion of the PA includes the Days Creek-South Umpqua HUC (1710030205) and some treatment units have small parts of their area in this HUC.

- Road densities were calculated for the PA and Upper and Middle Cow Creek watersheds to evaluate enhanced peak flows and sediment production using BLM GIS data. Roaded area was estimated in GIS by assuming a 40 foot buffer (20 on either side of the centerline to allow for vegetation clearing) for roads using the same BLM-GIS data.

- Field crews looking specifically at soil and water resources have visited each proposed treatment unit at least once. Field surveys occurred primarily in November 2014 to March 2015. Typical field crews were three people with extensive field experience directed and supervised by a BLM hydrologist and soils specialist. Field verification of information occurred in most units by a hydrologist and soils specialist from March 2015 up to the present.

- Equivalent Clear-cut Area (ECA) determinations provide an estimation of open space within a given catchment area created from recent occurrences such as harvest activities, activity fuels treatments, or fires. Recent thinning and regeneration harvest across all ownerships was analyzed for vegetative cover using the National Agriculture Imagery Program (NAIP) aerial photography (USFS 2014). Areas that currently exhibit 30% or less canopy cover were considered bare ground for the purposes of establishing the ECA (OWEB 1999, pp. IV-11) in the watershed.

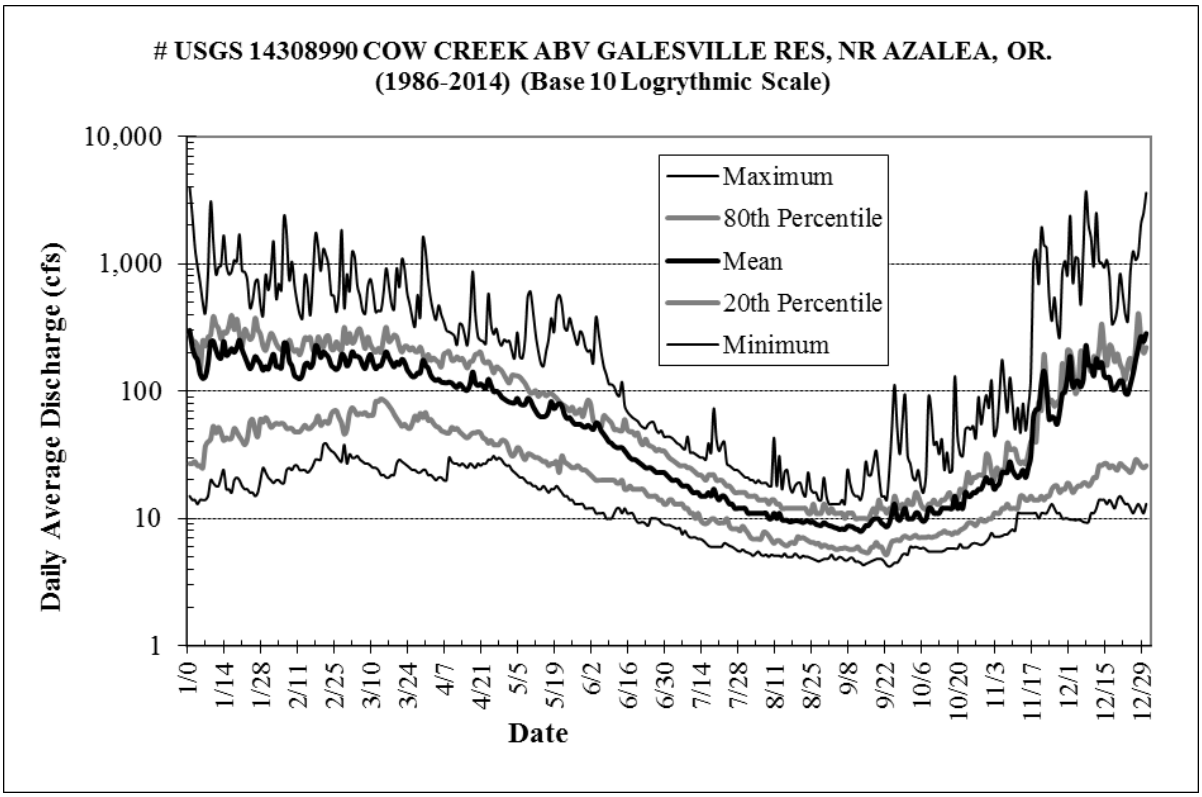
- It is assumed that the BLM-designed logging systems will be similar to those eventually implemented by the contractors. Logging systems were designed for the proposed treatment units by a BLM forester according to the needs of the prescription. Logging systems include the location of landings, temporary routes and tractor routes. Implementation by commercial harvesters, service, stewardship, or other contracts will include the flexibility to modify the location of these logging systems, but should not result in substantial changes to the methods or intensity described, or the resulting disturbance considered for this analysis.

3.6.1 Affected Environment

The geology of Upper Cow Creek does not allow for a great degree of water storage due to shallow soils and bedrock controlled streams (BLM 2004b). There is more water storage in the Middle Cow Creek watershed, including Galesville Reservoir (BLM 2004a).

The seasonal pattern of precipitation does not supply much rainfall between June and October. As a result, recharge of streams by groundwater is limited during the summer months in the Upper and Middle Cow Creek Watersheds. Stream runoff in both Upper and Middle Cow Creek is usually greatest from December to February, also the months of maximum precipitation. At elevations where accumulations of snow are common, annual streamflow may exhibit two peaks or an extended peak (Upper Cow Creek), one from rain in the winter and a second from snowmelt into April or May (Figure 11). Intense rainfall in localized storms can also occur any time, but storm events are more likely in the winter.

Figure 11 Surface Water Stream Daily Average Statistics from USGS Data from Cow Creek above Galesville Reservoir, Near Azalea, Oregon from (1986 - 2014) (USGS 2015a).



The elevation breaks between the rain, transient snow and the seasonal snow zones for southern Oregon are 2,500 feet, 5,000 feet and above 5,000 feet, respectively (Jefferson 2011). Roughly half of the PA is in the transient-snow zone (13,376 acres) and half is in the rain zone (13,095 acres). The elevation of Galesville reservoir is about 1,845 feet which is the break between Upper and Middle Cow Creek. Basically, the Middle Cow Creek watershed is in the rain zone and Upper Cow is in the transient snow zone. None of the PA is in the seasonal snow zone.

Riparian vegetation consisting of Oregon ash, maple, willows, and cottonwoods have been removed in the floodplains as a result of mining and past logging practices. Several streams in the Middle Cow Creek Watershed have a history of placer mining and are downstream of proposed treatment units. Placer mining activities have altered and sorted the substrate of stream channels and changed the distribution of sediment vertically and latterly, changing the geomorphology of stream channels. The channels in the areas of active placer mining are likely unstable and will continue to erode until channel geomorphology returns to pre-disturbance conditions (BLM 2004a).

Water quality standards are set by the State of Oregon DEQ and approved by the EPA to achieve characteristics needed to support beneficial uses and values such as aquatic life or drinking water. Water quality can be based on biological or physical properties in addition to chemical properties. Section 303(d) of the federal CWA requires states to periodically list water bodies that do not meet

water quality standards ("303(d) list"). For information on the 303(d) listed streams within the PA, see the Table 3.6-1 below.

Table 3.6-1 303(d) Listing Status Stream Segments and Lakes in the PA (Based on the 2010 Assessment (Oregon DEQ 2015).* +

Stream or Lake Name	Parameter/ Criteria+	Season	Status and Benefit
Galesville Reservoir	Mercury	Year Around	On 303(d) list for human health impacts from fishing
Snow Creek	Temp. 17.8oC, 7-day max.	Summer	Water quality is limited and TMDL is approved for salmonid fish spawning-rearing, resident fish and aquatic life
Whitehorse Creek	Habitat Modification	Undefined	Water quality limited, but not needing TMDL for salmonid fish spawning-rearing and resident aquatic life
Starvout Creek	Biocriteria	Year Round	Potential concern for aquatic life
Cow Creek	Beryllium, pH 6.5 to 8.5 and alkalinity	Summer	Potential concern for alkalinity and beryllium for human health, resident fish and aquatic life; Anadromous fish passage; Salmonid fish rearing; Water contact recreation; Salmonid fish spawning

* This list is not meant to be comprehensive.

\+ Temperature is in degrees centigrade and represents the maximum temperature in the running average value of the daily maximum water temperature. pH is measure of acidity and alkalinity of a solution with 7 being neutral.

The PA has five water bodies listed on the 303(d) list (Table 3.6-1). Galesville reservoir is listed for mercury, the source may be from past mining activities and/or air pollutants. Oregon DEQ periodically reviews the status of water quality in the basins around Oregon; the latest assessment for this basin was in 2010. Status might include the need for a TMDL, acknowledgment of a TMDL in place or other pollutant concerns. Strategies and methods are described in Water Quality Restoration Plans to reduce loads and achieve TMDL goals.

BLM has developed restoration plans for the Upper and Middle Cow Creek (BLM 2004a; BLM 2004b) to address TMDLs for Stream Temperature. These plans advocate the management of riparian areas to achieve ACS objectives as per the NWFP. Specific recommendations for Forest Management relevant to this project include silvicultural treatments designed to promote achievement of site potential hardwood and conifers and to minimize sedimentation with good road management.

Maximum summer water temperatures have probably always been high in the PA, partly because the geology and soils in Upper and Middle Cow Creek do not allow for a great degree of water storage, uplands are steep and soils are relatively shallow. As a result, recharge of streams by ground water is limited during summer months, causing minimal stream flow and high stream temperatures. Stream segments that naturally exceed DEQ standards due to geology or other factors are not considered impaired.

Both sedimentation and nutrients are generally elevated in the first 2 years after disturbances such as fire, timber harvest and/or severe storm events, but tends to diminish as vegetation reestablish and precipitation approaches normal values. Some nutrient inputs to surface waters in forests result from erosion and increased surface runoff on public lands. Agricultural, mining and forest management activities on private lands also contribute both sedimentation and nutrients to Cow Creek. Movement and transport of nutrients and sediment can be complicated by chemistry and physical features such as large woody debris (LWD), making downstream water quality a combined function of all upstream activities in a given watershed.

3.6.2 No Action Alternative

Direct/Indirect Effects

Road use, road maintenance, silvicultural treatments, water source improvement and other activities would be expected to continue on BLM managed lands under the No Action Alternative (see Chapter 3 for specific actions). These activities are likely to contribute to baseline conditions with accelerated erosion (see Section 3.5) increasing sedimentation and changes in hydrology related to storm response.

Primary sediment sources include: episodic landslides and slumps usually associated with intense winter storms, hillslope erosion, stream bank erosion, motorized recreation, mining, wildfires, and forest management activities. Forest management related increases in sedimentation can also be the result of poorly designed and/or poorly maintained forest roads (Wemple and Jones 2003).

The PA has an established road system used for accessing private and public land. Right of Way agreements with adjacent landowners would continue to allow private maintenance and use of existing roads on BLM administered lands under all Alternatives. The development of this road system has resulted in current and past accelerated erosion and continues to alter hillslope hydrology and contribute to sedimentation downstream (Colombarolia and Gavin, 2010).

Roads contribute to stream sedimentation at different levels depending on: road design, surface type, depth and quality of road surface aggregate, location of the road, position on the slope, fill material, underlying geology, maintenance frequency, condition near stream crossings, and moisture levels of road material during use. For more detail see the Upper Cow LSR Project Hydrology/Soils Resource Report. Paved roads in good condition generally produce minimal negative effects. Effects are more likely at stream crossings of aggregate and natural surface roads (Table 3.6-2):

Table 3.6-2 Number of Stream Crossing for all roads in the PA (based on BLM GIS Data)

Stream Type	Aggregate Surface	Natural or Unknown Surface	Total
Ephemeral	165	76	241
Intermittent	100	86	186
Perennial	132	86	86
Fish Bearing	14	13	27
Total	411	261	540

The condition of riparian areas, channel morphology and hydrology can be affected by land use activities such as timber harvest or road use and maintenance, and may increase surface water temperatures in streams (Oregon DEQ 2006). For more detail see the Upper Cow LSR Project Hydrology/Soils Resource Report.

Nutrients contained in soils and forest litter may be transported to streams through near-stream erosion. While a certain amount of this erosion is natural, accelerated erosion resulting from silvicultural practices and road maintenance may increase nutrient loads above background conditions. Nutrient loads from these activities are most likely associated with roads and culverts that are hydrologically connected to stream systems. Under all alternatives private lands would continue to see timber harvest, and silvicultural practices and road maintenance would continue on BLM administered lands.

Cumulative Effects

The Cumulative Effects analysis area for water quality is the South Umpqua subbasin (17100302), which has a Water Quality Management Plan (WQMP). The major concerns for water quality are nutrients, sediment and water temperature. These can all be detrimental to the aquatic habitat of salmon species due to the production of algal blooms, loss of dissolved oxygen, high stream temperatures and loss of physical habitat due to sedimentation. This also applies to the resident fish and other aquatic life, particularly resident cutthroat, which are present in streams in the PA.

The WQMP for the South Umpqua indicates that maximum summer water temperatures have probably always exceeded the current DEQ standard in some locations. Dissolved oxygen levels and nutrient loading is impacted by upland watersheds such as Middle and Upper Cow watersheds, however climate variability, municipal water treatment systems and industrial and agricultural sources of nutrients probably overshadow any impacts from headwaters from the PA lower in the Umpqua watershed.

The Cumulative Effects analysis area for water resources is the South Umpqua subbasin (17100302) to consider potential downstream effects. Peak flow enhancement, water yield and changes in hillslope hydrology were considered for the Upper Cow and Middle Cow Creek watersheds and the PA. Peak flow enhancement refers to a changing response (timing and/or magnitude) in the flow of a stream or river during a high flow event. Peak flows have the potential to alter stable stream channel morphology and cause stream bank erosion. Enhanced peak flows and changes in water yield are the result of all activities described in the soils Cumulative Effects section for the baseline conditions and can be evaluated by estimating Equivalent Clear-cut Area (ECA) and roaded area by watershed.

No clear-cuts are proposed under the Action Alternatives; however clear-cuts on private lands and other non-timbered lands in the PA having the potential for enhanced peak flows due to ECA for a rain-dominated system (See Table 3.6-3, 22% for Upper Cow). Enhanced peak flows in rain-dominated and transient zones are not observed until the ECA plus any proposed treatment exceeds 29 or 15%, respectively (Grant et al. 2008). The Grant et al. (2008) paper recommends that the area

between the mean response lines are good predictor of enhanced peak flow from treatments in lower disturbance intensities.

Table 3.6-3 shows the ECA in Upper and Middle Cow Watersheds and the PA Based on digitizing canopy openings based on 2014 aerial photography. Openings include hay fields or other non-treed areas.

Table 3.6-3 Equivalent Clear-Cut Ares within the PA

Analysis Area Name	Analysis Area (Acres)	Clear-cut Area (Acres)	% Total
Planning Area	26,470	4,908	19%
Middle Cow Watershed	21,949	3,214	15%
Upper Cow Watershed	15,125	3,273	22%

Studies have found enhancement of peak flows attributable to changes in flow routing due to roads and in water balance due to treatment effects and vegetation succession (Jones and Grant 1996; Thomas and Megahan 1998). Within the PA, there are approximately 199 miles of existing system roads, based on BLM GIS Data. For a visual representation of the road densities and estimated road disturbance of the existing road system in the PA and Upper and Middle Cow Watersheds, see Table 3.6-4 below.

Table 3.6-4 Road Densities within the PA

Analysis Area Name	Analysis Area (Acres)	Analysis Area (mi^2) *	Roads (mi)	Road Density (mi/mi^2)	Road Disturbance+ (Acres)	Percent Roaded Area
Project Area	26,470	41.4	199	4.81	724	2.7%
Middle Cow Watershed	15,125	34.3	164	4.78	596	2.7%
Upper Cow Watershed	21,949	23.6	118	5.00	429	2.8%

* miles = mi
+ Assuming and average disturbance width of 30 feet

All thinning treatments that harvest timber will use system roads for hauling whole log or chips (Currently 199 miles in the PA). No new permanent roads would be built and all temporary routes would be fully-decommissioned, therefore there would be no long-term increase in road density under the Action Alternatives, but a slight increase in temporarily roaded area during harvest (about 0.2% in the PA). The percentage of roaded area for each analysis area is estimated at less than 3% (Table 3.6-4), well below 12%; which is the threshold that may result in observable increases of peak flow according to most studies (Ziemer 1981).

The current road density within the PA is approximately 4.81 mi/mi^2 (See Table 3.6-4). This road density is likely to be the same or decrease under the No Action Alternative, since the basic road network is in place to harvest timber on both private and public lands. As harvest is completed, roads are often storm-proofed and if done properly are unlikely to contribute to peak flows in the future.

Any new road construction is likely to be off-set by decommissioning of unused roads, or be so small as to not change the overall road densities in the analysis areas, which are roughly 5 mi/mi^2.

Enhancement of peak flows and increases in water yield are not identical, but both are influenced by canopy cover, ECA and roaded area. Water yield refers to the total water produced from a watershed including base flows. Based on numerous paired watershed studies, water yield does not show a measurable increase until 20% of forest canopy is removed. Any measurable enhancement of peak flows evaporates 2-4 years after the initial disturbance as vegetation is reestablished and effective canopy and transpiration increase (Best et al. 2003). The ECA area predicts no measurable change in water yield for the Middle Cow Watershed. There may be some enhancement of water yield for Upper Cow expected due to ECA estimates (Grant et al. 2008) since ECA values are above 20%. Upper Cow has an ECA of 22%, but ECA areas that were cut within the last few years (since the analysis was done in 2014) have likely recovered to normal water yields and therefore shouldn't be considered as significant.

Since no measureable difference in enhanced peak flows or annual water yield is expected from ECA and in Upper or Middle Cow Creek, no Cumulative Effects are expected under the No Action Alternative to water yield and watershed response.

3.6.3 Common to Action Alternatives 2 and 3

Direct/Indirect Effects

Temporal Scale for the Analysis

The temporal scale for direct effects for this analysis is short-term (1-2 years) to address initial disturbance from activities. The long-term temporal scale (50+ years) will be used to talk about indirect effects in relationship to Aquatic Conservation Strategy (ACS) objectives and the long term scale will be used to discuss values like LSR characteristics, changes in streamflow timing, water temperature, and other values impacted by the overall health and function of watersheds that make up the affected environment.

Geographical Scale for the Analysis

The geographic scale of direct and indirect analysis for water resources will focus on the PA which is mostly in the Upper Cow Creek watershed and the Middle Cow Creek watershed. The PA includes small portions of the headwaters in the tributaries of the South Umpqua River (See Table 3.6-5), i.e. only 8% of the PA. Some of the proposed treatment units include small portions in the Days Creek - South Umpqua River drainage (132 acres of proposed treatment in 14 units). These treatment units on the watershed boundary are fairly homogenous and are expected to be similar in terms of vegetation, topography and hydrology to the portions of the units in the Cow Creek drainage area. Therefore the effects for these areas are expected to be similar to effects described for units in Upper and Middle Cow Creek watersheds.

Table 3.6-5 Hydrological Unit Code Boundaries within the PA* (26,470 acres)

Subbasin (HUC 08)	Watershed (HUC 10)	Subwatersheds (HUC 12)	Subwatershed Tributaries
South Umpqua (HUC # 17100302)	Upper Cow Creek (9,830 acres, 37% of the Project Area)	Galesville Reservoir (9,830 acres)	McGinnes Creek Meadow Creek Sugar Creek Negro Creek
	Middle Cow Creek (14,418 acres, 55% of the Project Area)	Whitehorse Creek (13,722 acres)	Blackhorse Creek Russell Creek
		Quines Creek (696 acres)	Starvation Creek Fizzleout Creek Quartz Creek
	Days Creek -- South Umpqua River (2,222 acres, 8% of the Project Area)	Stouts Creek (342 acres)	Stouts Creek
		Shively Creek (1,026 acres)	Shively Creek
		Canyon Creek (394 acres)	Canyon Creek
		O'Shea Creek (460 acres)	O'Shea Creek
*This table corresponds to the Project Boundary Figure 1, actual treatment unit acres are shown in Appendix A contained within the Soil and Water Resources Specialist Report; BLM managed acres in the PA are 13,744 acres.			

Water Resource

Effects Common to all Road Use and Temporary Construction Activities

As discussed in the No Action Alternative, the primary effect of the existing road network is the interception of shallow groundwater flow and concentration of subsurface flow in drainage ditches. When drainage ditches have adequate relief culverts or the road is out-sloped, water in drainage ditches has an opportunity to infiltrate into hillslope soils. However, when drainages are routed to cross drains placed in drainages or when cross-drains are inadequate road ditches can become an extension of the natural drainage density and result in effects to water yield or contribute changes in runoff response to storms. A direct effect from the Action Alternatives will be the maintenance and use of this existing road system.

Hydrologic effects of roads and other disturbance are strongly influenced by landscape conditions, road design and construction, and storm history. Hydrologically-connected disturbance from roads, trails, landings and logging corridors have the potential for adverse effects, including sedimentation, surface and groundwater dynamics and changes in flow characteristics (Furniss et al., 2013). Primary linkages that provide this hydrological connection are ditches draining to road-stream crossings and ditches draining to gullies below cross-drains. These can be identified with LiDAR using Geographical Information Systems (GIS). Each treatment unit was evaluated for these connectors that would drain proposed ground disturbance, suspension corridors, and sections of haul routes to stream systems that could transport sediment.

Haul routes have been evaluated to determine which road segments may be hydrologically connected to perennial streams that may receive sediment from these areas have also been identified. Nine crossings on proposed haul routes off of paved roads would be used to haul timber (Table 3.6-6).

Table 3.6-6 Number of Stream Crossing based on BLM GIS Data for Identified Haul Routes to be used in Alternative 2*

Stream Type	Aggregate Surface	Grid Rolled	Pit Run	Natural or Unknown	Total
Ephemeral	35	22	35	17	109
Intermittent	24	12	24	2	62
Perennial	22	14	11	2	49
Fish Bearing	6	0	3	0	9
Total	**88**	**48**	**73**	**21**	**230**

**Alternative 3 is less impactive than Alternative 2 so effects are anticipated to be less than those described for Alternative 2.*

With seasonal rain there is likely to be small pulses of sediment at stream crossings, where surface disturbance is hydrologically connected to stream systems. These pulses of sediment have the potential to briefly increase turbidity, but the amounts are not likely to exceed levels from naturally occurring erosion and runoff. For more detail see the Upper Cow LSR Project Hydrology/Soils Resource Report.

PDFs and BMPs will be employed for surface disturbance that is in areas with the potential of transporting sediment to streams. More than likely BMPs and EPZ buffers will be effective and no observable increases in sedimentation or turbidly in surface waters would occur. For this sediment to be transported to perennial surface waters it needs to come from roads with ditches that are hydrologically connected to surface waters. Of the proposed haul routes 58 of the 230 road segments have portions that cross perennial streams. These crossings have the potential for sediment delivery to surface waters from the use of the road system. BMPs and good road maintenance is likely to reduce the potential for sedimentation due to timber hauling and magnitude is unlikely to be detectable above effects described for the No Action Alternative.

Table 3.6-7 Units with roads, culverts and/or logging systems that are hydrologically connected to perennial waters.

Units or Haul Routes*	Description of Hydrologically Connected Activities to Perennial Surface Waters+	Stream System (See Table 3.6-5)
5-4	Ground-based harvest with skid trails and drainage that may be connected to perennial surface waters.	Russell Creek
9-1 and 9-26	Ground-based harvest with skid trails and drainage that may be connected to perennial surface waters.	Whitehorse Creek
17-1C	Ground-based harvest with skid trails and drainage that may be connected to perennial surface waters.	Quartz Creek
21-12	Ground-based harvest with skid trails and drainage that may be connected to perennial surface waters.	Fizzleout Creek
27-12	Ground-based harvest with skid trails and drainage from temporary roads that are connected to perennial surface waters. These units drain to Galesville Reservoir.	Galesville Reservoir and Cow Creek
23-3N	The locations of suspension corridors are likely to be perpendicular to perennial stream. Failure of culvert on access road.	McGinnis Creek
27-4S	The locations of suspension corridors are likely to be perpendicular	Fizzleout Creek

Units or Haul Routes*	Description of Hydrologically Connected Activities to Perennial Surface Waters+	Stream System (See Table 3.6-5)
	to perennial stream.	
31-2	The locations of suspension corridors are likely to be perpendicular to perennial stream.	Russell Creek
* Units that have no features that are likely Hydrologically connected to surface waters are: 1-1, 1-1B, 1-2, 1-13A, 3-1A, 8-6, 9-24, 11-6, 11-25, 11-26, 11-34, 13-4, 13-37, 14-3, 17-1A, 17-1B, 17-1D, 17-1E, 17-4, 19-3,19-4, 19-4B, 19-9, 21-2, 23-1, 23-2, 23-2S, 23-6N, 23-7SA, 23-8, 23-10, 24-1, 24-3, 24-5, 25-1A, 25-7, 25-7N, 26-3, 26-1B, 26-3A, 29-1, 32-4, 32-7N, 30-2, 31-2S, 31-2W, 31-3, 31-6, 32-4, 32-12, 33-4, 35-1B, 35-1F, 35-2, 35-5, 35-5A, 35-7, 35-24. + Hydrologically connected means any road segment that has a continuous surface flow path between any part of the road prism and a natural stream channel. (Furniss et al. 2013).		

Paved roads proposed for haul are generally in good condition and would require only rare instances of ditchline maintenance. Stream crossings on paved roads are also expected to be adequate for timber haul.

Roads with an aggregate surface that are proposed for haul generally have good surface conditions. Some roads have aggregate that includes pit run or is grid rolled. Properly maintained roads would be expected to have low levels of erosion unless utilized for hauling under wet conditions (See Section 3.5). Prior approval from the authorized officer would be required for wet season use of rocked roads (generally October 15 – May 15).

Under either Action Alternative approximately 65 miles of haul routes were identified for possible maintenance/renovation. Maintenance/renovation would restore a proper road shape, restore drainage features, restore road surfacing and maintain ditchlines. Restoring road shape would be to provide a slope to shed water from the road surface and proper designs include outsloped or an insloped road with grade breaks or crowned and ditched. Restoring drainage features may include: rolling dip structures, building new rolling dip features, installing culverts for cross drains to drain inside ditches and culverts for crossing surface flow paths.

Ditchlines in the project that are functioning properly, showing adequate movement of water, and little scour may have brush removed but will not be mechanically cleaned. In areas where ditchlines are not properly functioning mechanical treatment during the dry season will be done to restore the function of the ditch for road drainage. If accumulated sediment needs to be removed it will be hauled to a stable location not hydrologically connected to the stream system. Maintenance activities should occur in the dry season or during dry conditions in the wet season (October 15 – May 15).

Water Resource Effects Common to all Treatments

The likelihood of increases to peak flow as a result of Action Alternatives would be low (Grant et al. 2008), since road density within the PA will be almost identical to pre-disturbance condition (this project will add 6 acres of short-term disturbance as compared to 724 acres of estimated road disturbance in the PA for the existing road system). Normal use of roads can lead to deteriorating conditions and there is the potential for localized failures due to concentrated surface runoff. Proper

maintenance of roads will be required, which may include unclogging culverts during the wet season or rebuilding road segments that are failing. Failure of roads, if it occurs, could result in increased sediment, but transportation of this sediment to perennial waters is unlikely due to lack of hydrologically connected road segments for this project.

Harvest activities would add an estimated 52 acres to the ECA area during the short-term (1-2 years), but with successful reclamation no increase in the ECA area would occur. The percentages of ECA in Middle Cow Creek (15%) or Upper Cow Creek (22%) would not exceed the 19% or 29% thresholds described for transient-snow or rain dominated systems described earlier with this additional short-term disturbance.

Strategies to reduce stream temperatures are described in the Northwest Forest Plan (NWFP) and in in Water Quality Restoration Plans (Oregon DEQ 2006). The NWFP recommends silvicultural practices rates to achieve ACS objectives (See Chapter 2.2, pp. 20-24: Treatments in Riparian Reserve Thinning). The NWFP recommends these treatments be focused on previously harvested, dense stands, unnaturally dense stands of mid- to late-seral trees along wide valley channels or steep ground that are at elevated risk of catastrophic fires would provide the greatest benefit to streams with high water temperatures. Thinning prescriptions described in the Proposed Action are designed to improve forest health and resiliency to disturbances such as fire, drought and insects and achieve ACS objectives. This is accomplished by reducing canopy density, improving stand health, and diversity.

Studies based on pollen found in natural lake sediments indicate Oregon forests were generally resilient to disturbance during most of their life history. For example, shade tolerant species in riparian reserves generally maintain their abundance even through periods of drought, severe fire, and moderate erosion events (Colombarolia and Gavin 2010). Conditions in the Upper and Middle Cow Creek watersheds are likely similar to these areas. Consequently, forest stands resiliency to disturbance in the PA has likely been reduced by road building, logging, and major floods. Vegetation and hillslope stability of areas with a legacy of logging and severe erosion will likely remain sensitive to subsequent severe fire events for the foreseeable future.

LSR objectives include a diversity of species as well as stand types. Treatment in stands that are young but uniform can also be used to provide gaps and diversity in stand characteristics. This non-uniformity can have benefits for wildlife, but also can help make timber stands more resilient to disturbances such as wildfire, insects or diseases. Objectives for achieving the ACS include maintaining and restoring the composition and structural diversity of plant species, water quality chemistry, flow conditions, physical integrity of stream systems, and aquatic habitats. In some cases this means leaving intact refugia, but in other cases it means active management to restore disturbed systems such as former timber plantations.

An EPZ buffer of 85 feet is expected to be fully protective of the primary shade zones for trees 100 feet or taller on hillslopes up to 60 % (USFS/BLM 2012, p. 29 Table 4). The primary shade zone is

the vegetation that shades streams from 10 am to 2 pm in a given day, the period most responsible for warming streams. It is estimated that 58% of the heating of streams occurs between 10 am and 2 pm. In addition to shade, temperatures in the area around the stream form a micro-climate zone that can have significantly lower air temperatures than the surrounding forest, important for maintaining stream temperatures. This micro-climate zone has been estimated at 50 feet.

Site potential tree height for the Upper Cow Watershed is 200 and for Middle Cow it is 195 feet; therefore, the 85 foot buffer is expected to be fully protective of the primary shade zone and micro-climate in riparian areas in the PA. Effects from thinning in the secondary zone are dramatically less of an impact to stream temperature as compared to closer treatments (USFS/BLM 2012: p. 31, Figure 14).

For near-stream riparian inputs, empirical and modeling studies suggest that stream wood input rates decline exponentially with distance from the stream and vary by stand type and age (ICS 2013). A no treatment buffer of 120 feet (36.6 meters) would likely retain at least 95% of the wood that would be available for recruitment to the stream from stands that have been harvested in the past (ICS 2012: p. 31, Figure 10).

Based on the ICS graph, an 85 foot buffer on perennial non-fish bearing streams for all treatments is expected to maintain about 85% of the potential wood recruitment (ICS 2012: p. 31, Figure 10). Water quality benefits from the input of coarse wood include reducing stream temperature, increasing dissolved oxygen and by retaining nutrients and sediments in the physical complexity. For more detail on sedimentation and stream temperatures see the Upper Cow LSR Project Hydrology/Soils Resource Report.

3.6.4 Action Alternative 2

Direct/Indirect Effects

No new permanent road construction is proposed by this project, only temporary roads that will be fully-decommissioned are proposed. Road density is more likely to impact peak flows on small watersheds and impacts diminish with larger watersheds (Gucinski et al. 2001). Increases in peak flow have not been found in foundational paired-watershed studies until roads and other impermeable areas occupied more than 12% of the watershed (Ziemer, 1981). But, since roads occupy only 5% of the watershed area in each watershed, no changes in peak flow response is expected due to roads.

Harvest activities would add an estimated maximum of 72 acres to the ECA area during the short-term (1-2) years, but with successful reclamation no long-term increase in the ECA area would occur. The percentages of ECA in Upper and Middle Cow Creek would not exceed the 19% or 29% thresholds described for rain-on-snow or rain dominated systems with the additional disturbance (See Section 3.5.2: Effects from No Action Alternative). Therefore, effects to peak flows are expected to be indistinguishable from background conditions described for the No Action Alternative.

Stream buffers intercept and filter sediment from upslope erosion sites, so long as drainage is not concentrated in gullies, channels, or cable-yarding and skid trails (i.e. hydrologically connected, see Table 3.6-7). Perennial streams employ an 85 foot buffer to protect the primary shade zone and fish bearing streams employ a 120 foot buffer to allow for course wood recruitment (See Chapter 1: Ecological Protection Zones).

BLM has identified Best Management Practices (BMPs) for the protection of water quality under the Clean Water Act in Section 2.4: Chapter 1, BMPs that are specific to this project and the management actions proposed under the Action Alternatives. The BLM has also developed Water Quality Restoration Plans for Middle and Upper Cow Creek that are being implemented (BLM 2004a; BLM 2004b). Specific passive and active restoration goals are described for federal lands and have been incorporated into the project design. For example to help with the streamflow and channel component of stream flow maintaining and reducing road densities is a goal. The protection of the primary shade zone is a goal to help the shade component of maintaining stream temperature. This approach is in conformance with Designated Management Agencies' plans as described in the Umpqua WQMP.

The table (Table 3.6-6) above shows the total stream crossings within proposed haul routes for this project, and the associated stream types and surface types of roads. The likelihood of increases to peak flow as a result of Proposed Actions would be low (Grant et al. 2008), since road density within the PA will be almost identical to pre-disturbance condition (this project will add 6 acres of short-term disturbance as compared to 724 acres of estimated road disturbance in the PA for the existing road system).

No new permanent road construction is proposed by this project, only temporary roads that will be fully-decommissioned. Harvest activities would add an estimated 52 acres to the ECA area during the short-term (1-2) years, but with successful reclamation no increase in the ECA area would occur. Of the 11,332 acres of riparian reserves in the PA, 273 acres are proposed for treatment under Alternative 2. Treatments (Thinning and/or Understory Reduction) would be the same in these areas down to the no-treatment buffers or EPZs that have been removed from unit boundaries. Alternative 2 would treat 2.4% of the riparian reserve on BLM managed lands in the PA. Riparian thinning in the secondary shade zones, 85feet from the stream, is unlikely to result in a measureable change in stream temperatures due to the small amount of treatment proposed and due to protection of the primary shade zone. A no treatment buffer of 120 feet (36.6 meters) would likely retain at least 95% of the wood that would be available for recruitment to the stream from stands that have been harvested in the past (ICS 2013, p. 31: Figure 10).

Units with Thinning using Helicopter Yarding (221 Acres) – Thinning with helicopters involves hand crews to fell the trees and attach them to the helicopter cable. Very little disturbance is expected to soils and no effects to water resources are expected beyond those described that are common to all. Direct effects at helicopter landings and road use for timber haul are expected. Of the 18 landings anticipated for supporting helicopter yarding, 9 are expected to be located on BLM Administered

lands.

Thinning with Ground Based Equipment (248 Acres) - Localized erosion within units would persist on skid trails until vegetation became re-established. Table 3.6-7 identifies the ground-based units that have the potential for sediment delivery to surface waters (Units 9-1, 9-26, 17-1C, 21-12, 27-4N and 27-12). Temporary routes, landings, hydrologically connected corridors/ skid trails and other areas of exposed soils that are not already reclaimed or decommissioned will be winterized prior to October 15 in these units, skid trails in the riparian reserve will be scarified, seeded, water barred, mulched and blocked.

Cumulative Effects Action Alternative 2

The Cumulative Effects analysis area for peak flows, temperature and sediment is the Upper and Middle Cow Creek watersheds; for water quality it is the South Umpqua subbasin (17100302). Where Cumulative Effects could lead to peak flow enhancement, a determination of equivalent clearcut area (ECA), road densities and roaded area were calculated for each 5th level or 10th digit watershed and the PA.

For this project, it was determined that little to no sedimentation would occur from individual units, landings, and crossings along haul routes. In other words, no measureable sedimentation would occur above natural background levels described for the No Action Alternative. Therefore, no water quality measures would be negatively affected. Some short-term direct and indirect effects to water quality were identified due to pulse increases in sediment and turbidity from road work, generally during the first significant storm event of the wet season. While these effects from sediment could potentially occur, it would still remain within acceptable water quality limits for turbidity, and sediment loads would be difficult to distinguish from background levels.

No-treatment buffers (EPZs), Best Management Practices (BMPs), and specific associated project design features (PDFs) identified in Chapter 2.4, would result in no direct or long term input of sediment to streams and thus no Cumulative Effects to water quality. In addition to sediment filtering, the EPZs would also retain trees that contribute to the primary shade zone for streams, and thus would maintain stream temperatures.

The risk of negative effects to water quality from the Proposed Actions is low. There would be no changes to current slope stability or risk of slope failure. The potential for periodic slope failures within the range of natural variability would still remain in association with areas exhibiting an historic disposition to soil movement, particularly in the event of a major storm (See Section 3.5).

The Proposed Action would not increase road densities since all temporary roads would be fully decommissioned after use. Landings constructed in new disturbance would be rehabilitated, therefore no increase in ECA or road densities, and no perceptible increase in peak flows would be expected.

For this project, it was determined that no cumulatively measurable or significant alterations to the hydrologic function of the Upper Cow Creek, Middle Cow Creek or tributary systems to the South Umpqua river would occur.

3.6.5 Action Alternative 3

Direct/Indirect Effects

The difference in acres of treatment is 178 acres between Action Alternatives 2 and 3.Alternative 3 would only treat stands that are 80 years of age and younger and would not cut trees greater than 20 inches diameter at breast height (DBH). Understory reduction treatments would still occur in these units. Road work and Project Design Features/Best Management Practices are the same within Action Alternatives 2 and 3.

The units not treated under Action Alternative 3 and have riparian reserves would not have the benefits of forest health and species diversity anticipated in riparian stands (20 acres). Understory reduction treatment would still be expected to provide some benefits to riparian stands. In stands that remain untreated next to perennial streams no effects are expected to stream temperature or aquatic habitat, due to the EPZ implemented under Action Alternatives 2 and 3 that is designed to be protective of the primary shade zone and 85% to 95% of the potential wood recruitment.

Ground-based harvesting would not occur during the wet season under Alternative 3. Impacts are more likely with ground-based harvesting when soils are wet due to more effective compaction by ground-based equipment and increased risk of displacement due to less soil cohesion. It is difficult to quantify the degree impacts would be less since under Alternative 2 ground-based harvest would only occur in dry conditions with a waiver after a soils test has determined there was less than 25% soil moisture 4-6 inches below the surface. Effects to water resources would be reduced as compared to Action Alternative 2 due to a reduction in activities when soils are wet, but this is not likely be measurable in sedimentation rates due to no-treatment buffers and the use of the waiver system.

All commercial thinning operations will use system roads for timber hauling. No new permanent roads would be built and all temporary routes would be fully decommissioned after use, therefore there would be no increase in road density under Alternative 3 after implementation. Effects from logging systems to both soil and water resources would be similar with lower acres of treatment and less use of the road system for timber hauling under this alternative as compared to alternative 2.

Cumulative Effects Alternative 3

Effects would be similar to those described for Action Alternative 2. There would be slightly less disturbance to soils and water resources and a higher potential risk for catastrophic disturbance (wildfire, insects and/or disease) in addition to the effects described for the No-action (Alternative 1). This higher risk for disturbance is based on the assumption that the treated stands will be more resilient and resistant to future disturbance as compared to untreated stands.

3.7 Fisheries and Aquatics

3.7.1 Affected Environment

The scale of the analysis for the PA totals 26,470 acres (~41 square miles) and includes the watersheds listed in the Hydrology section Table 3.6-5. This PA provides habitat for special status species, including Oregon Coast (OC) Coho Salmon (*Oncorhynchus kisutch*); OC Steelhead (*Oncorhynchus mykiss*); Oregon Coast Chinook (*Oncorhynchus tshawytscha*), and Umpqua Chub (*Oregonichthys kalawatseti*). In addition, resident Coastal Cutthroat Trout (*Oncorhynchus clarki*) are present in streams of the PA (Table 3.7-1). Current fish distribution is based on sources of information that include historical surveys, Oregon Department of Fish and Wildlife (ODFW) Aquatic Inventory observations, Streamnet, Middle Cow Creek Watershed Analysis (BLM 1999a), Upper Cow Creek Watershed Analysis (BLM 2005), and the South Umpqua Watershed Analysis and Water Quality Restoration Plan (BLM 2001b). For a complete list of fish species found within the three HUC 10 watersheds, refer to the Watershed Analyses listed above.

Table 3.7-1 Fish Bearing Streams Located near the Proposed Treatment Units

HUC 10	Stream name	Fish Species
Upper Cow Creek	Cow Creek	OC Coho, Cutthroat Trout
	McGinnis Creek	Cutthroat Trout
	Sugar Creek	Cutthroat Trout
	Negro Creek	Cutthroat Trout
	Snow Creek	Cutthroat Trout
Middle Cow Creek	Cow Creek	OC Coho, OC Steelhead, OC Chinook, Umpqua Chub, Cutthroat Trout
	Whitehorse Creek	OC Coho, OC Steelhead, Cutthroat Trout
	Blackhorse Creek	OC Coho, OC Steelhead, Cutthroat Trout
	Fizzleout Creek	OC Coho, OC Steelhead, Cutthroat Trout
	Starvout Creek	OC Coho, OC Steelhead, Cutthroat Trout
	Russell Creek	Cutthroat Trout
Days Creek-South Umpqua River	No fish bearing streams located in proximity to units	N/A

<u>Federally-Threatened Species</u>

Salmon are listed under the Endangered Species Act (ESA) by evolutionarily significant units (ESU). An ESU is a stock of Pacific salmon that is 1) substantially reproductively isolated from other specific populations units; and 2) represents an important component in the evolutionary legacy of the species. The southernmost extent of the federally listed threatened OC Coho Salmon is the Umpqua Basin. See Table 3.7-2 below for a list of treatment units and their proximity to fish bearing and Coho Critical Habitat (CCH).

Oregon Coast Coho

On June 20, 2011, the National Oceanic and Atmospheric Administration (NOAA) Fisheries Service published a final determination to retain OC Coho Salmon as a threatened species under ESA (Federal Register Vol. 76, No. 118). Designation of Critical Habitat became effective on February 11, 2008 (Federal Register Vol. 73, No. 28). OC Coho Salmon are present in Middle Cow and Upper Cow Creek HUC 10 watersheds downstream from proposed units and haul routes.

Table 3.7-2 Distance from Proposed Treatment Units to Fish Bearing Streams and Coho or CCH

Nearest Fish Bearing Stream	Units in proximity	Distance to Fish Bearing Stream	Distance to Coho or Critical Habitat
Upper Cow Creek (Galesville)	21-2, 27-4S, 27-12, 26-1, 26-1B, 34-1, 35-1, 35-1B, 35-2, 35-3, 35-5, 35-5A, 35-15, 35-15A, 35-7, 1-2,	120 feet -1.5 miles	120 feet - 1.5 miles
McGinnis Creek	23-3N, 23-2, 23-2B, 24-3, 26-3, 26-3A	120 feet -1.0 miles	1.0 - 1.5 miles
Sugar Creek	19-4, 25-1B, 25-7, 25-12, 25-37	0.2 - 0.5 miles	2.25 - 2.5 miles
Negro Creek	3-1, 11-1	120 feet - 0.5 miles	1.0 – 2.0 miles
Snow Creek	1-8, 13-37	0.5 – 1.0 miles	0.5 - 5.0 miles
Middle Cow Creek	1-1, 1-1B, 29-1, 33-4	0.5 - 1.0 miles	0.5 – 1.25 miles
Whitehorse Creek	3-1A, 11-6, 11-25, 11-34, 15-19, 9-1, 9-19, 9-22, 9-26, 23-8, 23-7SA, 23-10	120 feet - 1.0 miles	120 feet - 1.0 miles
Blackhorse Creek	13-4, 14-3, 11-26	0.25 – 0.5 miles	0.5 - 1.25 miles
Fizzleout Creek	21-2, 27-4S	120 feet - 0.5 miles	0.2 - 1.0 miles
Starvout Creek	9-24, 8-6, 17-1, 17-1A, 17-1B, 17-1C, 17-1D, 17-1E, 17-4	0.5 - 1.5 miles	0.5 - 1.5 miles
Russell Creek	5-4, 31-2, 31-2S, 31-2W, 31-2NW, 31-3, 31-6, 32-4, 32-7N, 32-7S, 32-12	120 feet - 0.5 miles	0.25 - 2.0 miles

Special Status Species (SSS)

OC Steelhead is a Bureau Sensitive Species and also listed as a Sensitive Species by the State of Oregon. OC Steelhead are located throughout the Umpqua Basin (Middle Cow Creek HUC 10) with habitat preferences similar to those of other salmonids. OC Steelhead tend to occupy streams with higher gradients than do OC Coho Salmon, and their distribution is similar to resident cutthroat trout, where access is not blocked by manmade or natural barriers. OC Chinook is a Bureau Sensitive Species and also listed as a Sensitive Species by the State of Oregon. OC Chinook are found in the Middle Cow Creek HUC 10 watershed portion of the PA.

The Umpqua Chub is a Bureau Sensitive Species found in the main stems of the North and South Umpqua Rivers and several larger tributaries (Simon 2008). Umpqua Chub are found in the main stem of Cow Creek but their presence has not been established within the PA.

For a discussion of the Aquatic Habitat, Coho Critical Habitat, and Essential Fish Habitat within the PA see the Fisheries and Aquatics Specialist Report in the Administrative Record.

3.7.2 No Action Alternative

Direct/Indirect Effects

Under the No Action Alternative, there would be no vegetation treatments or associated activities within the PA. There would be no road maintenance, road renovation or road construction associated with harvest.

Cumulative Effects

The following activities have been previously analyzed and approved projects that may still occur within the PA in the near future; Major Federal Highways Project, Water source Maintenance , Medford Road Maintenance CX, Hazardous Fuels Reduction CX.

Medford Road Maintenance CX- Actions under this project include ongoing scheduled and emergency road maintenance activities. Road maintenance activities benefit the hydrologic function within the PA which will benefit habitat for fish and aquatic species.

Incremental impacts created by private land practices are unquantifiable due to the limited size and spatial scattering of treatment areas on private lands, road drainage improvements in the watershed, and Oregon Forest Practices Act regulations on size of harvest units.

Under the No Action Alternative there would be no project-related road maintenance activities. Road maintenance activities improve the function of system roads and decrease non-point source pollution that may emanate from unmaintained roads. Thus, under the No Action Alternative, there would be no decrease to non-point source pollution within the PA associated with project activities.

Additionally, under the No Action Alternative, Riparian Thinning would not occur, thus there would be no benefit to ACS or aquatic species associated with this Alternative (for more information on ACS, see the Administrative Record). Fuels reduction treatments associated with project activities would also not occur, thus there would be no reduction to fire hazard within the PA.

3.7.3 Action Alternative 2

Direct/Indirect Effects

Federally-Threatened Species

Stand treatments, yarding, landing construction and rehabilitation, temporary route construction and reconstruction (including route decommissioning), road maintenance, hauling, and activity fuels treatments would have no effect on OC Coho Salmon (ESA-Threatened) and designated Coho Critical Habitat (CCH). For the PA, the closest CCH to any proposed treatment units is in Whitehorse Creek. Treatments in units 9-1 and 9-26 will be 120 feet from Whitehorse Creek, consistent with the EPZ established for treatments on any fish bearing stream. The PA haul routes cross fish bearing streams at several locations (Table 3.7-3). At the bridge crossing Cow Creek upstream of Galesville Dam (Road 32-4-1.0), OC Coho are present but CCH is not designated. At the culvert crossing on Blackhorse Creek (Road 32-4-15.0), OC Coho and CCH are present. Sediment would not be expected to enter CCH as a result of haul or maintenance of haul roads, with dry condition haul, properly functioning cross drains, and sediment barriers installed, where needed,

to prevent sediment delivery into CCH. Project activities would follow all provisions of the CWA (40 CFR Subchapter D) and Oregon DEQ's provisions for maintenance of water quality standards.

Table 3.7-3 Haul Route Crossings at Fish Bearing Streams

Road	Stream name	Fish Species	Crossings
31-4-31.0	Russell Creek	Cutthroat Trout	1
32-4-6.0	Russell Creek	Cutthroat Trout	1
32-4-22.0	Whitehorse Creek	Cutthroat Trout	3
32-4-15.0	Blackhorse Creek	OC Coho, OC Steelhead, Cutthroat Trout	1
31-3-31.0	Sugar Creek	Cutthroat Trout	1
32-4-1.0	Cow (upstream of Galesville Dam)	OC Coho, Cutthroat Trout	1

Special Status Species (SSS)
OC Steelhead and OC Chinook habitats are contained within the CCH analyzed for OC Coho salmon. Within the PA, SSS adjacent to proposed treatment units in Whitehorse Creek are present. Treatments in units 9-1 and 9-26 will be 120 feet from Whitehorse Creek, consistent with the EPZ established for treatments on any fish bearing stream. The PA haul routes intersect SSS habitat at the bridge crossing Cow Creek upstream of Galesville Dam (Road 32-4-1.0), and at the culvert crossing on Blackhorse Creek (Road 32-4-15.0).

Proposed vegetation treatments would have no effect on OC Steelhead, Umpqua Chub, and OC Chinook. With dry condition haul, properly functioning cross drains, and sediment barriers installed, where needed, sediment would not be expected to enter SSS habitat as a result of haul or maintenance of haul roads. Project activities would follow all provisions of the CWA (40 CFR Subchapter D) and Oregon DEQ's provisions for maintenance of water quality standards. Fish species are listed as SSS by ESUs. See Chapter "3.7.1: Affected Environment: Federally-Threatened Species" above for the definition of ESUs.

Aquatic Habitat, Coho Critical Habitat, and Essential Fish Habitat
For background information regarding the above-listed topics, see the Fisheries and Aquatics Specialist Report in the Administrative Record.

Spawning Substrate
Stream substrate is not expected to change from the Affected Environment description because the proposed activities would occur outside EPZs. BMPs and PDFs in upslope areas and along haul routes would greatly reduce the likelihood of harvest-related sediment entering spawning substrate.

Pool Quality
Pool quality would not be affected by proposed harvest and road-related activities. Activities would occur outside EPZs; BMPs and PDFs in upslope areas and along haul routes would greatly reduce the likelihood of harvest-related sediment affecting pool quality.

Large Woody Debris
EPZs would be 85 feet on either side of non-fish bearing perennial streams and perennial springs, and intermittent streams would have EPZs of 35 feet per side. Fish bearing streams would receive a 120 foot buffer on either side of the stream. Restricting harvest to outside of EPZs of 120 feet would be sufficient to keep large wood at current levels. As a result, there would be no probability of an effect to Large Woody material as a result of proposed harvest and road related activities.

Habitat Access
Habitat access would remain unaltered under Alternative 2. Fish passage culverts or bridges are not proposed to be replaced or upgraded under this project.

Essential Fish Habitat
Streams within the PA designated as Essential Fish Habitat (EFH) include Cow Creek (downstream of Galesville Dam), Starvout Creek, Fizzleout Creek, Whitehorse Creek, and Blackhorse Creek.

Within the PA, EFH adjacent to proposed treatment units in Whitehorse Creek is present. Treatments in units 9-1 and 9-26 would be 120 feet from Whitehorse Creek, consistent with the EPZ established for treatments on any fish bearing stream. The PA haul routes intersect EFH habitat at the culvert crossing on Blackhorse Creek (Road 32-4-15.0).

Proposed vegetation treatments would not adversely affect EFH. With dry condition haul, properly functioning cross drains, and sediment barriers installed, where needed, to prevent sediment delivery into EFH streams, sediment would not be expected to enter EFH as a result of haul or maintenance of haul roads. Project activities would follow all provisions of the CWA (40 CFR Subchapter D) and Oregon DEQ's provisions for maintenance of water quality standards.

Aquatic Conservation Strategy Assessment
The Aquatic Conservation Strategy (ACS) was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. The ACS must strive to maintain and restore ecosystem health at watershed and landscape scales to protect habitat for fish and other riparian-dependent species and resources and restore currently degraded habitats. This approach seeks to prevent further degradation and restore habitat over broad landscapes as opposed to individual projects or small watersheds (USFS/BLM 1994b, p. B-6).

A site/project scale and HUC 10 assessment was performed for the Upper Cow Project. Proposed activities in Alternatives 2 and 3 would meet, and are consistent with, ACS goals and objectives at the site and watershed scales. The detailed ACS assessment to support this determination can be found in Appendix C.

Cumulative Effects

No additional effects were identified as a result of Alternative 2 when considered with the effects of other ongoing or reasonably foreseeable actions in the PA. No direct or indirect effects to fish and aquatic resources are anticipated as a result of implementing the actions proposed in Alternative 2 due to the implementation of BMPs and PDFs.

3.7.4 Action Alternative 3

Direct/Indirect Effects

Alternative 3 has the same road building and the same logging systems as would be used in Alternative 2, which was analyzed above. Proposed vegetation treatments would not affect ESA listed fish species and designated Critical Habitat, Special Status Species, EFH, resident fish, or aquatic resources. Sediment would not be expected to enter fish streams as a result of haul or maintenance of haul roads, with dry condition haul, properly functioning cross drains, and sediment barriers installed, where needed, to prevent sediment delivery into fish streams. Project activities would follow all provisions of the CWA (40 CFR Subchapter D) and Oregon DEQ's provisions for maintenance of water quality standards.

Cumulative Effects

No additional effects were identified as a result of Action Alternative 3 when considered with the effects of other ongoing or reasonably foreseeable actions in the PA. No direct or indirect effects to fish and aquatic resources are anticipated as a result of implementing the actions proposed in Alternative 3. Because Alternative 3 does not allow for dry condition haul and harvest in certain areas the effects of Alternative 3 are anticipated to be less than those described in Alternative 2.

3.8 Cultural and Paleontological Resources

Methodology

- Cultural resource surveys were conducted with strict adherence to Class III standards in accordance with the Secretary of the Interior's Standard and Guidelines for Archeology and Historic Preservation (43 CFR § 7).

Assumptions

- Forest floor visibility is fair to poor due to heavy undergrowth, riparian vegetation, leaf litter, and needle cast.

3.8.1 Affected Environment

For the purpose of analysis, cultural resources are divided into two categories: prehistoric and historic archaeological sites and culturally significant resources. While this division does not necessarily alter the way in which the BLM manages a given tract of land, it does provide a better understanding of properties that require protection.

Archaeological (historic and prehistoric) sites are expected to occur within the PA. The cultural resource sensitivity of lands therein is considered to be moderate due to the area's rich mining history. Paleontological resource sensitivity within the PA is considered to be low, and to date, no known paleontological resources are known to exist in the area.

For a broad historical overview of the human and cultural mechanisms that have influenced the PA see the Cultural and Paleontological Specialist Report in the Administrative Record.

3.8.2 No Action Alternative

Under the No Action Alternative, the exclusion of fire and other treatments across the landscape would lead to continued natural accumulation of organic litter (duff, branches, and large branches). This may result in the production of more intense burning through cultural sites in the event of a wildfire. Thus, the No Action Alternative would not benefit cultural resources.

3.8.3 Action Alternatives 2 & 3

Direct and Indirect Effects

Cultural resource surveys were conducted within project units and no new sites were discovered that warrant protection. A total of 11 previously recorded cultural sites are located within the PA but none of these sites are near any project units, helicopter landing sites, or prosed temporary routes. Any known sites were excluded or avoided during the design of the project. To ensure protection of possibly undetected sites during project implementation the IDT designed PDFs that direct operators to cease all operations immediately and contact the project archaeologist if unidentified cultural or paleontological resources are encountered. If cultural resources are discovered during project implementation, the project would be redesigned to protect the cultural resource values present, or evaluation or mitigation procedures would be implemented based on recommendations from the Resource Area Archaeologist with input from federally recognized Tribes, approval from the Field Manager, and concurrence from the State Historic Preservation Office. Because of cultural resource surveys and PDFs the treatments proposed under the Action Alternatives would have no direct or indirect effects on heritage resources.

Cumulative Effects

Reducing fuel loads within the PA reduces the likelihood of a catastrophic fire event, lending to the better management and protection of cultural resources in the long term.

3.9 Special Status Plant and Fungi

Methodology

- Information pertaining to Threatened and Endangered, Survey and Manage, and Interagency Special Status/Sensitive Species plant sites was obtained from the Medford District BLM Geographic Biotic Observation (GeoBOB) database.

- GIS was utilized to query BLM-managed acreage and stand age.

- For this resource the PA boundary was determined to be upper ridgelines within three 10th field watersheds (Middle Cow, Upper Cow, and Days Creek South Umpqua River) encompassing the affected area.

- Vascular and nonvascular plant surveys have been conducted since 2012, and most recently, in the spring of 2015. Professional botanists surveyed the PA units using intuitive controlled methodology, wherein areas supporting high potential habitat were surveyed more intensively.

Surveys were also conducted in compliance with the 2003 Survey and Manage protocol, which requires surveys for Category A and C species. Survey and Manage protocol requires managing known (documented) sites of Category A, B, C, and E species, managing 'high-priority' Category D species, and no site management requirement of Category F species.

Assumption

- Private land will continue to be logged and re-planted, and will be subject to requirements listed within Oregon's Forest Practices Act (www.oregon.gov).

3.9.1 Affected Environment

A general description of the Affected Environment for the Upper Cow Project is located on page 51. In addition to the general description, the affected environment as it specifically relates to botanical resources is described below.

Plant and fungi species found within final proposed unit boundaries are broken out into their respective designations/categories – Threatened and Endangered (T&E), Bureau Special Status (BSS) / Interagency Special Status Species Policy (ISSSSP) species, and Survey and Manage (S&M) - discussed in more detail below.

<u>Threatened and Endangered (T&E) Plants – Not Present, Not Affected</u>

Final units within the Upper Cow Project do not fall within the range of the four federally listed plants found within the Medford District (*Arabis macdonaldiana, Fritillaria gentneri, Limnanthes flocossa* ssp. *grandiflora*, and *Lomatium cookii*) , as determined by the 2004 U.S. Fish and Wildlife Service Biological Opinion.

However, final units were surveyed to the Service's protocol in the course of conducting surveys for Bureau Special Status species (discussed below) and various vascular plant surveys have occurred under the pretenses of other land management projects within the Upper Cow project perimeter have occurred since 1979 (see past projects listed in Ch. 3 of the Upper Cow EA, p. 48), and no new threatened and endangered plant sites were found. There would be no anticipated effect from the Action Alternatives on any federally listed plant.

<u>Bureau Special Status (ISSSSP / BSS) & Survey and Manage (S&M) Plants and Fungi – Present, Not Affected</u>

ISSSSP Policy – Vascular, Nonvascular, and Fungi

On July 26, 2007 a new Special Status Species list went into effect (IM No. OR-2007-072), coupled with a new Interagency Special Status/Sensitive Species Policy (ISSSSP). This new list has two categories, (ISSSSP) Sensitive and Strategic. The former categories of Bureau Assessment and Bureau Tracking no longer exist.

Per Bureau 6840 regulations, the agency must not trend a Sensitive species toward federal listing under the Endangered Species Act (ESA). To comply with 6840 regulations, Sensitive species require a pre-project clearance and, if found as a result of pre-disturbance surveys would employ site management to prevent them from trending toward federal listing.

There is no pre-project clearance or management required for the Strategic Species at the BLM District level, thus Strategic Species will not be analyzed in this document.

S&M Standards and Guides – Vascular, Nonvascular and Fungi
Survey and Manage requirements have been re-instated as of April 2013. The Upper Cow project is consistent with the 2001 Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines, as incorporated into the District Resource Management Plan.

For vascular and nonvascular surveys, this project utilizes the December 2003 species list, which incorporates species changes and removals made as a result of the 2001, 2002, and 2003 Annual Species Reviews (ASR).

Special Status (ISSSSP) and Survey and Manage – Specific to Fungi

ISSSSP
Upper Cow project units occur in stands less than 180 years old. With the exception of incidental fungi sites reported by contractors, units less than 180 years old were not surveyed for ISSSP Sensitive fungi. Pre-disturbance surveys for Special Status fungi are not practical, nor required per BLM Information Bulletin No. OR 2004-121.

The likelihood of a sensitive fungi occurring within a unit(s) encompassed in the PA is low. As such, BLM contends that the likelihood of contributing toward the need to list is not probable. For more information regarding ISSSSP fungi species see the Special Status Plant and Fungi Specialist Report contained within the Administrate Record.

Survey & Manage
Strategic surveys have not been completed for category B fungi for the province containing the Upper Cow PA, and equivalent effort surveys have not been completed because units were not over 180 years of age (the age triggering fungi surveys IF there is suitable habitat).

Based on the aforementioned information, BLM contends that activities proposed within the Upper Cow project would not jeopardize persistence (S&M species) or contribute toward the need to list (ISSSSP species).

Vascular, Nonvascular, and Fungi Survey Results
Surveys pertaining to units surveyed in 2015 revealed the following new sites (see Table 3.9-1); (4) *Chaenotheca ferruginea*, and (2) *Cypripedium montanum*. *Craterellus tubaeformis* (former S&M) is no longer on the current S&M list and with the exception of inclusion in Table 3.9-1, will not be analyzed further. All sites, whether historic or resulting from the most recent surveys, have been compiled and listed in Table 3.9-1.

Table 3.9-1 Bureau Sensitive and Survey and Manage Plant Sites in Upper Cow units

Species	Common Name	Sensitive	Survey & Manage Category	Number of Sites	TRS (unit)
Chaenotheca ferruginea	Needle lichen	No	B	4	17-1E, 23-5 (dropped unit), 9-26, and 33-2 (dropped unit)
Cypripedium montanum	Clustered lady's slipper	No	C	2	Out of unit

Recommended Plant and Incidental Fungi Site Protection
Vascular species such as Cypripedium montanum typically receive a protection buffer ranging from 5-200 feet in diameter, depending on site specific conditions and unit prescription(s). However, these sites are outside of final unit boundaries, therefore, they will not receive a protection buffer.

For Survey and Manage (S&M) species, S&M protocols state Category A, B, and E species are under a "manage known sites" requirement. Therefore, the Category A, B, and E species in the above table would receive a 5-200 foot buffer, depending on site-specific conditions and unit prescriptions.

It is important to note that regarding the above-mentioned buffers, the actual buffer itself may be comprised of either a physical buffer made from flagging, or a virtual buffer provided on a map. In either case, the intent of the buffer is to provide awareness of the site, and to prevent any activity from occurring within the buffer radius that would jeopardize species persistence.

3.9.3 No Action Alternative

Direct and Indirect Effects

T&E, ISSSSP Sensitive, and S&M Plants (Vascular and Nonvascular) and Fungi
There would be no direct or indirect effects to ISSSSP Sensitive or S&M plants or fungi under Alternative 1 because no physical disturbance would occur that could impact them. There would be no additional loss of late-successional forest which may provide suitable habitat for the 10 suspected and 4 documented Medford District BLM Sensitive fungi.

Cumulative Effects
Past activities within the PA are accounted for in the baseline for analysis purposes. Present and reasonably foreseeable activities within the Upper Cow PA are listed in Chapter 3 of this EA, and are broken out into their respective categories for further review.

Present and Reasonably Foreseeable Activities
BLM Authorized Activities

The activities listed in Chapter 3, starting on page 42 of the Upper Cow EA have been previously analyzed and approved projects would still occur within the PA in the near future: the Fire Resiliency Project, the Middle Cow LSR Landscape Planning Young Stand Management Project, Slim Jim EA, Medford Road Maintenance CX, and the Hazardous Fuels Reduction CX. Below is a description of the activities that are occurring within this PA under these projects.

- Fire Resiliency Project – This is an active stewardship project with 219 acres of understory thinning and 181 acres of density management. Cumulative Effects to botanical resources would be beneficial, as 1) botany sites receive protection during the course of project implementation, and 2) the acres treated under fuels resiliency will benefit botanical resources by reducing fuel loading, thereby reducing the probability of stand-replacement wildfire.

- Pump Chance Maintenance CX – Two existing sites will be maintained within this planning area as part of this action – Bonnie Riffle and Skull Creek pump chances. Cumulative Effects to botanical resources are not anticipated by the BLM because 1) the scope and scale of such projects are typically less than 0.25 acres, and 2) each site will be assessed for rare plant occurrence – and if found, site will be protected prior to implementation.

- Medford Road Maintenance CX- Actions under this project include ongoing scheduled and emergency road maintenance activities. Cumulative Effects to botanical resources include possible short-term (0-3 years) disturbance of rare plant sites that may have established since the road prism was initially disturbed.

- Hazardous Fuels Reduction CX- Up to 1,500 acres within or adjacent to the planning area. Same Cumulative Effects to botanical resources as listed under Fire Resiliency Project.

Non-Discretionary Actions

Reasonably foreseeable activities within the Upper Cow PA include non-discretionary Reciprocal Right-of-Ways (RROW) where certain private timber companies can request access into their lands via building a new road across BLM-managed lands. These actions may occur in Matrix, Riparian Reserves, 100 acre NSO activity centers, nest patches, etc. Aside from the Endangered Species Act, and / or other federal laws, there is no requirement for RROWs actions to be consistent with ISSSSP or S&M policy. As such, BLM assumes there is a possibility of Bureau Sensitive or S&M plant/fungi site degradation if a site were within this PA. Since the actual locations, extent, and magnitude of this action is not known, the impacts associated with this action cannot be assessed.

Timber Harvest on private land

Although specific logging plans for private industrial forest lands are not available, industry has been actively logging within the Upper Cow PA and will continue to do so. BLM assumes commercial harvest will occur in the future on relatively short rotations, and that privately-owned forests will remain in early to mid-seral stages. Sensitive and S&M species do not receive protection on privately-owned lands, but will continue to be protected and conserved on federal lands, according to BLM policy (IM OR-91-57).

Future wildfire events

As naturally-ignited wildfires have occurred in the Klamath-Siskiyou Ecoregion in the past, BLM assumes future fires will occur. Current trends as a result of fire suppression/exclusion would continue. Stands within the Upper Cow PA would likely burn at severe intensities given current stocking levels. The potential for intense, stand-replacing fires and the risk of direct mortality or

damage to Special Status plants or fungi and/or loss of suitable habitat from high severity wildfire would remain unchanged from current conditions.
Alternative 1 would not contribute additional Cumulative Effects to ISSSP vascular / nonvascular plants, or fungi. The amount of mid-seral and late-successional forest on BLM-managed lands would remain unchanged.

3.9.4 Action Alternative 2

Under Alternative 2, proposed land management activities would occur on approximately 4% of BLM-managed acres within the Upper Cow PA.

Direct and Indirect Effects

ISSSSP/S&M Vascular, Nonvascular, and Fungi Species

Although the Upper Cow Project occurs within LSR, and proposed project activities are intended to expedite maturation processes and improve the quality of mid-seral stands within project units, direct short-term effects to vascular, nonvascular and fungi species are similar to a project occurring within Matrix lands because mechanized equipment would be utilized to accomplish project objectives.

T&E, ISSSSP Sensitive, and Survey & Manage Vascular Plants

Under Alternative 2, there would be no direct or indirect effects that would jeopardize the presence or persistence of ISSSSP or S&M vascular plants because no sites reside within final planning units (Table 3.9-1).

ISSSSP Sensitive and Survey & Manage Nonvascular Plants

Under Alternative 2, no direct or indirect effects that would jeopardize the persistence or presence of nonvascular ISSSSP Sensitive or S&M species would occur because sites requiring protection within final planning units (Table 3.9-1) would receive protection buffers.

ISSSSP Sensitive and Survey & Manage Fungi

While the effects of soil disturbance (resulting from mechanized equipment and green tree removal) to above-ground plants have been well documented, much less information pertaining to below-ground fungi and their associated mycelial network is available. Addressing short-term direct and indirect effects to ISSSSP and S&M fungi species is further complicated because fungi surveys were not performed for ISSSP Sensitive / S&M fungi within the Upper Cow final units in accordance with Survey and Manage protocol, as units are less than 180 years old and do not exhibit the stand complexities as described in the 2001 Survey and Manage Standards and Guidelines, and therefore do not trigger fungi surveys.

Even if surveys had been conducted, surveys address only fruiting bodies, or sporocarps, not the mycelial network. This fruiting body and mycelial situation is analogous to looking for a flowering plant which reproduces from a bulb, but does not produce flowers every year. In any given year, the plant may not flower, but the underground bulb is still present. Thus, even if surveys were conducted and no sites were found, it does not ensure that Sensitive fungi are absent in treatment units.

Direct and Indirect Effects, Summarized
There would be no direct or indirect effects to documented ISSSSP or S&M vascular or nonvascular species resulting from proposed activities because 1) re-locatable sites with intact habitat within final planning units (Table 3.9-1) would receive protection buffers or be deferred from project activities, and 2) PDFs would reduce the risk of introducing or spreading noxious weeds during project implementation, which could potentially impact Sensitive vascular plant habitat.

Direct and indirect effects to ISSSSP fungi are more difficult to ascertain, due to the aforementioned discussion regarding the two-part composition of fungi organisms – fruiting bodies (sporocarps) and mycelial networks. Based on the findings of past surveys, where no Sensitive or S&M A or C fungi have been located within 14 miles of the PA, the relatively young age of the stands, coupled with the project design wherein all but 7 (which will retain 30%) units retain a minimum of 40% canopy cover, thus providing mycelial "hubs" throughout the unit, and harvest activities would likely occur in some units when many species are dormant (dry season, for fungi, is generally July 1 – Sept. 1) BLM does not anticipate direct or indirect effects to ISSSSP and/or Survey and Manage A/C sporocarps or mycelial networks.

No ISSSSP Sensitive Status or S&M vascular, nonvascular, or fungi species would trend toward listing (ISSSSP) or cease persisting (S&M) as a result of implementing the activities proposed in Alternative 2.

<u>Cumulative Effects</u>
Information is not available for rare plant populations in the Upper Cow PA prior to BLM botanical surveys, which began within the last 35 years. However, it is assumed that past activities, such as logging, road building and activities such as those listed as present and foreseeable in Alternative 1 likely affected Sensitive / S&M vascular, nonvascular and fungi species by damaging or destroying individuals / populations, or reducing or degrading suitable habitat.

Although information is not available for logging plans on private industrial forest lands, BLM assumes commercial harvest will occur in the future and privately-owned forests will be in early to mid-seral stages. Sensitive species do not receive protection on privately-owned lands, but will continue to be protected and conserved on federal lands, according to BLM policies and federal regulations.

Sensitive and/or S&M plants would not be directly impacted by the activities proposed in Alternative 2 because surveys have been conducted and only S&M plants were located within final units, and those sites would receive protection buffers. PDFs would reduce the risk of introducing or spreading noxious weeds during project implementation. No Sensitive Status or S&M vascular or nonvascular plants would trend toward listing (ISSSSP) or cease persisting (S&M) as a result of implementing the activities proposed in Alternative 2.

The potential Cumulative Effect of the proposed project on Sensitive fungi would be the risk of impacting rare populations on 1,375.2 acres during timber harvest, thinning, and fuels reduction treatments. However, the intent of this project (listed under Section 1.3.2) and the associated

proposed harvest is to enhance and maintain conditions of late-seral and old-growth forest ecosystems. Thus, BLM asserts that the short-term (0-3 years) potential impact is offset by the long-term (4-100 years) goal of accelerating the development of late-successional and old-growth forest characteristics.

Because of their rarity across the Pacific Northwest Forest Plan Area, it is unlikely ISSSSP Sensitive fungi are present in final Upper Cow project units. The risk is low that they would be impacted. The same holds true for S&M A&C fungi. It is protection of species at the landscape level that ensures Sensitive species will not trend toward listing and S&M species will persist. The assumption is made that protecting known sites (current and future) of these Sensitive and S&M (categories A-E) fungi, in addition to conducting large-scale inventories throughout the Pacific Northwest, will be adequate in ensuring that this project and future projects would not contribute to the need to list them (USFWS 2004, p. 5-2) or jeopardize their persistence (USFS/BLM 2001a, p. 3).

3.9.5 Action Alternative 3

Direct and Indirect Effects

For botanical resources, direct and indirect effects of Alternative 3 are generally the same as described in Alternative 2, albeit on a lesser scale due to less proposed treatment acres.

ISSSSP Sensitive & Survey and Manage Fungi (This analysis supplements that which was discussed under Alternative 2)

Under Alternative 3, direct and indirect effects to potential ISSSSP Sensitive and S&M fungi generally mirror those described in Alternative 2 (direct and indirect effects) as aforementioned in this specialist report – with a key exception, from a fungi perspective – Alternative 3 proposes to exclude ground-based logging activities during the wet season (generally Oct 1 – May 1).

For ISSSSP and S&M fungi and their associated mycelial networks – if present within final units – the omission of ground-based logging activities is a noteworthy difference because less overall compaction will result as compared with Alternative 2. If ground-based logging operations were not permitted in the wet season, fungi and mycelial networks would endure fewer disturbances from compaction. In a study conducted by Luckow and Guldin (2007), “very moist” soils exhibited up to twice the level of compaction as the same soils in the dry season.

BLM reasons that if less compaction occurs, short-term (0-3 years) effects listed in Alternative 3 would affect fungi mycelial networks to a lesser extent, therefore species would re-colonize at a faster rate over the long term (4-100 years). Thus similar to Alternative 2, the BLM assumes that although a Sensitive/S&M species (if present) may incur a short term setback, the species would re-colonize the area within a shorter timeframe than projected in Alternative 2.

Cumulative Effects

Alternative 3 would not contribute to additional Cumulative Effects to ISSSSP or S&M vascular, nonvascular, or fungi species compared to Alternative 2, because less acres (1,102) acres in Alternative 3 versus 1,373 acres in Alternative 2 would be affected in Alternative 3. The amount of mid-seral and late-successional forest on BLM-managed lands would remain unchanged.

Alternative 3 proposes less commodity removal which reduces the acres between Alternatives 2 and 3, although the yarding methods proposed for each Alternative are the same. Alternative 3 limits the amount of ground-based harvesting in the wet season and limits hauling on roads that do not have an all-weather road surfacing. Additionally, treatments under Alternative 3 would not allow harvest of units/stands greater than 80 years of age and would also not allow the harvesting of trees greater than 20 inches in diameter. Alternative 3 involves less soil disturbance due to the deferral of 80 year old stands. This would not contribute to any additional Cumulative Effects described in Alternative 2. Direct and indirect effects resulting from Alternative 3 would be similar to or less than those discussed under Alternative 2.

3.10 Noxious Weeds

Methodology

- GIS and past survey reports were utilized to query BLM-managed acreage and weed species reported within the PA.
- For noxious weed the PA boundary was determined to be the upper ridgelines within three 10th field watersheds (Middle Cow, Upper Cow, and Days Creek South Umpqua River) encompassing the affected area.
- Noxious weed population calculations include populations located within proposed and final units, directly adjacent to proposed and/or final units (along the roads, landings, etc.), and along suspected haul routes.

Assumptions

BLM assumes that there are noxious weeds present on private lands within the PA, and that although industry is treating a subset of noxious weeds within selected areas, other private landowners are not.

3.10.1 Affected Environment

All final Upper Cow units have been surveyed for noxious weeds during parts of 2010, 2012, and 2015. In addition, several historic sites located along roadsides within the PA have been treated (not all in the same year) annually since 2010. Documented noxious weeds within the PA include *Cytisus scoparius* (Scotch Broom), *Senecio jacobaea* (Tansy ragwort), *Lathyrus latifolius* (perennial peavine), *Rubus armeniacus* (Himalayan blackberry), *Rubus laciniatus* (Cutleaf or Evergreen blackberry), *Centaurea pratensis* (Meadow knapweed), *Centaurea maculosa* (Syn: *Centaurea biebersteinii*) (Spotted knapweed), *Cirsium arvense* (Canada thistle), *Chondrilla juncea* (Rush skeletonweed), *Centaurea nigra* (Lesser knapweed), *Hedera helix* (English Ivy) and *Geranium robertianum* (Herb Robert).

Based on population sizes, per noxious weed reports provided by professional botany contractors, the Grants Pass botanist estimated that approximately 1.18 acres, or 0.09% (using 1,373 as final acreage) of the thinning units / fuels reduction units / road renovation / improvement / temp route construction acreage harbor noxious weeds. One of the species reported, Himalayan blackberry, is commonly found throughout our region and although small, isolated patches might be treated, it is not practical to target for priority treatment due to its predominance across the landscape.

Details regarding the 2012-2015 noxious weed surveys within the Upper Cow PA see Table A6-1 in the Noxious Weed Specialist Report contained within the Administrative Record.

3.10.2 No Action Alternative

Direct and Indirect Effects

Under the No Action Alternative, noxious weeds within the PA would continue to spread into suitable habitat at an unknown rate, which could degrade some elements of the environment. To predict the rate at which noxious weeds spread is impossible to quantify, as it depends on a myriad of factors including, but not limited to, logging on private lands, motor vehicle traffic, recreational use, rural and urban development, and natural processes (BLM 1985, p. 59). For a more detailed description of the factors affecting noxious weed spread see the Noxious Weed Specialist Report in the Administrative Record. The degree of degradation would depend on the noxious weed species, as some, such as scotch broom and meadow knapweed, are more intrusive and/or have a higher tolerance to heat generated from wildfires, than others.

Across the Grants Pass Resource Area, the more aggressive species and/or new invaders are prioritized and slated for treatment under Medford District's Integrated Weed Management Plan EA OR-110-98-14 (BLM 1998). However, the success of implementing the weed management plan would be temporary, as logging on non-federal lands, recreational use, rural and urban development, natural processes and vehicle traffic would continue to spread noxious weed populations into the Project Area regardless of extraction activities proposed in this document.

Cumulative Effects

Cumulative indirect effects of noxious weed spread include the potential degradation of wildlife habitat (Rice et al. 1997, Harris and Cranston 1979), a decline in natural diversity (Forcella and Harvey 1983; Tyser and Key 1988; Williams 1997), and decline in water quality (Lacey et al. 1989); however, a very small amount of Upper Cow unit acreage (approx. 0.09% of unit acreage under Alternative 2) harbored noxious weeds prior to the project, making it difficult to quantify any potential decline in ecosystem health related to existing noxious weed populations, or to quantify the potential decline in ecosystem health related to any additional noxious weed populations potentially established by the activities described in Table 1-1 of the Noxious Weed Specialist Report in the Administrative Record.

3.10.3 Action Alternative 2

Direct and Indirect Effects

In the short-term (approximately 1-5 years), proposed activities within the PA – including road construction, landing construction, lop-and-scatter and/or piling and burning of activity fuels, and associated hauling – could result in spreading noxious weeds. However, the rate at which this potential spread would occur is unknown due to the indistinguishable causal effect of other activities and factors on the spread of noxious weeds (See Table A6-2 Noxious Weed Specialist Report in the Administrative Record).

Openings and disturbance provide the greatest opportunity for the establishment of noxious weeds. Project Design Features (PDFs) have been included in the project in an effort to decrease the

potential spread of noxious weeds associated with Action Alternative 2. PDFs include washing equipment prior to moving it on-site, mulching with certified weed-free straw, and seeding and/or planting newly created openings with native/approved vegetation to reduce the potential establishment of noxious weeds. These PDFs are widely accepted and utilized as Best Management Practices (BMPs) in noxious weed control strategies across the nation (Budesa 2006) (Table 1-2 in the Administrative Record delineates the PDFs and their expected implementation results).

The effect of implementing Alternative 2 could possibly result in the establishment of new noxious weed populations. Although the immediate potential for weed spread would be less with the No Action Alternative than for Action Alternative 2, the potential for the spread of existing noxious weeds and the introduction of new species is considered similar for both alternatives. Because of the inclusion and implementation of all PDFs in Alternative 2, and the fact that under the No Action Alternative, populations would continue to establish and spread due to seed transport by vehicular traffic, wildlife, and other natural dispersal methods listed in Table 1-1 Noxious Weed Specialist Report in the Administrative Record.

There are three main reasons why potential weed establishment that might be caused by Alternative 2 is not expected to result in a detectable effect to overall ecosystem health. First, surveys indicate that a very small percentage – 0.09% of acreage within the PA units – are affected by noxious weeds. Second, these sites located in units proposed for treatment, have been reported during pre-disturbance surveys. Some of these sites (depending on how aggressive the species is) have already received treatment in 2014 under Medford District's Integrated Weed Management Plan EA (OR-110-98-14) (BLM 1998), meaning that the acreage in the PA affected by noxious weeds is now even closer to 0% until ongoing activities listed in Table 1-1(Noxious Weed Specialist Report in the Administrative Record) would potentially re-introduce weeds into the PA. Third, as aforementioned, PDFs have been established to minimize the rate at which project activities might potentially spread noxious weed seed from outside/adjacent sources.

Cumulative Effects

BLM's influence over the causes of the spread of noxious weeds is limited to those caused by human activities. Additional human disturbance and traffic would increase the potential for spreading noxious weed establishment, but regardless of human activity, spread of these weeds would continue through natural forces. Thus, the BLM cannot stop the spread of noxious weeds; it may only reduce the risk or rate of spread.

Given the unpredictable vectors for weed spread, such as vehicle usage by private parties, wildlife behavior, and wind currents, it is not possible to quantify with any degree of confidence the rate of weed spread in the future, or even the degree by which that potential would be increased by implementing Action Alternative 2.

PDFs exist to reduce the potential that Action Alternative 2 would contribute to the spread of weed seed and establishment of new populations. PDFs are not expected to completely eliminate any possibility of the spread of weed seed and establishment of new populations; however, PDFs ensure that any incremental contribution to the spread of weeds, when added to the rate of weed spread

caused by past, present, and future actions, would be so small as to be incapable of quantification or distinction from background levels.

BLM, and other federal and nonfederal organizations involved in combating noxious weed spread, routinely utilize the PDFs described above in noxious weed control strategies, as they are inexpensive to implement, easily attainable, and accomplish the objective of reducing the potential of spreading noxious weeds as a result of project-related activities.

3.10.4 Action Alternative 3

Direct and Indirect Effects

Alternative 3 proposes the same amount of ground-based, cable yarding, and helicopter yarding as Alternative 2. Alternative 3 limits the amount of ground-based harvesting in the wet season and limits hauling on roads that do not have an all-weather road surface. Additionally, treatments under Alternative 3 would not allow harvest of units/stands greater than 80 years of age and would also not allow the harvesting of trees greater than 20 inches in diameter. Although both Action Alternatives increase available light, thereby creating favorable growing environments for noxious weeds, Alternative 3 involves less soil disturbance in the wet season resulting from equipment associated with operations. Direct and indirect effects resulting from Alternative 3 would be similar to or less than those discussed in the Alternative 2 section.

Cumulative Effects

Cumulative Effects resulting from Alternative 3 are similar in scope and do not exceed those listed under Alternative 2.

Chapter 4 Prepares, Consultation and Coordination

4.1 Interdisciplinary Team (IDT) Members

Table 4.1-1 Interdisciplinary Team Members

IDT Members	Title	Responsibility
Jason Reilly	Wildlife Biologist	Wildlife/Consultation/Co-Project Lead
Jon Raybourn	Fisheries Biologist	Fisheries
Bob Lange	Hydrologist	Hydrology/Water Resources/Soil Erosion
Laura Schaeffer	Forester	Harvest Systems and Road Design
Rachel Showalter	Botanist	Plants/Noxious Weeds
Yanu Gallimore	Fuels Specialist	Fire and Fuels/Air Quality
Sean Gordon	Silviculturist	Vegetation/Soil Compaction and Productivity
Aaron Ennis and Julie Arwood	Archaeologist	Cultural Resources
Colton Smith	Engineer	Road Specification/Engineering
Colby Hawkinson	Park Ranger	Recreation/Visual Resource Management
Bonnie Million	Associate Field Manager	Management Representative
Brian Lawatch	Writer/Editor	Notes, NEPA Writer/Editor
Ferris Fisher	Planning and Environmental Coordinator	Project Lead, NEPA Writer

4.2 Consultation and Coordination

The federally threatened NSO is the only threatened and endangered wildlife species in the Upper Cow Project PA. The Medford District prepared a Biological Assessment (BA) for Action Alternative 2 as analyzed in the Upper Cow LSR Project EA. The BA will be submitted to the U.S. Fish and Wildlife Service in February 2016. The Grants Pass Field Manager will not issue a Decision Record for the Upper Cow Project until a Biological Opinion (BO) is received. Following receipt of the BO, both the BA and the BO will be posted on the BLM's ePlanning internet site at: http://tinyurl.com/BLMePlanning-UpperCow.

4.2.2 Tribal Coordination

The BLM sent the Upper Cow LSR Project scoping letter to local federally recognized Tribes interested Medford District BLM proposed projects. The Tribes included the Cow Creek Band of Umpqua Tribe of Indians, the Confederated Tribes of the Grande Ronde Community of Oregon, and the Confederated Tribes of the Siletz Indians of Oregon. These letters invited the Tribes to participate in meetings and or initiate formal consultation.

Although no Tribes expressed interest in formal consultation, the BLM will continue to work with individual tribal governments to further identify and address Native American concerns and traditional uses of lands administered by the BLM, including the progress of this project.

4.2.3 State and Local Agency Coordination

This project has been designed to adhere to the 2015 State Protocol agreement between the State Historic Preservation Office (SHPO) and the BLM. There are no cultural sites located near any project units, helicopter landing sites, or proposed route construction areas. Because the Upper Cow LSR Project was designed to avoid and/or buffer all cultural sites, formal consultation with SHPO was not necessary.

The Josephine County Board of Commissioners, the Josephine County Planning Department, and Public Works Department were sent scoping letters requesting input on the Upper Cow proposal. They subsequently received invitation letters to participate in the field tour, which was held in November of 2015. The BLM did not receive a response from of the above-listed County Boards or Departments.

4.2.4 Regional Ecosystem Office (REO)

Due to some of the treatment prescriptions described in Action Alternate 2, the BLM was required to request REO concurrence with proposed exemptions from the South Umpqua River/Galesville Late-Successional Reserve Assessment. The BLM held an initial coordination meeting with REO members on June 30, 2015 to provide the outline of the project proposal and obtain initial feedback. The final proposed exemption was submitted to the REO on November 12, 2015. Concurrence with the proposal will be obtained prior to issuing the Decision Record. If the REO does not concur with the requested exemptions, the Decision Record will reflect this outcome.

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Appendix A Glossary

These terms are specifically applicable to the Upper Cow LSR Project.

Abiotic – Nonliving basic elements and compounds of the environment.

Accelerated Erosion – Erosion that is a consequence of human activity and outside of an assumed natural sediment balance.

Activity Fuels – Slash created from forest management activities timber and vegetative cutting. To reduce the fuel loading, activity slash within units may be machine or hand pile/burned, chipped, or lopped and scattered based on a post-harvest assessment of fuel loading.

Aquatic Conservation Strategy – Developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within public lands.

Cable yarding – Removes logs by use of wire cable(s) and tower for full or partial suspension log removal from harvest units.

Canopy Base Height – The lowest height above the ground with sufficient understory canopy fuel to propagate fire vertically through the canopy. Canopy base height determines whether surface fires can climb into tree crowns.

Canopy Bulk Density – The weight of fine canopy fuels (leaves, needles, smaller branches) divided by the total canopy volume. It determines whether crown fire spread, or the horizontal transfer of fire between crowns, can occur.

Canopy Cover – Commonly expressed as a percentage of total ground area; for example, at 50% canopy cover, half of the total ground area is covered by the vertical projection of tree crowns.

Coarse Woody Debris (CWD) – Portion of trees that have fallen or been cut and left in the woods.

Compaction – Refers to soil becoming consolidated by the effects of surface pressure often from heavy machinery or vehicle and pedestrian traffic.

Decay Class – Any of five stages of deterioration of logs in the forest. Stages range from essentially sound (decay class 1) to almost total decomposition (decay class 5).

Diameter Breast Height (DBH) – Tree diameter, measured 4.5 feet above ground on the uphill side of the tree.

Equivalent Clear-cut Area (ECA) – Provides an estimation of open space within a given catchment area created from recent occurrences such as harvest activities, activity fuels treatments, or fires.

Fire Severity – A qualitative assessment indicates the degree of environmental change caused by fire. The effect of a fire on ecosystem properties, usually described by the degree of soil heating or mortality of vegetation. Fire Intensity + Fire Duration = Fire Severity. For soils it is a qualitative

assessment of the heat pulse directed toward the ground during a fire. Burn severity relates to soil heating, large fuel and duff consumption, consumption of the litter and organic layer beneath trees and isolated shrubs, and mortality of buried plant parts.

Fire Regime Condition Class 1 – Fire regimes are within or near the historical range for the area. The risk of losing key ecosystem components is low. Vegetation species composition and structure are intact and functioning within the historical range for the area.

Fire Regime Condition Class 2 – Fire regimes have been moderately altered from their historical range (i.e., missed more than one return interval). This change results in moderate changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns.

Fire Regime Condition Class 3 – Fire regimes have been substantially altered from their historical range. The risk of losing key ecosystem components is high. This change results in increases to fire size, frequency, severity, and landscape patterns.

Full decommissioning – Road surface (travelway) would be decompacted so that the former compacted surface would be rendered loose and friable to a depth of 12 to18 inches. Slash, boulders, and other debris would be placed along the roads entire length as determined by availability of materials to provide ground cover and discourage mechanized use. Blockage at the entrance would consist of placing logs, slash, boulders, berms, and other material so the entrance is camouflaged for a minimum distance of 100 feet and vehicle access is precluded. Seeding with approved native seed species and mulching with weed-free straw or approved native materials would occur within 100 feet of the road's entrance. Treatments described may be modified by the Authorized Officer in consultation with appropriate earth scientists or aquatic specialists. Stormproofing should be completed after hauling and within the same season as constructed/opened, subject to seasonal maintenance restrictions.

Functional all-weather surface – A crowned or inslope/outslope travel surface with adequate aggregate, such that the road shape will be maintained during hauling when the road base is saturated.

Intermittent Stream – Any nonpermanent flowing drainage feature having a definable channel and evidence of scour or deposition. This includes what are sometimes referred to as ephemeral streams if they meet these two criteria.

Hydrologically Connected Features – Surface disturbance or other activities with the potential to entrain sediment in storm runoff that are linked to perennial surface waters with the potential to transport sediment to aquatic habitats.

Hydrological Unit Code (HUC) – A hydrological code or hydrologic unit code is a sequence of numbers and description that identifies a hydrological feature like a river, river reach, lake, or area like a drainage basin. Each HUC order is defined by two digits, such that a 5th order HUCs has 10 digits that define watershed and may be further divided into 6th and 7th order HUCs each defined by

an additional two digits with the first 10 digits in common with the 5th order HUC. The 5th level HUC is considered a "watershed" and 6th and 7th order HUCs are "subwatersheds."

Large Woody Debris (LWD) (aquatic) – A piece of wood greater than or equal to 3 meters long (9.8 feet) and 0.15 meters (0.5 feet) diameter. A "Key" piece of LWD is greater than or equal to 10 meters (33 feet) long and 0.6 meters (24 inches) in diameter. Note: Key pieces are the most important of the large wood because they are the big logs that fall into streams and trap/sieve smaller stuff that floats along during high winter flows. LWD creates complex habitats in the channel for fish and other aquatic species (ODFW Stream Survey manual).

Peak Flow Enhancement – An additional increase (timing and/or magnitude) in the flow of a stream or river during a high flow event. Peak flows have the ability to alter stable stream channels and cause additional stream bank erosion.

Snag – A standing dead tree usually without merchantable value for timber products, but having characteristics that benefit cavity nesting wildlife species.

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

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

Reclaiming Landings – Restore the original contours of the landing when the surface is no longer needed. Remove compaction by ripping, divoting, or discing and planting native seeding considering seasonal and moisture needed for seed germination.

Rehabilitate Skid Trails – Rehabilitate skid trails means to remove compaction by sub-soiling and apply a BLM-approved native seed mix. Sub-soiling is typically achieved by 18 inch ripping blades on a bull dozer, but can also be accomplished by an excavator pock marking the soil. The result should be a loose course surface that would be available for seeding and would capture effective precipitation for seed germination.

Timber Productivity Capability Classification (TPCC) – Classification of BLM lands based on the physical and biological capability of the site to support and produce forest products on a sustained yield basis.

Wildfire – Any wildfire not designated and managed as a prescribed fire with an approved prescription.

Winterization – Temporary measures to reduce surface runoff and erosion during the wet season, which begins October 15. Winterization activities should be completed before this date or a waiver should be obtained from the BLM Authorized officer that specifies areas that need winterization and mitigation. Winterization generally uses waterbars, hay bales, straw waddles and other measures to stabilize the site until the more complete decommissioning, fully decommissioning, rehabilitating, or reclamation activities occur as specified under the contract.

Appendix B Scoping Comments

The BLM is required to respond to substantive comments submitted during scoping (40 CFR § 1503.4). The BLM is not required to respond to non-substantive comments (BLM Manual, National Environmental Policy Handbook, 1/30/2008). During the interdisciplinary team process it was decided to respond to a majority of the comments received during scoping as they were considered in the development of the Upper Cow LSR Project.

1) Stand Age

Comment: We encourage the Grants Pass Resource Area to pursue vegetation management treatments in stands over 80 years old.

BLM Response: The BLM has a limited ability to treat stands greater than 80 years old within the South Umpqua/Galesville Late Successional Reserve. The Northwest Forest Plan (NWFP) guides the BLM to defer treatment in stands greater than 80 years old, with some exceptions. The BLM is considering vegetation management in stands over 80 years old if the treatments maintain or enhance late successional characteristics. The BLM will consider treatments in stands greater than 80 years old and has pursed concurrence for these treatments from the Regional Ecosystem Office.

2) Cutting Limits

Comment: AFRC continuously opposes the use of arbitrary limitations (age, diameter, etc.) on any vegetation management proposals.

BLM Response: The management of the South Umpqua/Galesville Late Successional Reserve is guided by objectives set forth in the NWFP, directing the BLM to defer treatments in stands greater than 80 years and retain trees greater than 20 inches in diameter.

3) Landscape Level Assessment

Comment: The context of the Northwest Forest Plan (NWFP) was focused on the landscape. Forest elements such as snags, coarse wood, old growth and untreated skips were intended to be maintained across the landscape, and not within every stand. We would like the BLM to describe and consider untreated areas in the EA to put the proposed treatment area into perspective. We would like for these untreated acres to be considered when silvicultural prescriptions and project design features are being developed. We believe that this consideration would highlight the high level of forest elements across the landscape and enable full implementation of the proposed treatment units.

BLM Response: The NWFP was focused on the landscape; however it did not meet the direction of the Endangered Species Act (ESA) to create “recovery plans” for listed species. The USFWS had been relying on the NWFP to aid in the recovery of the threatened NSO. The USFWS was mandated to create the June 2011 Revised Recovery Plan for the NSO. Additionally, in 2012, the Critical Habitat Rule was published.

To comply with the ESA, the BLM is required to consult with the USFWS regarding habitat modification and effects to individual owls. This is conducted on a stand level scale and a landscape level scale. Each unit is analyzed in context of how the proposed treatment affects each owl site which it overlaps. Our NEPA and consultation documents contain baseline data on the amount of habitat per watershed.

The BLM consults with the USFWS at the stand level, the 500 acre core level, and the CHU subunit KLE 2 and KLE 3 levels. These differing scales of consultation require the BLM to assess project affects to individual owls and owl habitat. Thus full implementation of proposed treatment units must be assessed on a stand level and extend into the larger landscape level as directed by the NWFP and the ESA.

4) Canopy Cover

Comment: We would like the BLM to consider the numerous "skips" inherent to every thinning unit when designing a prescription that must adhere to NSO canopy cover restrictions. For example, any given density management unit will contain "no-treatment" areas such as riparian reserves, survey & manage buffers, infeasible logging areas, etc. We would like the prescriptions for the Upper Cow Project to consider these areas in the calculations for canopy cover in order to permit the implementation of gap cuts while still adhering to the NSO sideboards.

BLM Response: Prescriptions are designed to achieve canopy cover percentages based upon the pre-treatment NSO habitat type. Canopy cover measurements are taken as an average across the unit area. While the BLM does consider the numerous "skips" when calculating the average canopy cover we must also consider the numerous "gaps" created from skid trails, cable yarding corridors, temporary routes, landings, etc. When calculating canopy cover all of the factors listed above influence the percent canopy cover retained.

5) Example Silvicultural Prescriptions

Comment: We encourage the BLM to consider and review the Johnson Cleghorn project analyzed and implemented by the Roseburg BLM. This project utilized variable density thinning that considered the many untreated portions of the unit and likewise implemented many gaps and heavy thin areas while maintaining NSO habitat thresholds.
http://www.blm.gov/or/districts/roseburg/plans/files/JohnsonClegEA.pdf

BLM Response: The Upper Cow IDT silviculturist reviewed the Johnson Cleghorn project and some principles were incorporated into the design of the Upper Cow project. For example the Upper Cow project proposes to utilize variable density thinning and implementing gaps around valuable ecological legacy trees.

6) Removal/Downgrade of NSO Habitat (1)

Comment: We would like the BLM to move forward with treatments that may remove or downgrade certain NSO habitat elements in the interest of the health of the larger landscape.

BLM Response: The Upper Cow Project is in the South Umpqua/Galesville Late Successional Reserve (LSR). LSR Objectives guide the BLM to enhance and maintain conditions of late-successional and old-growth forest ecosystems. These objectives influenced the purpose and need for the project. Because the project objectives focus around enhancing and maintaining habitat values, removing and downgrading NSO habitat elements would not meet the purpose and need of the project.

7) Removal/Downgrade of NSO Habitat (2)

Comment: In the past, certain treatments that strived towards "restoration" fell short due to the decision to maintain certain NSO habitat elements. Stands that were in need of the removal of encroaching Douglas-fir trees to a low density level to favor pine and oaks were instead only removed down to a specific canopy cover percentage derived from NSO literature. We encourage the BLM to develop a preferred alternative that proposes to fully implement the restoration treatments regardless of how many acres containing NSO habitat thresholds get removed or downgraded.

BLM Response: The purpose and need for the Upper Cow project is habitat maintenance and enhancement, not forest health. Although some stands may benefit from treatments that remove or downgrade NSO habitat, the purpose and need for the project precludes analysis of an Alternative that would remove or downgrade NSO habitat.

8) Riparian Reserve Treatments (1)

Comment: We encourage the BLM to be proactive in treating riparian reserves. It has been well documented that thinning in riparian areas accelerates the stand's trajectory to produce large conifer trees and has no effect on stream temperature with adequate buffers. Removal of small diameter suppressed trees has an insignificant short-term effect on down wood, and ultimately a positive effect on long-term creation of large down woody debris and large in stream wood, which is what provides the real benefit to wildlife and stream health.

BLM Response: The BLM interdisciplinary team is proposing thinning riparian stands within one site potential tree near non-fish bearing intermittent and perennial streams; and thinning treatments within two site potential trees for fish bearing streams. Thinning is only recommended in stands where 40 or 60% thinning would likely benefit ACS objectives by improving stand health. Ecological protection zones (EPZs) or no-treatment buffers have been applied to streams to maintain Aquatic Conservation Strategy (ACS) objectives for wood recruitment and stream temperature.

9) Riparian Reserve Treatments (2)

Comment: We encourage the BLM to focus their riparian reserve treatments on a variety of native habitats. Utilization of gap cuts to promote early seral habitat in the reserves, treatments to diversify all areas of the reserve, and prescriptions that account for the full range of objectives that the ACS mandates should be considered.

BLM Response: The team hydrologist has reviewed each riparian stand within proposed treatment units. The team hydrologist and silviculturist will propose treatment options within riparian stands that are less than 200-400 feet of streams which may include the utilization of gap cuts and treatment in native habitats to maintain ASC objectives.

10) Riparian Reserve Fire Hazard

Comment: We would like the BLM to consider the possibility that these overstocked riparian stands may pose a fire risk in the near future without vegetation management. Often riparian areas act as a funnel that is conducive to increased fire behavior. With elevated fire activity anticipated in the future such treatments should be a priority for the BLM to implement. Ultimately, we believe that deferring such treatment, including the no-cut buffers, retards the achievement of the ACS.

BLM Response: BLM considers fuel loading in land management decisions and understands the impact of fuel densities and topography near streams. Impacts from proposed treatments to fire and fuels loading on public lands will be considered in the impact analysis. Fire hazard reduction cannot be achieved on every part of the landscape. This project proposes to treat activity fuels associated with forest management projects.

Riparian stands will be treated utilizing EPZs designed to meet ACS objectives within the LSR. EPZs for this project are 35 feet, 60 feet, 85 feet, 120 feet, 200 feet (one site potential tree), and 400 feet (two site potential trees), depending on the characteristics and values of the stream (See Figure 4, p. 24). It is likely that for the smaller buffers, no-treatment areas (70-190 feet wide), are unlikely to profoundly impact fire behavior in checker-board land patterns especially in small timber units.

11) Small Functional Wood in RR (1)

Comment: Nearly all wood that falls into stream channels has the capacity to influence habitat and aquatic communities (Dolloff and Warren 2003). Therefore, smaller woody material that enters stream channels is important to overall channel function because it can store sediment and organic material, contribute nutrients, and provide temporary pool habitat and slow-water refugia. It is important to note, however, that pools formed by smaller wood generally are not as deep or complex as those formed by large wood. In addition, small wood does not persist for long periods of time because it deteriorates quickly and is more likely to be flushed from the system (Naiman et al. 2002, Keim et al. 2002).

BLM Response: This topic and relevant policy and research is addressed in the hydrology analysis for the proposed treatments. No-treatment buffers or EPZs have been selected based on field surveys in part to protect potential sources of recruitment for small woody debris.

12) Small Functional Wood in RR (2)

Comment: In smaller streams adjacent to previously harvested stands, field surveys (McEnroe 2010) indicated that relatively large amounts of existing (in-stream) and potential (standing) small functional wood are present. Field surveys also indicate that the vast majority of the down wood in

these areas originated from within 50 feet of the stream channel. This is consistent with findings by Minor (1997), who found that in second-growth coniferous riparian forests, 70-84% of the total in-stream wood was recruited from within 15 meters (49 feet) of the channel. In addition, McDade et al. (1990) and Welty et al. (2002) found that 80% and 90%, respectively, of the wood loading occurred within 20 meters (66 feet) of the stream channel in coniferous forests.

BLM Response: This topic and relevant policy and research is addressed in the hydrology analysis for the proposed treatments. An EPZ of 35 feet or 60 feet, depending on the site, have been applied on intermittent streams to protect these areas of hydrologic concentration from direct erosion and allow for small wood recruitment. For perennial non-fish bearing streams, an 85 foot buffer was selected to provide shade and to allow for wood recruitment. For fish bearing perennial streams, a 120 foot buffer was selected to consider larger wood recruitment.

13) Purpose and Need Statement

Comment: In order to ensure that the timber products being offered for sale can successfully reach a local manufacturing facility, sales off the Upper Cow Project must be designed in an economically viable manner. Therefore, we would like the BLM to include in the Purpose & Need for this project the need to design economically viable timber sales to ensure socio-economic objectives be met.

BLM Response: All timber sales offered by the BLM are designed to be economically viable. The Upper Cow project is located in the Late Successional Reserve Land Use Allocation thus the purpose and need for the project reflects the land use designation objectives.

14) Economic Viability

Comment: Appropriate harvesting systems should be used to achieve an economically viable sale in order to meet this objective. We feel that there are several ways to properly harvest any piece of ground, and certain restrictive language can limit some potential bidders, thus driving the bid value down.

BLM Response: The BLM designates harvest systems based on access, percent slope, and timber type. These designations need to be established prior to the environmental assessment to allow interdisciplinary team members to analyze the environmental effects of each type of logging systems, which includes the incorporation of necessary PDFs and BMPs.

To ensure the BLM accounts for environmental effects projects analyze for activities that could potentially produce the greatest environmental impacts. Project activities are generally less impactive than what was analyzed in the environmental analysis.

15) Logging Damage Tolerance Levels

Comment: Including language in the EA and contract that specifies damage tolerance levels rather than firm restrictions gives the operator flexibility to utilize their equipment to its maximum efficiencies. For example, quantifying a residual stand damage threshold rather than entirely restricting activity during certain months (or restricting log lengths) will allow an operator the

flexibility to alter their yarding techniques to meet the threshold throughout the seasons instead of having to completely shut down during certain months.

BLM Response: The BLM allows whole tree yarding to reduce fuel loading within the unit, expedite logging by allowing processing at the landing, and decrease logging costs associated with processing logs in the woods.

Historically the Grants Pass Resources Area did restrict certain activities to specific dates. There have been on-going efforts to allow more flexibility. For example, in the past, cable yarding was restricted during spring months in thinning units due to "bark slippage". We have adopted a new contract stipulation that allows spring logging as long as unacceptable damage to residual trees does not occur.

16) Ground Based Harvesting Equipment

Comment: Though some of the proposal area is planned for cable harvest, there are opportunities to use certain ground equipment such as fellerbunchers and processors in the units to make cable yarding more efficient. Allowing the use of processors and fellerbunchers throughout these units can greatly increase its economic viability, and in some cases decrease disturbance by decreasing the amount of cable corridors, reduce damage to the residual stand and provide a more even distribution of woody debris following harvest.

BLM Response: The proposal will employ multiple types of harvesting equipment options including ground-based operations, cable harvesting and helicopter yarding. The use of ground-based equipment is limited by the RMP to slopes less than 35%.

17) Road Construction

Comment: Constructing forest roads is essential if active management is desired, and we encourage the BLM to propose road construction that will enable the treatment of as much as the project area as possible in an economically feasible way.

BLM Response: The NWFP and the RMP directs the BLM to construct roads in the LSR if the potential benefit of silvicultural activities exceeds the costs of habitat impairment. The RMP also states that new roads will be kept to a minimum, be routed through unsuitable habitat, where possible, and be designed to minimize adverse impacts. The IDT is developing a logging systems proposal that is guided by these directives. Additionally, the BLM is proposing helicopter yarding in inaccessible areas.

18) Operating Season

Comment: Consistent and steady operation time throughout the year is important for our members not only to supply a steady source of timber for their mills, but also to keep their employees working. These two values are intangible and hard to quantify as dollar figures in a graph or table, but they are important factors to consider. The ability to yard and haul timber in the winter months will often

make the difference between a sale selling and not, and we encourage the BLM to continue to look for ways to accommodate this.

BLM Response: The BLM makes an effort to provide consistent and steady operating times throughout the year. There is a balance between supplying a steady source of timber for mills and environmental protection. The BLM analysis is based upon operation during certain conditions instead of a "hard date" which ensures that environmental protection measures are maintained.

19) Road Decommissioning

Comment: Removing culverts, waterbarring, and closing a rocked road to vehicular traffic is a relatively inexpensive practice that would leave the roadbed intact for future use. We encourage the BLM to carefully consider the future management needs and added costs of fully decommissioning roads throughout the landscape.

BLM Response: Any proposed road closures will be described with the proposed project-level analysis. Temporary roads constructed for the project would be decommissioned or fully decommissioned to meet LSR objectives, but most existing roads would remain open, be administratively closed, or be decommissioned. These are described in detail in the Action Alternatives.

Many of the roads to be used for this project are existing open roads. These roads may be needed to provide access to BLM administered lands for fire or silvicultural treatments, are encumbered under reciprocal right-of-way agreements, or provide access to private lands; and therefore will remain open.

Efforts made to close roads require the BLM to coordinate with local government and property owners. For a description of the Medford District BLM road management categories see Chapter 2 of this EA.

20) Project Activities

Comment: We would like to support a project that achieves LSR management objectives by utilizing prescribed fire, thinning existing plantations and reducing the impact of the BLM transportation system on terrestrial and aquatic forest values.

BLM Response: The purpose and need for the project is to maintain and enhance late-successional characteristics by using silvicultural practices to accelerate and develop overstocked young plantations into stands with late-successional and old-growth forest characteristics. Natural stands may be identified for treatment if the proposal would reduce the risk of loss to catastrophic wildfire. The purpose and need of the project also aims to keep new road building to a minimum and consider alternate methods of access such as helicopter yarding. When fire is used as a management tool it should be applied in a manner that retains coarse wood.

21) Timber Sale in the Late Successional Reserve

Comment: Many of the treatments identified in the scoping notice sound like commercial timber sale activities that involve significant environmental impacts from forest canopy reduction, yarding, landing establishment and road construction activities.

BLM Response: Timber sale contracting is a tool used to implement active forest management activities. The proposed treatments are designed to enhance and maintain late successional habitat characteristics. The IDT has worked together to reduce environmental impacts from proposed activities.

22) Diameter Limit

Comment: We urge the BLM to consider and implement a [20" inch] diameter for harvest in this project.

BLM Response: The BLM is directed by the NWFP to limit cutting trees greater than 20 inches in the LSR. Any proposal to cut trees greater than 20 inches must be reviewed by the Regional Ecosystem Office.

23) Environmental Consequences

Comment: Increases in sediment and declines in watershed stability are significant and may be exacerbated by new road, landing construction and ground-based yarding activities.

BLM Response: This project will apply BMPs and PDFs that will limit the environmental impacts from project proposals.

24) Logging Systems

Comment: The project scoping notice indicates that restoration thinning (RT) prescriptions may be implemented in some stands. We urge the BLM to avoid logging or yarding activities in the "skips" in order to retain some undisturbed interior habitat.

BLM Response: The BLM is designing the project to avoid placing yarding corridors through skips. The IDT has designed the project in such a way that the skip areas are identified prior to the establishment of the logging system plan. A carefully designed logging system plan is important to the retention of identified features such as skips but the safe placement of logging corridors to ensure forest worker safety may surpass the design put forth by the IDT.

25) Cumulative Impacts

Comment: Past BLM management and adjacent private industrial timber harvest have greatly impacted the terrestrial and aquatic health, function and connectivity of this planning area. It is essential that project activities decrease, rather than increase, the significant cumulative impacts present on the landscape.

BLM Response: The Upper Cow EA analysis will include a full disclosure of the cumulative impacts from proposed project activities on vegetation, fire & fuels, wildlife, soils, hydrology, fish, cultural & paleontological resources, botany & noxious weeds, recreation resources, and visual resources.

26) Large Trees

Comment: Forest canopy closure should be largely maintained where it exists. Large trees should have substantive protections and should not be removed to facilitate yarding, road construction or landings.

BLM Response: The purpose and need for the project is to maintain and enhance late successional features and structure which includes the retention of large trees. While the BLM does aim to protect features in the LSR, such as large trees, this may not always be ensured due to Oregon Occupational Safety and Health Administration (OSHA) standards for safe working conditions.

27) Cumulative Effects (1)

Comment: The Jordan Cove DEIS indicates that the pipeline project will directly harm LSR function on BLM lands in a portion of the landscape that has been so heavily

fragmented by past federal and private logging that no LSOG habitat of value exists near the planning area that can mitigate for the additional loss of LSR habitat. Proposed logging, road construction, haul and yarding activities in the Upper Cow LSR project may compound the significant existing and foreseeable cumulative impacts negatively impacting forest fragmentation and watershed health in this planning area.

BLM Response: The scope of analysis for this project is contained within the established Upper Cow Planning Area which is defined by ridgelines and administrative boundaries. The BLM Upper Cow EA will disclose and analyze for habitat fragmentation within the Planning Area in the Cumulative Effects portion of Chapter 3.

28) Cumulative Effects (2)

Comment: Please disclose the cumulative and synergist impacts of ROW road construction through the LSR in projects such as the Seneca Road Construction Project (EA #OR-118-06-007).

BLM Response: The Upper Cow EA analysis will include a full disclosure of the cumulative impacts from past project activities on vegetation, fire & fuels, wildlife, soils, hydrology, fish, cultural & paleontological resources, botany & noxious weeds, recreation resources, and visual resources.

29) Aquatic Conservation Strategy

Comment: Please avoid any commercial treatments in native (non-plantation) stands located within Riparian Reserves. Canopy reduction and commercial yarding activities in such stands is not needed to attain the objectives of the Aquatic Conservation Strategy.

BLM Response: Since this project is in LSR, commercial treatments in riparian stands that meet LSR objectives have been avoided. If riparian stands do not exhibit LSR characteristics, proposed treatments will utilize EPZs to meet ACS objectives. EPZs for this project are based on 35 feet, 60 feet, 85 feet, 120 feet, 200 feet (one site potential tree), and 400 feet (two site potential trees) buffers, depending on the characteristics and values of the stream and the riparian stand. For example an EPZ of 35 feet or 60 feet have been applied on intermittent streams. For perennial non-fish bearing steams an 85 foot buffer was selected to provide shade and to allow for wood recruitment. For fish bearing perennial streams a 120 foot buffer was selected to consider larger wood recruitment. No commercial treatment would occur in these EPZs and yarding would be limited.

30) Thinning Plantations

Comment: Please note that page 57 of the LSRA indicates that "stand management in LSRs should focus on stands that have been regenerated following timber harvest or stands that have been thinned." We agree with this important recommendation and urge the BLM to focus on plantation thinning rather than logging native forest stands.

BLM Response: The purpose and need for the project is to maintain and enhance late successional and old growth characteristics. The project will focus treatments in stands that need active management to achieve late successional characteristics.

31) TPCC and Sensitive Soils

Comment: It is important to note that numerous sensitive and TPCC soils are located in the planning area. Please analyze and disclose project impacts on these important soil resources.

BLM Response: Sensitive and TPCC soils within the Planning Area have been disclosed in the soil sections of the EA.

32) Scoping Notice

Comment: The scoping notice is lacking in the kind of details that are likely to elicit informed public comments, such as the age of the stands, the origin of the stands, past treatments within the stands, whether there is existing road access, the purpose and rationale for treatments, etc.

BLM Response: For the scoping period we developed a purpose and need statement that enhances the scoping process. Our scoping letter disclosed the Land Use Allocations which define the scope of our project objectives, the acres that are being considered for treatment, and the types of treatments which would enhance late successional characteristics. This information allows the public to provide more focused input during the preliminary stages of project development.

33) Trade-offs

Comment: Land management inevitably involves trade-offs among competing uses of public lands. The agency must avoid portraying the effects of the proposed action in uniformly positive terms, while describing the effects of no action in uniformly negative terms. NEPA requires disclosure of the trade-offs among competing uses.

BLM Response: There is potential for short term impacts with long term habitat gains. The analysis in the EA will disclose whether the effects of each impact are considered significant.

34) Additional Treatments

Comment: When conducting commercial thinning projects take the opportunity to implement other critical aspects of watershed restoration especially pre-commercial thinning, restoring fish passage, reducing the impacts of the road system, and treating invasive weeds.

BLM Response: The project may contain a combination of these activities. Project activities will focus on outcomes that maintain and enhance late successional forest conditions.

35) Monitoring

Comment: Use projects as an opportunity to learn by conducting monitoring and research on the effects of thinning. There are many information gaps that need filling. Every project should generate useful information to inform future projects.

BLM Response: The Annual Program Summary is a review of the programs on the Medford District. The program summary is designed to report to the public, local, state and Federal agencies a broad overview of the activities and accomplishments for the fiscal year. Individual projects are monitored by resource area staff and the information gathered informs IDTs of the effectiveness of the BMPs and PDFs applied to projects. The BLM is not a research organization but the agency does cooperate with other agencies and organizations to ensure useful data is shared among organizations.

36) Synergistic Effects of Treatments

Comment: Young stands do not exist in isolation, so be sure to consider the effects of thinning on adjacent mature and old-growth habitat which may provide habitat for spotted owls, marbled murrelets, and other species. Spotted owls may use young stands for dispersal, foraging, and security from predators. It may be helpful to create a "risk map" that identifies areas that are more or less suitable for thinning based on criteria such as: existing habitat characteristics, proximity to occupied habitat or activity centers, proximity to suitable habitat, and proximity to recently thinned areas, non-habitat, and roads. The agency should also consider adjusting both the location and timing of thinning to minimize the Cumulative Effects of widespread thinning on the sensitive and listed species.

BLM Response: The BLM will analyze the effects of the proposed treatments in the Cumulative Effects analysis. This analysis discloses the effects of thinning on adjacent mature habitat. The BLM preformed an in-depth exercise to reduce effects to owls and prioritize treatments. The IDT began by gathering data on the owl sites that are in the Planning Area. These sites were ranked on

factors such as occupancy and nesting success. Each owl site that may potentially be affected by a proposed treatment was put into two categories: high value and low value sites. Once this designation was assigned, each owl circle was evaluated as to whether or not the site exceeded the 50% threshold at the core scale and the 40% threshold at the home range scale. The BLM employs seasonal restrictions to ensure that sensitive and listed species are not negatively impacted by proposed treatments.

37) Treat Young Stands

Comment: Focus on treating the youngest stands that are most "plastic" and amenable to restoration.

BLM Response: The IDT silviculturist visits each stand and authors prescriptions based on the purpose and need for the project and the treatment needs of each individual stand, regardless of age or origin.

38) Tree Retention

Comment: Generally retain all the largest trees, and some of the smaller trees in all age-size classes. This can be accomplished in part by retaining untreated "skips" embedded within the stand. Strive for a variable density outcome. Retain and protect under-represented conifer and non-conifer trees. Protect shrubs as much as possible, especially deciduous and tall shrubs, and those that produce insects, berries and mast.

BLM Response: Projects within the LSR are guided by management direction from the NWFP which limits the size of trees to be cut. Many projects have been influenced by "ecological forestry principles" which retain features such as "skips" and "gaps". The use of "skips" and "gaps" have aided in the retention of structure within units and on the landscape.

39) Variability

Comment: The scale of patches in variable density thinning regimes is important. Ideally variability should be implemented at numerous scales ranging from small to large, including: the scale of tree fall events; pockets of variably contagious disturbance from insects, disease, and mixed-severity fire; soil-property heterogeneity; topographic discontinuities; the imprint of natural historical events; etc.

BLM Response: The use of variable sized "skips" and "gaps" have aided in the retention of structure within units and on the landscape. While it is not practical to retain every feature on the landscape careful placement of "skips" and "gaps" can ensure variability is protected.

40) Snags (1)

Comment: Thinning does not always accelerate development of late successional forests, in particular commercial thinning has an adverse effect on snags and dead wood that are defining characteristics of late successional habitat. Thinning might produce the first large trees, but those

trees would be vigorous and less likely to experience mortality, so developing large snags is not direct and immediate result of growing large trees. Thinning also dramatically reduces the pool from which future mortality can be recruited so thinning actually retards development of some attributes of late successional forest and spotted owl habitat including snags and down wood.

BLM Response: The silvicultural prescriptions associated with the Upper Cow project are designed to retain more trees per acre to ensure that prescriptions support future sang and coarse wood recruitment. Additionally, any trees greater than 20 inches in diameter that are cut to facilitate management activities (yarding corridors, skid trails, tailhold/guyline trees, tractor swing routes, and any temporary routes constructed) will remain on site as coarse woody debris. Trees that are marked for retention within the above-listed operational areas will be swapped with an equivalent tree somewhere else in the unit to further ensure future snag and coarse wood recruitment.

41) Snags (2)

Comment: Continuous recruitment of snags is critical to development of old growth forest habitat. We urge the agency to adopt a process-based approach to snag habitat. Instead of focusing on how many snags there are now and immediately after logging, it is better to focus on (i) whether the project will retain an adequate pool of green trees from which to recruit snags and (ii) whether the project will retain the ecological processes that cause mortality, including density dependent mortality and other mechanisms.

BLM Response: It is difficult to ensure future snag recruitment if there is not an achievable metric in the present. The many untreated acres within the Planning Area will contribute to future snag recruitment.

42) Snag Creation

Comment: Artificial snag creation is often proposed as mitigation for the loss of snags during logging, but snags fall down and dead wood decays, so a one-time snag creation effort provides very short-term benefits. Since logging has long-term adverse effects on snag recruitment, it is necessary to adopt mitigation with long-term effects, such as retaining generous untreated “skips” embedded within treatments areas where natural mortality processes can flourish.

BLM Response: Within the Upper Cow Planning Area, many areas would be deferred from treatment. These areas include RA-32 habitat retention patches, RA-10 areas, riparian reserve areas currently meeting ACS objectives, 10-acre RTV habitat patches, and botany buffers. These untreated areas along with the retention of “skips” will ensure that snags are retained across the landscape in the short-term and long-term.

43) Computer Models (DecAID)

Comment: To inform the decision, please conduct a stand simulation model to fully disclose the adverse effects of logging on dead wood, especially large snags >20” DBH, and then mitigate for these adverse effects by identifying areas within treated stands and across the landscape that will

remain permanently untreated so they can recruit adequate large snags and dead wood to meet DecAID 50-80% tolerance levels as soon as possible and over the long-term.

BLM Response: Computer models can be informative but are often not created for the specific region where they are being employed. Rather than providing useful information these models may misrepresent the outcome of the simulation.

44) Leaving Nutrients on Site

Comment: If fuel management involves whole-tree-yarding or yarding-with-tops-attached, the agency should top a portion of the trees and leave the greens in the forest in order to retain structure and nutrients on site.

BLM Response: While there are no stand-alone fuels management treatments proposed under the Upper Cow EA, there could be instances when trees are yarded with their tops attached. Each unit was assessed to analyze whether or not leaving tops and branches in the unit would increase the fuel loading to unacceptable levels. Any trees or brush that is damaged during logging operations would be left on site.

45) Prey Species and Marking

Comment: Recognize and mitigate adverse effects of thinning on spotted owl prey such as flying squirrels and red tree voles. Avoid impacts to raptor nests and enhance habitat for diverse prey species. Train marking crews and cutting crews to look up and avoid cutting trees with nests of any sort and retain trees with defects such as forks, broken tops, etc.

BLM Response: The effects of thinning on NSO prey will be analyzed in detail in the Upper Cow EA, Chapter 3: Wildlife. Silvicultural prescriptions aim to retain trees that contain nests and defects, as these are the habitat elements that enhance wildlife habitat.

46) Spread of Weeds

Comment: Take proactive steps to avoid the spread of weeds. Use canopy cover to suppress weeds. Avoid soil disturbance and road construction. Scarifying landings and tempera roads and planting with native seeds is a good idea but please take steps to ensure that it is effective.

BLM Response: The BLM surveys project Planning Areas for noxious weeds and treats these areas prior to forest management activities. These areas are monitored into the future to aid in the control and spread of noxious weeds.

47) Stream Buffers

Comment: Buffer streams from the effects of heavy equipment and loss of bank trees and trees that shade streams. Mitigate for the loss of LWD input by retaining extra snags and wood (and green trees for recruitment) in riparian areas. Recognize that thinning “captures mortality” and results in a long-

term reduction in recruitment of functional down wood, and that effect is not mitigated by future growth.

BLM Response: The NWFP guides the BLM to protect streams by establishing stream buffers of various widths to achieve ACS objectives. The Upper Cow IDT has established site specific EPZs based on stream buffers and field surveys designed to protect stream bank areas from heavy equipment damage and loss of bank and shade trees. No treatment would occur in these zones to achieve ACS objectives. Because the proposed treatment prescriptions are variations of thinning treatments, mitigation for the loss of snags and down wood would be included in the prescriptions, including the retention of existing snags and downed woody debris.

48) Temporary Route Construction (1)

Comment: Avoid road construction. Building new roads will cause degradation that typically erases any alleged benefit of treatments. Roads have a variety of long-lasting adverse impacts on soil, water, and wildlife. Focus treatments on areas accessible from existing roads. Inaccessible areas can be treated non-commercially or become part of the landscape mosaic that is untreated and serve important ecological values such as dense forest cover, carbon storage, and natural rates of snag recruitment.

BLM Response: The BLM is carefully considering new route construction proposals. The NWFP and the RMP directs the BLM to construct roads in the LSR if the potential benefit of silvicultural activities exceeds the costs of habitat impairment. The RMP also states that new temporary roads will be kept to a minimum, be routed through unsuitable habitat, where possible, designed to minimize adverse impacts, and decommissioned after use. The IDT is developing a logging systems proposal that is guided by these directives. Additionally, the BLM is proposing helicopter yarding in inaccessible areas.

49) Temporary Route Construction

Comment: Where road building is necessary, ensure that the realized restoration benefits far outweigh the adverse impacts of the road. Carefully consider the effects of roads on connectivity, especially at road/stream crossings, across ridge tops, and midslope hydrological processes (such as large wood delivery routes).

BLM Response: The analysis within the EA discloses the impacts of proposed temporary route construction. If adverse impacts from temporary route construction along with adverse impacts from logging activities are beyond LSR objectives, helicopter yarding would either be considered or the units would be dropped from consideration.

50) Biomass Utilization

Comment: If this project involves biomass utilization, the impacts need to be clearly disclosed. How will the biomass be moved from the remote corners of the treatment areas to the landings? Will there be extra passes made by heavy equipment? Will the landings be enlarged to make room for

grinders, chip vans, and other equipment? Can the local forest roads accommodate chip vans? Will the roads be modified to make them passable by chip vans? What are the impacts of that? What are the direct, indirect, and cumulative impacts on soil, water, wildlife, and weeds?

BLM Response: Biomass removal is included in the analysis for this project, including the transportation means, method of extraction, landing size, chip van accommodations, etc. Cumulative Effects of the potential biomass removal activities is also analyzed within the Upper Cow EA.

51) Alternative Development

Comment: Develop an alternative that addresses carbon and climate by (a) deferring harvest of older forests to store carbon and provide biodiversity and connectivity and (b) thin younger stands to increase forest resilience and diversity and connectivity. Recognize that there is a carbon cost associated with thinning.

BLM Response: The BLM will develop an adequate range of Alternatives.

52) Pechman Exemptions

Comment: If the stands to be thinned are younger than 80 years, the agency may rely on the Pechman exemption and not complete surveys for rare and uncommon species. However, this exemption is intended to apply to even-aged stands. If there are distinguishable legacy trees (more than 2 per acre) those areas are not part of the younger stand, and not eligible for the Pechman exemption, therefore the agency must survey for red tree voles and other survey and manage species.

BLM Response: The BLM will comply with the Pechman Exemptions by completing surveys for red tree voles and other survey and manage species in stands greater than 80 years old.

53) Mimic Natural Patterns

Comment: If young stand management is to effectively mimic natural patterns and processes, that variable density treatments must be the rule, and the scale of the mosaic must be very fine scale.

BLM Response: This project proposes to treat a variety of forest stand types. Many of the prescriptions call for variable density thinning areas which include “skips” and “gaps”.

54) Trade-offs

Comment: Focus the analysis on “trade-offs” related to logging. All logging, including thinning stands of any age, include some adverse impacts and trade-offs. Some impacts of logging are unavoidable, so there is no such thing as a logging operation that is 100% beneficial. Depending on how thinning is done, it habitat disturbance; damage to the shrub layer; carbon removal; spreading weeds; reduced populations of prey for carnivorous species; reduced recruitment of snags; road-related impacts on soil, water, site productivity, and habitat; moving fuels from the canopy to the ground, hotter-dryer-windier microclimate that is favorable to greater flame lengths and rate of fire spread, etc. Some of these negative effects are fundamentally unavoidable, therefore all thinning has

negative effects that must be compensated by beneficial effects such as reducing competition between trees so that some can grow larger faster, increased resistance drought stress and insects, possible increasing species and structural diversity, possible fire hazard reduction, etc.

BLM Response: There is potential for short term impacts with long term habitat gains. The analysis in the EA discloses if the effects of each impact are considered significant.

55) Prescriptions / Marking Guides

Comment: Provide clear and detailed descriptions of silvicultural prescriptions and marking guides in the NEPA document. These are some of the trade-offs that must be disclosed and weighed in the NEPA document.

BLM Response: The BLM attempts to make all detailed descriptions regarding forest management treatments available to the public. These documents may be available as an Appendix within the Upper Cow EA.

56) Fuels Management

Comment: Include fuels management in the project.

BLM Response: Fuel management budgets are declining and fuels reduction treatments are being focused on other high priority planning areas. This project proposes to treat activity fuels associated with forest management projects.

57) Ride Along

Comment: Ride along opportunities to view potential work locations would be welcome, please let me know of any trips being made that would allow for public participation.

BLM Response: Prior to the EA comment period (winter 2015) the BLM hosted a field tour to showcase areas that the public had expressed an interest in seeing. Additionally, the BLM has provided a self-guided driving tour on the back of the scoping and EA Reader's Guide. A copy can be obtained by contacting the Grant Pass Field Office, 541-471-6500, or by visiting the BLM's ePlanning internet site at: http://tinyurl.com/BLMePlanning-UpperCow.

58) Past Projects

Comment: Field trips showing some of the excellent examples of late reserve care seen right from the road might help residents understand how long the NWFP has been in effect. There are several units that have been managed by BLM going back 20+ years that are excellent examples of some great LSR management practices.

BLM Response: Former successful forest management treatments are identified on the back page of the Upper Cow Late Successional Reserve EA Reader's Guide. The back of the guide contains a map with a driving tour showcasing past treatments within the Late Successional Reserve. For a copy of the Upper Cow Late Successional Reserve EA Reader's Guide, contact Ferris Fisher at 541-

471-6639 or visit the BLM's ePlanning internet site at: http://tinyurl.com/BLMePlanning-UpperCow. You may find the Reader's Guide under "Documents."

59) Inter-planting

Comment: Plant a mixture of species to speed attainment of a more historic species composition.

BLM Response: Many of the forest management treatments applied within this project will not open the canopy enough to facilitate the planting of shade intolerant species. Many of the silvicultural prescriptions call for thinning around large pines and cedars which may promote natural regeneration of under-represented species.

60) Jobs/Work for Locals

Comment: The Upper Cow Creek Community is interested in small sales and jobs for small local persons.

BLM Response: The Upper Cow IDT has designed a small scale stewardship project that is analyzed within the EA. This may be an opportunity for local interests to obtain a small sale to secure rural jobs.

61) Local Water Sources

Comment: Concerns about local water sources.

BLM Response: The BLM will analyze the quality and quantity of the water resources within the Planning Area in Chapter 3 of the EA and disclose potential impacts to local water sources.

62) Large Tree Removal

Comment: Concerns about logging of large trees.

BLM Response: The management of the South Umpqua/Galesville Late Successional Reserve is guided by objectives set forth in the Northwest Forest Plan. The NWFP directs the BLM to defer treatments in stands greater than 80 years and retain trees greater than 20 inches in diameter.

Appendix C Aquatic Conservation Strategy Consistency Analysis

"The Aquatic Conservation Strategy was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. The strategy would protect salmon and steelhead habitat on federal lands managed by the Forest Service and Bureau of Land Management within the range of the Pacific Ocean anadromy" (1995 Medford District RMP pg. 22).

The four components of the Aquatic Conservation Strategy (ACS) are Riparian Reserves, key watersheds, watershed analysis, and watershed restoration. The ACS was designed to meet the nine objectives discussed below.

This ACS consistency analysis evaluates the Upper Cow Late Successional Reserve (LSR) Project EA on BLM land.

Analysis of the Four Components of the ACS:

Riparian Reserves: The proposed project is consistent with the actions and directions within Riparian Reserves as described in the Medford District RMP. The Action Alternatives would result in thinning and understory treatments to promote forest health and the development of large woody debris (LWD) within Riparian Reserves outside the Ecological Protection Zone (EPZ). Thinning would be designed to expedite the development of late successional, multi-story habitat conditions and restore the species composition and structural diversity of the plant communities, needed to achieve ACS and Riparian Reserve objectives (Medford RMP, p. 22 and p. 26 respectively). Riparian Reserves within the proposed units are currently dominated by Douglas-fir and some hardwoods. Most riparian stands are lacking large wood debris, downed logs, and large tree structure. Thinning of dense Riparian Reserves would reduce competition on the retained trees for light, nutrients, water and growing space, allowing trees to develop larger canopies, display better vigor and put on diameter growth faster than if left untreated.

The project is also consistent with the Best Management Practices (BMP) within Appendix D of the 1995 Medford RMP.

2. Key Watershed: The Planning Area is not located in a key watershed.

3. Watershed Analysis: The BLM completed the Middle Cow Creek Watershed Analysis in 1999, the Upper Cow Creek Watershed Analysis in 2005, and the South Umpqua Watershed Analysis and Water Quality Restoration Plan in 2001. The proposed activity is consistent with the Watershed Analyses.

The Watershed Analyses found that management directions in the Northwest Forest Plan and the

1995 RMP including the Aquatic Conservation Strategy, Best Management Practices, and Riparian Reserve management would be adequate at protecting, maintaining and improving aquatic and riparian ecosystems. The Watershed Analyses recommended reducing road densities which are not needed for future management.

The Watershed Analyses discussed restricting road construction or considering alternatives to constructing new roads in sensitive soil areas. Permanent road construction is not proposed under the Upper Cow LSR Project. Many of the roads in the Planning Area are not public roads and are under reciprocal Right-of-Way agreements with private landowners because of the checkerboard ownership pattern. The BLM does not have the option to close these roads due to the reciprocal Right-of-Way agreements.

4. Watershed Restoration: Though the Upper Cow LSR Project is not an aquatic watershed restoration project, it would aid in the improvement of watershed health through the following proposed activities: thinning and activity fuels reduction in Riparian Reserves.

Analysis of the Upper Cow LSR Project for consistency with the Aquatic Conservation Strategy objectives:

The ACS gives direction to maintain and restore ecosystem health at watershed and landscape scales. For the purposes of this analysis the watershed scale will be discussed in terms of site or project scale and will be at the HUC 12 and 14 watersheds. The landscape scale will be at the HUC 10 watershed level.

Appropriate consideration of potential Cumulative Effects is a critical element in determining a project's consistency with the ACS. The minimal effects at the HUC 14 scale would not reach a magnitude detectable at the HUC 12 or HUC 10 scales. Because there would be no detectable Cumulative Effects caused by the Action Alternatives, Cumulative Effects will not be discussed in the individual ACS objectives.

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 watershed and landscape-scale features which protect species, populations, and communities dependent on aquatic systems would be maintained and in some cases enhanced in the short term and long term. The distribution, diversity, and complexity of watershed and landscape-scale features needed for the protection of aquatic systems would be maintained. Proposed activities such as road decommissioning and riparian thinning would restore watershed features in the short and long term.

Riparian Reserves

One key component of watershed and landscape scale features needed for the protection of aquatic

systems is Riparian Reserves. Riparian Reserves would be maintained at the site and watershed levels in the short and long term. Riparian vegetation treatments (thinning) would enhance riparian characteristics. Riparian thinning would result in a reduction in stand densities and would allow for the development of late successional riparian characteristics. One of these characteristics is multi-level canopy cover which helps to maintain cool water temperatures. Late successional characteristics in riparian areas also include downed coarse woody debris and LWD which increases channel complexity, and diverse species composition which provides a variety of chemical and biological inputs to streams. Riparian thinning would also reduce the spread of disease and the risk of a high intensity or severity fire in Riparian Reserves. Such a fire could result in tree mortality and a reduction in shade, which could negatively affect fish habitat by causing an increase in water temperature, a reduction in future recruitment of LWD, and an increase in soil erosion and sediment entering streams.

Roads

The project would result in up to 0.6 miles of temporary route construction and up to 1.6 miles of existing temporary route renovation/reconstruction to access timber in units proposed for thinning. These routes would be decommissioned after use. This action would not lead to stream sedimentation due to the predominately ridgetop location of these roads which are hydrologically disconnected.

Project Design Features (PDFs) would be expected to minimize sediment routing to streams through restrictions on ditch blading, use of cross drains, and the use of temporary sediment control measures. A small amount of sediment may enter streams without fish habitat during log haul and existing road maintenance where roads are hydrologically connected. All sediment producing actions would result in negligible sediment inputs which would not be observable or distinguishable from background levels. Sediment would not be expected to enter fish-bearing streams as a result of haul or maintenance of haul roads, with dry condition haul, well-vegetated ditch lines, properly functioning cross drains, and existing filter strips, or sediment barriers installed, where needed, to prevent sediment delivery into fish-bearing streams.

This project would not increase the number of permanent roads within these sub-watersheds, since permanent road building is not part of the proposed project.

Peak Flows

The Action Alternatives would not affect the timing, magnitude, duration, and spatial distribution of peak, high and low flows. See Chapter 3.6, Hydrology, for more information.

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.

The spatial and temporal connectivity within and between watersheds would be maintained in the short and long term at the site and landscape scales. Chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species would be maintained.

3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

The physical integrity of aquatic systems, including shorelines, banks, and bottom configurations would not be affected at the site or landscape scale in the short or long term. The proposed activities would not manipulate or affect shore lines, banks, or bottom configurations.

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.

Water quality necessary to support healthy riparian, aquatic and wetland ecosystems would be maintained. Water quality would remain within the range that maintains biological, physical, and the chemical integrity of streams.

Harvesting, yarding, landing construction and rehabilitation, temporary route construction and reconstruction (including route decommissioning), road renovation/improvement, road maintenance hauling, and fuel treatments would have no effect on Oregon Coast (OC) coho salmon (ESA-Threatened), coho critical habitat (CCH), or any other fish habitat. There are two haul road segments where BLM-maintained roads cross over coho bearing streams; one via a culvert, and one over a bridge. In addition, there are six haul road crossings on cutthroat trout streams, all via culverts. Sediment would not be expected to enter CCH or other fish habitat as a result of haul or maintenance of haul roads, with dry condition haul, well-vegetated ditch lines, properly functioning cross drains, and existing filter strips, or sediment barriers installed, where needed, to prevent sediment delivery into fish-bearing streams.

Slight increases in turbidity may occur in the short term in localized areas as a result of road use activities near streams without fish habitat. Best Management Practices (BMPs) would be implemented to minimize the amount and duration of sediment entering these stream channels. Such increases in turbidity would not measurably alter the biological, physical, or chemical integrity of streams. Aquatic and riparian dependent species' survival, growth, reproduction, and migration would be maintained.

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.

The sediment regime under which aquatic ecosystems evolved would be maintained at the site and landscape scales in the short and long terms. Some of the proposed activities such as road reconstruction and road maintenance would reduce sediment input in the short and long term. Streams within the Planning Area evolved with sediment input. Sediment input can result from natural disturbances such as landslides, slumps, wildfires, bank erosion, and channel scour.

Road Related Activities

Dry condition haul on proposed routes would result in negligible amounts of sediment entering streams without fish habitat because the roads are either bituminous surface treatment (BST) or crushed aggregate (rocked) or are hydrologically disconnected due to ridgetop location of timber harvest units.

Dry condition hauling on proposed routes could result in sediment entering stream channels without fish habitat, but because of PDFs the amount would be minimal. Sediment would not be expected to enter CCH or fish-bearing streams as a result of haul or maintenance of haul roads, with dry condition haul, well-vegetated ditch lines, properly functioning cross drains, and existing filter strips, or sediment barriers installed, where needed, to prevent sediment delivery into CCH and fish-bearing streams.

Changes in channel embeddedness, interstitial spaces, and pool depth would not be measurable. Road maintenance would result in a minimal amount of sediment reaching stream channels without CCH or other fish habitat. Increased sediment levels from road maintenance would not be detectable above background levels, and sediment input would be undetectable and short term. Changes in embeddedness, interstitial spaces, and pool depth would not be measurable.

Harvest Activities

All other soil disturbing activities are located outside the EPZ, and would be implemented using BMPs that minimize the quantity and transport of soil erosion. Since the EPZ is designed to filter out sediment produced during upslope activities that are implemented using BMPs, these activities would not result in any sediment entering streams.

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 woodrouting. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

The Upper Cow LSR Project would not affect the timing, magnitude, duration, and spatial distribution of peak, high and low flows. See Chapter 3.6, Hydrology, for more information.

7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

The timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands would not be affected by any of the proposed activities. There are no wetlands, as defined on page 117 of the 1995 RMP, in the Planning Area.

8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas 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 species composition and structural diversity of plant communities in riparian areas would be maintained at the site and landscape scales in the short and long term. There are no wetlands, as defined on page 117 of the 1995 RMP, in the Planning Area. Vegetation treatments proposed for the Action Alternatives were designed to enhance riparian conditions in the short and long term. Plant communities in riparian areas would be maintained and enhanced through silvicultural prescriptions and no treatment buffers in order to provide for 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.

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

Habitat for riparian-dependent plant, invertebrate and vertebrate species would be maintained at the site and landscape scales. Vegetation treatments proposed were designed to enhance riparian conditions in the short and long term. There would not be a reduction of habitat needed to support riparian dependent species in the short term or long term.

CONCLUSION:

Based on this analysis at both the site and landscape scales of the proposed activities in the Upper Cow LSR Project, it was determined that the actions are consistent with the nine objectives and the four components of the ACS. This determination was based on the small spatial and temporal disturbances associated with the proposed activities, and the implementation of Best Management Practices, and Project Design Features.

Appendix D Activities Considered in the Cumulative Effects Analysis

An assessment was performed to determine which projects would be considered in the Cumulative Effects analysis for the Upper Cow Project. Each resource specialist determined if any of the projects listed below would be analyzed in their specific Cumulative Effects analysis. The determination was based on the consideration of whether or not any of the projects listed below would have additional cumulative impacts when considering the effects of Alternatives 1, 2 and 3. Cumulative Effects resulting from the Alternatives in this project, if any, are described in the specific resource specialist write-ups contained within Chapter 3.

Past, Present, and Future Actions were analyzed as follows:

- Past Actions are included in the description of the "Past Actions for consideration within the Cumulative Effects Analysis," Chapter 3.
- Present Actions are projects that have existing decisions and/or are currently scheduled to occur (not speculative), Chapter 3, p. 44.
- Future Actions are projects that were previously analyzed but never decided upon or have been partly decided upon. These projects are either implemented, partially implemented, or may be implemented in the future. Future Actions would also include programmatic documents such as Categorical Exclusions, non-discretionary Right-of-Way requests, and projects which may be implemented within the PA but are not authorized or managed by the BLM.

Type of Project	Affected Resource	Cumulative Effect
Present Actions		
Young stand management	Vegetation	• Benefits the development of late successional conditions.
Middle Cow – fuels treatments	Vegetation, fuels	• Benefits the development of late successional conditions, increases the fire resiliency and aids in wildfire suppression within the PA.
Future Actions		
Water source maintenance	Vegetation, hydrology	• Benefits fire suppression thus having a positive effect within the PA because fire suppression activities reduce the loss of vegetation which equates to habitat and reduction in soil erosion. • Increase fire suppression effectiveness benefits local communities by reducing loss of property/life. • Protects botanical and wildlife species by increasing fire suppression efforts.

Type of Project	Affected Resource	Cumulative Effect
Medford District Programmatic Road Maintenance CX	Hydrology, aquatics, fuels, engineering	• Benefits the PA by reducing sedimentation from forest roads. • Any reduction in sedimentation is a benefit to aquatic species. • Maintaining road systems increases the ability to fight wildfire quickly and effectively which reduces overall loss.
Reciprocal Right-of-Ways	Hydrology, aquatics, wildlife	• During reciprocal ROW project activities, road maintenance activities could occur, thus decreasing sedimentation and positively benefiting the PA. • Any reduction in sedimentation is a benefit to aquatic species. • Negative impacts such as the removal of mature trees that could be utilized by wildlife. • Negative impacts to soil from the removal of trees that provide thermal cover for soil protection. • Could benefit fire suppression due to increased access to public lands.
Eastside Hazardous Fuels Reduction Project (programmatic fuels treatment, 489 acres have been completed, 1,033 acres are currently authorized. Treatments include: mechanical thinning with chainsaws, hand piling of slash and hand pile burning)	Vegetation, wildlife, fire/fuels, soils/hydrology	• Completing treatments across large landscapes provides a greater regional benefit in terms of fire suppression activities and protecting east west connectivity.
Slim Jim – Non-commercial density management, Commercial small wood removal, Hazardous fuels reduction, and Road decommissioning within the Glendale Resource Area Decision Record – small wood removal/commercial density management (79 acres)	Vegetation, wildlife, fuels	• Benefits the retained trees because stand densities would decrease. Retained trees would have greater availability to light, water, nutrients and growing space. Forest health would be improved. • Short-term impact to wildlife habitat with a long-term improvement to wildlife habitat, including larger trees and more diverse stands. • May cause a decrease in snags due to the harvest of future mortality. • Hazardous fuels would be treated which benefits the PA.

Appendix E Environmental Elements

In accordance with law, regulation, executive order and policy, the interdisciplinary team reviewed the elements of the human environment to determine if they would be affected by the Action Alternatives described in Chapter 2 of this EA. The following tables summarize the results of that review. Those elements that are determined to be "affected" will define the scope of environmental concern, Chapter 3 of the EA.

Table E-1 Supplemental Authorities Considered

Table 1. Supplemental Authorities to be considered (BLM Handbook 1790-1 Appendix 1). This table lists some of the other authorities that may apply if either of the Action Alternatives described in the Environmental Assessment were implemented.		
Critical Element of the Human Environment	**Status** **1 – Not Present** **2 – Not Affected** **3 - Affected**	**Interdisciplinary Team Remarks**
Air Quality (Clean Air Act)	Not Affected	Prescribed burning would be administered in accordance with the Oregon Smoke Management Plan administered by the Oregon Department of Forestry and the regulations established by the Oregon DEQ. The PA is not located within a Class I designated airshed or non-attainment area. The impact of smoke on air quality is expected to be localized and of short duration. Particulate matter would not be of a magnitude to harm human health, affect the environment, or result in property damage. Water of approved road surface stabilizers/dust control additives would be applied to road surfaces during timber hauling when there is visible dust trail behind vehicles. Any dust created would be localized and of short duration. As such, the Action Alternatives are consistent with the provisions of the Federal Clean Air Act. For site-specific locations of roads proposed for dust abatement See Chapter 2.4.
Areas of Critical Environmental Concern	Not Present	There are no Areas of Critical Environmental Concern located within the PA.
Energy (Executive Order 13212)	Not Affected	The Action Alternatives would have no effect on energy development, production, supply and/or distribution.
Wild and Scenic Rivers	Not Present	There are no eligible, suitable, or designated Wild and Scenic Rivers within the PA.
Hazardous or Solid Wastes	Not Affected	There would be no environmental effects associated with this element due to the implementation of Best Management Practices (BMPs) contained in the Medford RMP and the terms/conditions of the timber sale contract.
Prime or Unique Farm Lands	Not Present	There are no prime or unique farmlands within the PA.
Flood Plains (Executive Order 11988)	Not Affected	The Action Alternatives do not involve occupancy or modification of flood plains and would not increase the risk of floodplain loss. The Action Alternatives are consistent with Executive Order 11988.

Table 1. Supplemental Authorities to be considered (BLM Handbook 1790-1 Appendix 1). This table lists some of the other authorities that may apply if either of the Action Alternatives described in the Environmental Assessment were implemented.		
Critical Element of the Human Environment	**Status** **1 – Not Present** **2 – Not Affected** **3 - Affected**	**Interdisciplinary Team Remarks**
Wetlands (Executive Order 11990)	Not Affected	The Action Alternatives would not result in the destruction, loss or degradation of any wetlands. The Action Alternatives are consistent with Executive Order 11990.
Wilderness	Not Present	There are no designated wilderness areas contained within the PA.
Native American Religious Concerns	Not Affected	Three Native American Tribes were contacted during the scoping process for this project. None of the contacted Tribes expressed Religious concerns with the Action Alternatives.
Environmental Justice (Executive Order 12898)	Not Affected	The Upper Cow IDT held 2 public meetings and 1 field tour within the Upper Cow Creek and Azalea communities. The meetings and field tour were held within the potentially affected community areas to ensure public access to information regarding the Upper Cow project and provide an opportunity for local communities to participate in the NEPA process. The IDT produced an illustrated Scoping, Pre-EA, and EA-Release Reader's Guide which explains the project in terms that are understandable by members of the public who may have no knowledge of the NEPA process or federal land management activities. With the implementation of BMPs and PDFs listed in Chapter 2.4, there are no anticipated negative environmental consequences expected from Action Alternatives 2 and 3. Therefore minority and low-income populations would not be affected by the Upper Cow Action Alternatives.

Table E-2 Other Elements of the Environment to be considered

Table 2. Other Elements of the Environment. This table lists other elements of the environment which are subject to requirements specified in law, regulation, policy, or management direction and the interdisciplinary team's predicted environmental impact per element if the Action Alternatives (Alternative 2 & 3) described in the EA was implemented.		
Critical Element of the Human Environment	**Status** **1 – Not Present** **2 – Not Affected** **3 - Affected**	**Interdisciplinary Team Remarks**
Recreation	Not Affected	Recreational opportunities on BLM administered land within the Upper Cow Late Successional Reserve PA consist of dispersed camping and general forest recreation (including hunting, fishing, hiking, sightseeing, etc.). No developed BLM administered recreational sites, trails, etc., exist within the PA. Douglas County Parks recreational facilities exist within the PA. With the implementation of PDFs listed in Chapter 2.4 of this EA, there are no anticipated effects from the Action Alternative. No BLM managed sites or Douglas County managed sites will be affected during project implementation. For more information see the Specialist Report on Recreation contained within the Upper Cow Administrative Project Record.
Rural Interface Area (RMP, Map 13)	Not Affected	Rural residents residing in the PA would experience short-term noise, dust, and traffic congestion due to logging operations. These types of activities are common because of activities occurring on private and other public lands.
Special Areas (not including ACEC)	Not Present	There are no Special Areas contained within the PA.
Visual Resources	Not Affected	The silviculture prescriptions for the Upper Cow units will not significantly change the visual characteristic elements of form, line, color, texture, and scale found in the predominant features of the characteristic landscape. Treatments within the PA will not dominate or detract from the area's visual resources or its characteristics as observed from points commonly visited by the public. The project is consistent with the VRM objectives as stated in the Medford District RMP (p. 70). For an analysis of the Visual Resources for the Upper Cow Project see the Visual Resource Specialist write-up contained within the Administrate Project Record.
Port-Orford-cedar	Not Present	The Upper Cow Project is not within the natural range of Port-Orford-cedar (POC). A POC risk key analysis is not required. No management specific to POC and POC root disease (*Phytophthora lateralis*) is required. The Action Alternatives are consistent with management direction in the Port-Orford-cedar EIS.

Table 2. Other Elements of the Environment. This table lists other elements of the environment which are subject to requirements specified in law, regulation, policy, or management direction and the interdisciplinary team's predicted environmental impact per element if the Action Alternatives (Alternative 2 & 3) described in the EA was implemented.		
Critical Element of the Human Environment	**Status** **1 – Not Present** **2 – Not Affected** **3 - Affected**	**Interdisciplinary Team Remarks**
Greenhouse Gases and Carbon Storage	Affected	The purpose of the Upper Cow Carbon Report is to provide information to the decision maker to help determine whether the Action Alternatives are likely to significantly impact the human environment with respect to greenhouse gas levels (i.e., atmospheric carbon levels). While each of the volume removed estimates within the Action Alternatives of the Upper Cow Project would result in emissions of carbon dioxide, carbon dioxide emissions resulting from the project in each of the estimates is very small when compared to worldwide and United States emissions estimates. The high-end volume estimate for Alternative 2 would produce approximately 0.0000203% of the 2015 worldwide estimated carbon dioxide emissions and approximately 0.0001355% of the 2015 United States estimated carbon dioxide emissions. The low-end volume estimate for Alternative 2 would produce approximately 0.0000172% of the 2015 worldwide estimated carbon dioxide emissions and approximately 0.0001145% of the 2015 United States estimated carbon dioxide emissions. The high-end volume estimate for Alternative 3 would produce approximately 0.0000199% of the 2015 worldwide estimated carbon dioxide emissions and approximately 0.0001325% of the 2015 United States estimated carbon dioxide emissions. The low-end volume estimate for Alternative 3 would produce approximately 0.0000190% of the 2015 worldwide estimated carbon dioxide emissions and approximately 0.00011267% of the 2015 United States estimated carbon dioxide emissions. Approximately 80-90 percent of these estimated emissions are due to the treatment of activity fuels associated with harvest and with understory reduction treatments. The ranges of carbon dioxide emissions are similar for both Action Alternatives. For a more detailed analysis on the Greenhouse Gases and Carbon Emissions associated with the Upper Cow Project see the Carbon Report in the Administrative Project Record.

Appendix F Special Status Species – Grants Pass Resource Area

Table Headings and Letter Code Definitions

Species: Grouped alphabetically by taxon.

Status: lists the Oregon BLM Program codes as follows:

Oregon BLM Codes:
FT - USFW Threatened - likely to become endangered species within the foreseeable future
FC - USFW Candidate - proposed and being reviewed for listing as threatened or endangered
BSEN - Bureau Sensitive (BLM) - eligible for addition to Federal Notice of Review, and known in advance of official publication. Generally these species are restricted in range and have natural or human caused threats to their survival.
BSTR - Bureau Strategic Species (BLM) - not presently eligible for official federal or state status, but of concern which may at a minimum need protection or mitigation in BLM activities.

Range: indicates yes or no, if the breeding range overlaps with the Grants Pass Resource Area. If not within the range, both presence and basic conclusion are not applicable (N/A). For invertebrates in which there is inadequate data to determine ranges, 'U' is used for unknown.

Presence: indicates 'P' if a species is known to occur in the project area, 'S' suspected to occur based on known sites adjacent to the project area, or suitable breeding habitat exists, 'U' uncertain that the species occurs within the project area based on insufficient data, 'A' absent from the project area based on no known sites and/or no suitable breeding habitat within the project area, and 'T' possibly transitory species utilizing habitats within the project area during migration.

Basic Conclusion: describes the facts, context and intensity to provide the rationale for the conclusion of the Proposed Action(s) on the species and its habitat.

Table F-1 Special Status Species in the Grants Pass Resource Area

SPECIAL STATUS SPECIES IN THE GRANTS PASS RESOURCE AREA				
SPECIES	**STATUS**	**RANGE (Y/N)**	**PRESENCE**	**PROJECT SPECIFIC COMMENTS/ BASIC CONCLUSIONS**
Birds: Bureau Sensitive & Bureau Strategic				
American peregrine falcon	BSEN	Y	A	No nesting habitat within the PA, but they could forage within the PA. Project activities would not affect this species at the landscape scale.
Bald eagle	BSEN	Y	P	Proposed activities impacts have been addressed in detail in the Chapter 3.3.

SPECIAL STATUS SPECIES IN THE GRANTS PASS RESOURCE AREA				
SPECIES	**STATUS**	**RANGE (Y/N)**	**PRESENCE**	**PROJECT SPECIFIC COMMENTS/ BASIC CONCLUSIONS**
Lewis' woodpecker	BSEN	Y	S	Potential habitat exists within and adjacent to the PA. Project activities would not adversely affect this species at the landscape scale as adequate levels of snags would be retained (Chapter 2.4) post treatment.
Marbled Murrelet	FT	N	N/A	N/A
Northern spotted owl	FT	Y	P	Proposed activities impacts have been addressed in detail in the Chapter 3.3.
Purple martin	BSEN	Y	A	No habitat within the PA.
Streaked Horned Lark	FT	Y	A	No habitat within the PA.
Tri-colored Blackbird	BSEN	Y	A	No habitat within the PA.
White-headed woodpecker	BSEN	Y	U	Potential habitat exists within and adjacent to the project area. Project activities would not adversely affect this species at the landscape scale as adequate levels of snags would be retained (Chapter 2.4) post treatment.
White-tailed kite	BSEN	Y	A	No habitat within the PA.
Amphibians: Bureau Sensitive & Bureau Strategic				
Black salamander	BSEN	N	N/A	Project is outside of range. No known sites.
Foothill yellow-legged Frog	BSEN	Y	P	Project activities would not affect this species if present in the project area. No actions in primary habitat (Chapter 2.4).
Oregon Spotted frog	BSEN	N	N/A	Project is outside of range. No known sites.
Siskiyou Mt. salamander	BSEN	N	A	Project is outside of range. No known sites.
Reptiles: Bureau Sensitive & Bureau Strategic				
Northwestern pond turtle	BSEN	Y	S	Suspected within the watershed at large water sources (Galesville Reservoir, main stem Cow Creek), but not expected to occur in any areas proposed for treatment.
Mammals: Bureau Sensitive & Bureau Strategic; Federal Candidate				
Fisher	FC	Y	A	Proposed activities impacts have been addressed in detail in the Chapter 3.3.

SPECIAL STATUS SPECIES IN THE GRANTS PASS RESOURCE AREA				
SPECIES	**STATUS**	**RANGE (Y/N)**	**PRESENCE**	**PROJECT SPECIFIC COMMENTS/ BASIC CONCLUSIONS**
Fringed myotis	BSEN	Y	S	Potential habitat exists within and adjacent to the project area. Project activities would not adversely affect this species at the landscape scale as adequate levels of snags would be retained (Chapter 2.4post treatment.
Pacific pallid bat	BSEN	Y	U	Adequate potential habitat exists within and adjacent to the project area. Project activities would not adversely affect this species at the landscape scale as adequate levels of snags would be retained (Chapter 2.4) post treatment.
Townsend's big-eared bat	BSEN	Y	S	Project activities should not affect maternity or hibernacula areas.
Invertebrates: Bureau Sensitive & Bureau Strategic				
Chase sideband snail	BSEN	N	A	No known sites in PA.
Coronis Fritillary	BSEN	Y	A	No known sites in project area. No habitat present in the PA.
Evening fieldslug	BSEN	N	A	No known sites in PA.
Franklin's Bumblebee	BSEN	Y	A	No known sites in project area. Project activities would not affect this species habitat.
Johnson's Hairstreak	BSEN	Y	U	No known sites in project area. Project activities would not adversely affect this species at the landscape scale
Mardon skipper butterfly	FC	N	N/A	Project is outside of range. No known sites in PA.
Oregon shoulderband snail	BSEN	Y	A	No known sites in PA.
Scale lanx snail	BSEN	N	N/A	Project is outside of range. No known sites in PA.
Siskiyou hesperian snail	BSEN	N	N/A	Project is outside of range. No known sites in PA.
Siskiyou short-horned grasshopper	BSEN	N	N/A	Project is outside of range. No known sites in PA.
Travelling sideband snail	BSEN	N	N/A	Project is outside of range. No known sites in PA.
Vernal pool fairy shrimp	FT	N	N/A	Project is outside of range. No known sites in PA.

Appendix G Silviculture Prescription

Introduction

The Planning Area (PA) refers to the collective units proposed for treatment under the Upper Cow Late Successional Reserve (LSR) Project. The proposal includes Understory Reduction, Density Management, Legacy Tree Culturing, Restoration Thinning, and Variable Density Thinning.

The Recovery Action 32 (RA-32) directs resource personnel to field-identify the best habitat for the NSO (RA-32). A total of 51 acres were identified in 8 separate locations and are deferred from any management activities. A total of 191 acres were identified as RTV zones in 11 separate locations and are likewise deferred from management activities. BLM managed lands within the PA include the following Land Use Allocations:

Land Use Allocation Objectives

Late-Successional Reserves (LSRs) (RMP p. 32)

- Protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth forest-related species including the northern spotted owl and marbled murrelet.
- Maintain a functional, interacting, late-successional and old-growth forest ecosystem.

Riparian Reserves (RRs) (RMP p. 26)

- Aquatic Conservation Strategy objectives (RMP p. 22-23)
- Provide habitat for terrestrial species associated with late-successional forest habitat.
- Provide dispersal habitat for the northern spotted owl.
- Implement strategies to achieve the goals established in the BLM's Riparian Wetland Initiative for the 1990s.

Current Condition/Forest Inventory

Stands in this PA can be classified as mixed conifer/hardwood and generally fall into one plant series: Douglas-fir. The primary conifer species in the PA is Douglas-fir with lesser percentages, in decreasing order, of ponderosa pine, incense cedar, sugar pine, and white fir. Hardwood and shrub species include, but are not limited to the following in generally descending order: Pacific madrone, canyon live oak, salal, sword fern, Pacific oceanspray, ceanothus species, California hazel, western hemlock, golden chinquapin, California black oak, poison oak, big-leaf maple, manzanita, tanoak, and Oregon white oak.

Conifer forestlands within the PA were inventoried and field reviewed to identify areas of opportunities to optimize habitat for late-successional forest-related species in the short and long term. Stands were first defined using the forest operational inventory boundaries. Boundary changes were delineated using GPS, LiDAR, GIS, and aerial photographs. Treatment area boundaries were

defined that met the need for intervention to accelerate the stand into late successional structure. Portions of stands that met LSR objectives were deferred from treatment.

The vegetation condition classes within stands and between stands are generally patterned by soils, aspect, past disturbance, and fire suppression. Table A4-1 displays the GIS estimation of Vegetation Condition Classes on BLM lands in the Planning Area.

Table G-1 Current Vegetation Condition Classes for BLM Managed Lands within the PA

Vegetation Condition Class	Acres	Percentage
1 - Grass, Forbs and Herbaceous	65	0
2 - Shrubs, Non-Forest Land	11	0
3 - Hardwood/Woodland	22	0
4 - Early Seral & Seedlings/Saplings	5,411	40
5 - Poles (5-11" DBH)	696	5
6 - Mid Seral (11-21" DBH)	1,407	10
7 - Mature (21"+ DBH)	5,644	41
8 - Suitable/Non Suitable Woodland	289	2
9 – Water	144	1
TOTAL	**13,690**	**100**

The greatest percentage of cover on BLM land in the PA occurs in the early seral and mature vegetation condition classes at near equal percentages. There are insignificant amounts of shrubland on the landscape. The ones that do exist, including meadows, are being encroached upon by Douglas-fir. The following observation by Swanson (2007) explains that:

> The trouble is, through much of the Northwest, montane meadows - those at elevations where snowpack is not deep or persistent - are slowly giving way to forest in a phenomenon referred to as 'conifer encroachment.' Increasingly, meadows that were open throughout recent memory are filling with conifers. Trees are either marching in waves from the forest edge or are forming tree islands that gradually coalesce . . . we know that forests and meadows have formed a shifting mosaic over the centuries. However, recent encroachment appears more extensive and rapid that had occurred historically.

Coarse woody debris (CWD) or down woody material were inventoried in 27 representative units with potential commercial sawlog extraction (harvest units). Using a transect length of 200 feet, a sampling of this inventory demonstrated down woody total of 657 feet/acre yielded 18.5 feet/acre in ROD compliance. Three units exhibit > 120 linear feet/acre CWD.

Insects & Diseases (I&D)

Figure A4-1 is a snapshot of the annual cooperative aerial surveys conducted by Forest Health Protection staffs of the Oregon Department of Forestry, Washington Department of Natural Resources, and the USDA Forest Service Pacific Northwest Region. The Region 6 Data Dictionary (USFS 2013) explains:

> "Each year, all forested federal, state and private land in Oregon and Washington are aerially surveyed for insect and disease activity. This survey is flown cooperatively by Region 6 USDA Forest Service, Forest Health Protection (FHP); Oregon Department of Forestry (ODF), Insect and Disease Section; and Washington Department of Natural Resources (WDNR). These data are collected to determine regional insect and disease trends and to serve as an indicator to land owners/managers on insect and disease activity in their area.
>
> Data are collected during annual surveys that are generally flown from early July through September. Historically, the surveys were flown in fixed-wing aircraft on various grid patterns. The accuracy of polygon placement and polygon attributes may be limited by several factors, including: surveyor experience, weather, time of day, time of year and visibility."

The I&D survey shows flatheaded fir borer *Phaenops (Melanophila) drummondi* detections where they breed in and kill weakened Douglas-fir host trees from drought, competition, fire, or other disturbances. By consuming the cambium and then some inner phloem, this species is a primary cause of Douglas-fir mortality in southwestern Oregon. On southwest Oregon sites below 3,500 feet elevation and droughty sites, the flatheaded fir borer behaves much more aggressively causing extensive Douglas-fir mortality (Shaw et al. 2009) and often attacking and killing numerous apparently healthy Douglas-firs (SWOFIDSC). The flatheaded fir borer does not wait for the tree to die, but rather eats the cambium of a live tree which inhibits the tree from producing new phloem, subsequently killing the tree. Fettig et al. (2007) reported that in Douglas-fir forests, factors contributing to beetle infestation levels consistently include poor growth and high stand density.

Bark beetles are not restricted to dying hosts (SWOFIDSC 2014). Even at low levels, Larsson et al. (1983) suggest that comparatively few mountain pine beetles are needed to kill low vigor ponderosa pine trees. Flowers and Kanaskie (2007a) add that "the mountain pine beetle (MPB) is the most destructive tree-killing beetle in Oregon." Because it can be difficult to differentiate MPB attacks from those made by western pine beetle (*D. brevicomis*) and because both species infest the same pine, some of these aerial survey observations could include western pine beetle. When stand densities are high, pine beetles will behave similarly to the flatheaded fir borer in stands on south and east aspects below 3,500 foot elevations (USFS 1998). The elevation in the PA ranged from 1,700 to 3,900 and averaged 2,741. Of the units proposed for treatment, 90% of the acreage was below 3,500 feet in elevation. Because the majority of units are below 3,500 feet elevation, high stand densities here signify that trees in 90% of the proposed treatment area are predisposed to bark beetle infestations.

Table G-2 displays vigor index ratings and corresponding thresholds of trees resilience to insect attack. These ratings were derived from tree cores collected in the field using increment borers and recorded data was collated in a spreadsheet developed by experts in the forest physiology. The vigor rating for ponderosa pine in the PA was 11.88 g/m²/yr signifying that this species would succumb to attack of relatively low intensity (Table G-2).

Figure 11 2014 Aerial Insect and Disease Survey snapshot within the PA where F = Flatheaded fir borer with number of trees affected

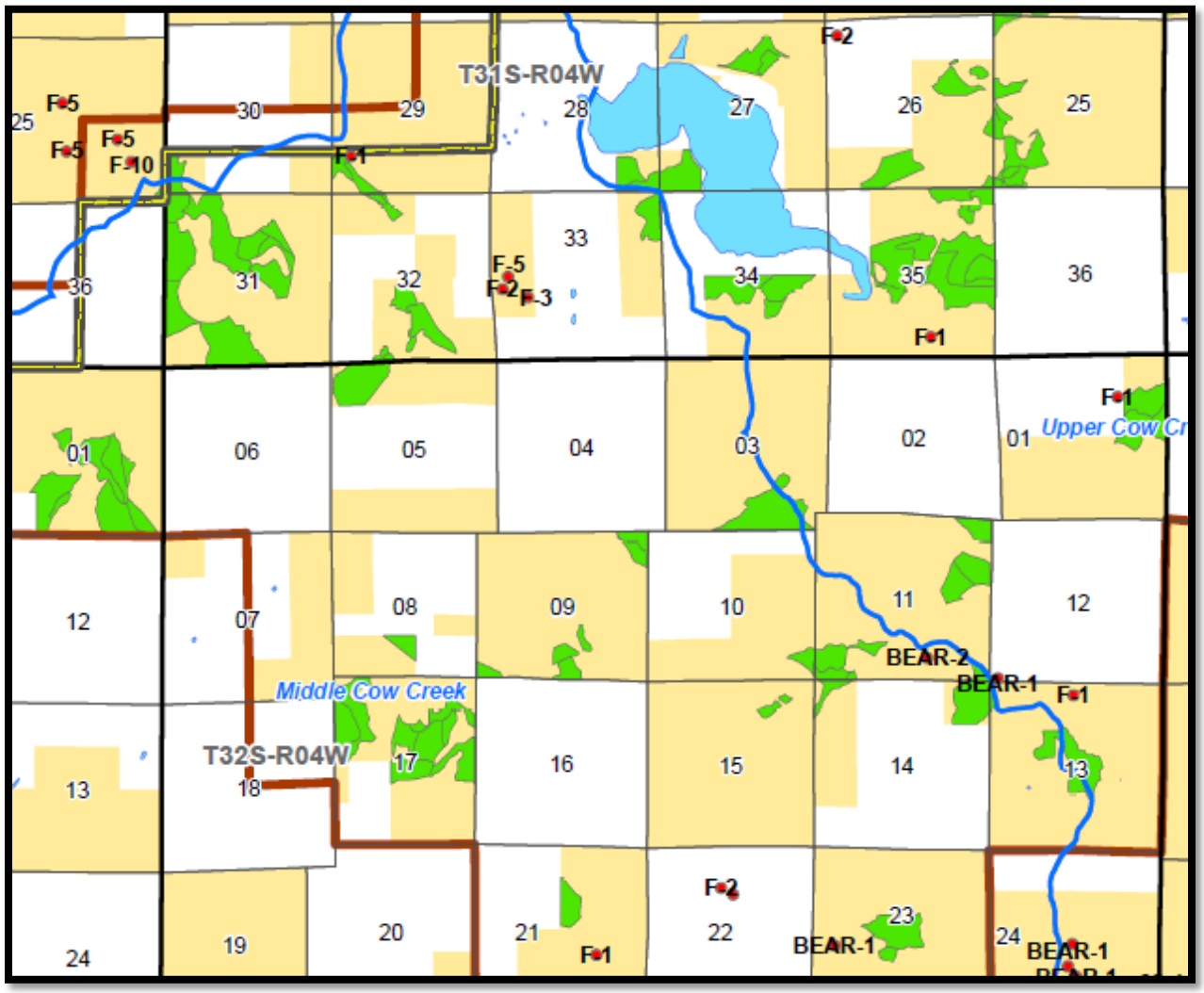

Table G-2 Tree Vigor Rating Index Thresholds (adapted from Waring and Pitman 1985, Christiansen et al. 1987, and Larsson et al. 1983)

Grams of stem growth per meter squared per year (g/m²/yr)	Effect of Bark Beetle Attack on Trees
< 30	Would succumb to attack of relatively low intensity
30-70	Can withstand progressively higher attacks but are still in danger of mortality
70-100	Can generally survive one or more years of relatively heavy attacks
> 100	Can emit sufficient oleoresins to repel invading beetles and survive even relatively heavy insect attacks

> 150	Can open the stand to sucking insects, such as aphids, who take advantage of free sugars and low tannin or other defensive compounds

Desired Condition

Future conditions rely on the implementation of the Medford District RMP which envisions enhancing, restoring, or maintaining the ecological health of the environment while providing a sustainable production of natural resources. The Upper Cow Project landscape objectives involve maintaining or restoring healthy, functioning ecosystems, ecological processes, and functions on both temporal and spatial scales. Ecological processes such as disturbance regimes define the temporal scale whereas the ecological unit of the landscape or ecosystem defines the spatial scale.

Disturbance regimes such as fire thinned forests and kept stand and landscape densities low, providing vigorous growing conditions of individual trees and maintained fire resiliency across the landscape. A desired condition to restore and enhance species diversity on both the landscape and stand level scale include increasing the proportion of fire-resilient ponderosa pine, oak species (excluding tanoak), incense cedar, and stimulate early seral shrub development. This would be accomplished by utilizing disturbance-based forestry that reduces Douglas-fir. Early seral vegetation resulted from more frequent historic fire disturbances and low-severity density reduction events. The effects of these disturbances can be achieved through silvicultural intervention to restore the function and process of the ecosystem.

Ecosystem Management Treatments

Ecosystem management as part of an integrated vegetation management strategy applies the principles of ecological forestry to restore, enhance, and maintain sustainable natural systems and functional ecological processes and components in the ecosystem across both spatial and temporal scales. The desired future condition is to maintain a sustainable fire-resilient system and to provide a sustainable production of natural resources.

- Composition: an increased proportion of fire-resilient species, including hardwoods, to Douglas-fir incorporating untreated patches and small disturbance-based gaps across the landscape to enhance species diversity and encourage understory development is a desired future condition.

- Structure: complex forest structure defines the desired outcome within LSRs. Restoring structural heterogeneity on the stand and landscape level is another desired condition that benefits late-successional species and encourages structural diversity.

- Function: how response and adaptation of an ecosystem to its natural life cycles and disturbance regime defines the ecological function. Restoring an ecosystem to its natural fire adapted environment is desired. A fire-resilient landscape that restores ecological function and processes in the LSR is the desired outcome.

The Medford District RMP specifies that forests be managed toward a variety of structures, stands containing trees of varying age and size, and stands with an assortment of canopy configurations. Over time, stands should be managed for a balance of seral stages.

Basic Prescription and Guidelines

- Reduce stand density to increase long-term tree growth, quality, and vigor of the remaining trees and increase resistance of landscape to fire, drought, and insects by reducing basal areas in overstocked stands.

- Provide and protect patches of ecological significance (seeps, rock outcrops, hardwood groves) and wildlife values (hiding cover, habitat, visual barriers).

- Create diversified stand structure (height, age, and diameter classes) to enhance structural complexity and composition which is the result of variability by utilizing skips, gaps, and clumps.

Silvicultural Design

Silvicultural actions utilize variable density thinning to accelerate the development of structural and species diversity, large trees, canopy gaps for spatial diversity and understory development, large snags, and down wood. The South Umpqua River/Galesville LSRA informs us that:

> Release can accelerate the growth of selected trees by reducing the effects of competition. This will shorten the period of time needed for the creation of large diameter trees, snags, and large down woody debris that are all key components of late-successional forests. The growth of desirable components of the stand would be ensured and would allow the site to be occupied by species appropriate to meet late-successional conditions. (BLM 1999b. pp.72-73)

Desirable hardwoods would be promoted as leave trees (oak trees 10 inches DBH and larger, madrone trees 16 inches DBH and larger with full live crown ratios of 30% or greater). Gaps (openings) would vary in size (1/4 to 3/4 acre) and constitute approximately 10-15% of the stand. Skips (untreated areas) of various sizes would likewise constitute approximately 10-15% of the stand. Trees retained within the Riparian Reserves can contribute to overall retention objectives (USFS/BLM 1994b).

An additional aim of treatment is to increase the proportion of fire-resilient early seral tree species and stimulate their proliferation by utilizing gaps around these ecological legacy components. Prescriptions would be modified where needed to retain additional canopy cover for the NSO. In addition, Standards and Guidelines on CWD, green tree, and snag retention require retaining both living and dead structural elements in harvest units (USFS/BLM 1994b). Snags and CWD would be retained in units within operational safety guidelines.

The Medford District RMP (1995) describes management actions/direction in Matrix (General Forest Management Areas) that leave a minimum of 120 linear feet of logs per acre ≥ to 16 inches in diameter and 16 feet long counting decay class 1 and 2 logs towards the total and reflecting the species mix of the original stand (USFS/BLM 1994b). All harvest units would meet these minimum retention requirements which includes the post-harvest residual structure required to make up the deficit of CWD and snag retention requirements. The LSRA (BLM 1999b) describes the importance

of down wood as a component of late successional forests. Harvest prescriptions would utilize unthinned patches to provide variability. In these untreated areas, suppression mortality will contribute to snags and down wood recruitment (BLM 1999b, p.75). In thinned areas lacking sufficient down wood, the levels required can be added within 5 years of thinning (BLM 1999b, p.75). In addition, the stand could be underplanted to ensure that understory development of desired species occurs. These criteria would be assessed post-harvest.

All units would receive post-harvest activity fuels treatments to reduce potential increases in fuel hazard due to the buildup of harvest generated slash and residual small high density trees. These fuels treatments could include lop and scatter, slashing, hand piling, hand pile burning and/or biomass removal. Underburning of treatment areas could take place up to 10 years after treatment to maintain stand characteristics.

Non-commercial Treatments
Basic Prescription and Guidelines

- Reduce understory stand densities to reduce fuel continuity.
- Enhance understory vigor and productivity by removing competing vegetation from desirable species.
- Plant desirable species where species diversity and/or regeneration is lacking (e.g. ponderosa pine, incense cedar, etc.).

Understory Reduction
Units: 17-1, 17-1A, 17-1D, 17-1E, 19-23, 19-4A, 25-1A, 25-4A, 26-3A, 27-11, 28-1, 28-6, 31-2NW, 31-2S, 3-1A, 35-1, 35-15A, 35-5A, and 35-7

The fuel loads of these units present a risk to habitat loss and suppression control in the event of a wildfire. Densities can be as high as 10,000 understory trees per acre, often higher in clumps. Hand piling and burning to reduce the fire hazard is typically applied to reduce fuels.

This treatment consists of reducing the understory (vegetation less than 8 inches diameter) with chainsaws and disposing of the material by hand-piling and burning or use of a lop and scatter method in lighter fuels. Long term risk would be lowered by reducing densities, favoring fire resistant species as residuals, and breaking up the fuel continuity. Benefits of understory reduction include increased residual tree growth and vigor that helps shift the landscape from a fire-intolerant system to a more fire-resilient ecosystem that can develop into high value late successional habitat.

- Fire resilient species would be favored as residuals and include:

Conifers	Hardwoods
1. Ponderosa pine	1. White oak
2. Incense cedar	2. Black oak
3. Sugar pine	3. Canyon live oak
4. Douglas-fir	4. Pacific dogwood

5. Western hemlock	5. Golden chinquapin
6. White fir	6. Pacific madrone

Understory removal to create gaps may be incorporated into fuels reduction treatments to protect and release legacy pine and cedar in stands of all ages. Removing understory vegetation (< 8 inch DBH) at a 1/4 to 3/4 acre in size (50 to 100 foot radius) would allow these areas to be planted with fire resilient species or naturally regenerated with shrubs, an important successional component in the ecosystem.

> In stands over 80 years old, where ponderosa pine are dominant in the overstory, the density of understory vegetation within a 30-100 foot radius of the overstory pine would be reduced to allow for the initiation of ponderosa pine regeneration by either planting or natural seeding. (BLM 2005. p.102)

Commercial Treatments

Density Management

Units: 17-1B, 26-1B, 11-1, 11-26, 11-34, 11-6, 14-3, 15-19, 19-4, 21-2, 23-8, 25-37, 26-3, 3-1, 34-1, 35-1B, 35-5, and 9-24

Some stands greater than 80 years of age have similar stand conditions described in the LSRA for the mid-seral stands (single canopied, low within stand diversity) and should be considered potential treatment units (BLM 1999b, p.77). These stands (listed in Table 1) lack functionality for late-successional related species which is more important than age of the stand and would continue in this condition for a long period with the lack of disturbance (BLM 1999b, p.77). The Upper Cow Creek Watershed Analysis points out that:

> Late successional forests are also defined by forest composition and structure, not just stand age class or size of trees. Some of these features are "large standing dead trees, large accumulations of fallen tree boles, and small- and intermediate-sized shade tolerant trees are also important components of late successional forests. These components and other characteristics combine to produce unique habitat and influence ecosystem processes. (BLM 2005, p.49)

Density Management/Understory Reduction

Units 13-37, 31-3, and 33-4

These stands are in similar condition and age as the previous category with a need for understory density reduction to reduce risk of habitat loss to fire.

Legacy Tree Culturing

Units: 35-1F, 25-1B, 26-1B, and 32-7N

These stands are in the 80-110 ten-year age class. Treatments would reduce Douglas-fir around singular legacy pine species and incense cedar that represent fire-resilient dominant old growth

structural components on the landscape. Understory reduction is included in Unit 35-1F to reduce risk from wildfire.

Restoration Thinning
Units: 1-1, 1-1B, 26-1, 32-7S, and 35-15

These sites contain a significant component of ponderosa pine, sugar pine, and/or incense cedar which indicate its appropriateness for the site conditions. These species greatly contribute to landscape species diversity. The managed stand layer ranges in age from 60-70 years. Unit 32-7S (3 acres) is a 120 year old stand along a dry ridgeline with pine beetles attacking and killing legacy ponderosa pine (Figure 5). California black oak is also at risk of competition mortality from Douglas-fir (Figure 6). Treatments would reduce Douglas-fir to favor these valued fire-resilient species, thereby restoring the site to densities tailored to the historic vegetation class.

Restoration Thinning/Understory Reduction
Units: 23-7SA, 21-12, and 9-1

These units are in the same condition class as the previous prescription category except that excessive understory densities present a risk of losing valued habitat to fire. Understory reduction reduces densities to ameliorate this risk. The managed stand layer ranges in age from 50-70 years.

Riparian Thinning
Units: 1-2, 1-8, 5-4, 9-1, 9-22, 9-26, 17-1C, 21-12, 23-1, 23-10, 23-3N, 24-1, 27-4N, 27-4S, 31-2, 31-2W, 32-12, 32-4, and 35-5

These stands exhibit slightly, sometimes drastically elevated densities in riparian zones while still exhibiting upland forest conditions. Ecological Protection Zones (EPZ) are modified riparian buffers. Areas between riparian zone boundary and EPZ boundary function more as upland forest ecology than by a riparian function.

EPZ recommendations apply treatments in modified riparian zones because these upland areas currently demonstrate a need for restoration. By applying EPZ boundaries, restoration treatments would be accomplished that would meet ACS objectives and benefit the ecological functions and processes of the stand. Stream surveys were conducted to determine extent and site specific operational EPZ widths.

Variable Density Thinning
Units 1-2, 23-6N, 25-12, 25-37, 25-7, 19-3, 19-9, 23-1, 23-2, 23-2B, 23-3N, 24-1, 24-3, 26-1B, 27-12, 30-2, 31-2, 31-6, 32-12, 32-4, 35-2, 35-3, 11-25, 11-6, 13-4, 17-4, 19-3, 29-1, 35-1B, 35-5, 8-6, and 9-22

Variable density thinning (VDT) is proposed in stands from 30-80 years in age. These stands are primarily even aged, overstocked, single storied plantations or even-aged and single storied 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 variety of stand densities for development

into late-successional conditions (BLM 1999b, p.75). A lower stand density reduces competition, accelerating the growth of leave trees, thereby shortening the period of time needed to attain large woody structure associated with late-successional forests.

Variable Density Thinning/Understory Reduction
Units 17-1C, 23-10, 27-4S, 31-2W, 31-3, 32-12, 5-4, 9-19, and 9-26

These stands are in the same condition as the previous category. The stand ages range from 50-70 years. The understories exhibit densities that warrant density reduction treatment. Understory reduction is prescribed to reduce the risk of habitat loss to fire, enhance structural and species diversity, and accelerate diameter growth for residual trees that develop into large woody structure desired in late-successional forests.

Table G-3 Short Term Vegetation Effects (0-10 years) of Alternatives 2 & 3

Stand Condition	**Alternatives 2 and 3**			
	Restoration Thinning	**Legacy Tree Culturing**	**Density Management and Variable Density Thinning**	**Understory Reduction**
Vigor of Residual Trees	No change/decrease (in skips) to slight increase	Increase	Slight change (in 60%+ canopy retention units)/Increase (in 40%+ canopy retention units)	Slight change to increase
Growth Rate	No change/decrease (in skips) to slight increase	Increase	Slight change (60%+ canopy retention)/Increase (40%+ canopy retention)	Slight change to increase
Live Crown Ratio	No change/decrease (in skips) to no change/slight increase	Increase	Slight change (60%)/Increase (40%)	Slight change to increase
Species Diversity	Increase on stand and landscape scale	Increase on stand and landscape scale	Slight increase (60%)/Increase on stand and landscape scale (40%)	Increase on stand and landscape scale
Shrubs/Brush/ Forbs	Decrease (in skips) to increase as more light gets to the understory	Increase	No change (60%)/Increase (40%)	No change to increase
Snags	No change to slight increase (sm-dia in skips) to no change	No change	No change	No change
Coarse Woody Debris	No change to slight increase (sm-dia.in skips) to no change	No change	No change	No change
Branching	Continued loss of lower limbs (in skips) to slight increase	Increase	Slight change (60%)/Increase (40%)	Retention of lower limbs and lateral expansion
Windthrow Hazard	No change to slight increase/increase along ridges	Slight increase	No change (60%)/slight increase (40%)/Increase in larger gaps	No change to slight decrease
Ability to Respond to Environmental Changes	No change to increase	Increase	Decrease (60%)/Increase (40%)	Increase
Rate of Development	Increase	Increase	No change (60%)/Increase (40%)	Increase

Stand Condition	Alternatives 2 and 3			
	Restoration Thinning	**Legacy Tree Culturing**	**Density Management and Variable Density Thinning**	**Understory Reduction**
of Older Forest Characteristics				

Table G-4 Long Term Vegetation Effects (11+ years) of Alternatives 2 & 3

Stand Condition	Alternatives 2 and 3			
	Restoration Thinning	**Legacy Tree Culturing**	**Density Management and Variable Density Thinning**	**Understory Reduction**
Vigor of Residual Trees	Increase to gradual leveling	Increase with continued response to growing space	Decrease (60%)/Increase to gradual settle (40%)	Increase
Growth Rate	Increase	Increase with continued response to growing space	Decrease (60%)/Increase to gradual settle (40%)	Increase
Live Crown Ratio	Increase	Increase with continued response to growing space	No change (60%)/Increase (40%)	Increase
Species Diversity	Increase on stand and landscape scale	Increase on stand and landscape scale	No change (60%)/Increase on stand and landscape scale (40%)	Increase on stand and landscape scale
Shrubs/Brush/ Forbs	Increase to gradual settle	Decrease to no change	Decrease (60%)/Increase to gradual settle (40%)	Increase then decrease as canopy closes
Snags	Decrease in numbers, increase in size	No change to slight increase due to mortality as crowns close, smaller dia.	Increase in numbers, decrease in size (60%)/Decrease in numbers, increase in size (40%)	Decrease in numbers, increase in size
Coarse Woody Debris	Decrease in numbers, increase in size	No change to slight increase, small dia.	Increase in numbers, decrease in size (60%)/Decrease in numbers, increase in size (40%)	Decrease in numbers, increase in size
Branching	Retention of lower limbs until canopy closes, development /retention of large & epicormic branches	Development /retention of large & epicormic branches	Diminishing (60%) / Retention of limbs present, possible development of large branches currently present (40%)	Retention of lower limbs until canopy closes, some development /retention of large branches
Windthrow Hazard	Decrease	No change	Decrease	Decrease
Ability to Respond to Environmental Changes	Increase	Increase	Decrease (60%)/Increase (40%)	Increase
Rate of Development of Older Forest Characteristics	Increase	Increase	Increase to gradual settle (60%)/Increase (40%)	Increase

Appendix H Road Work and Use

Road Work Activities	Road Number/Unit Access	Surface Type	All Weather Surfacing Present	Alt 2 Miles	Alt 2 Season of Use	Alt 3 Miles	Alt 3 Season of Use
New Temporary Route Construction (Fully Decommission after use*: Block, rip, water bar, seed and mulch)	Unit 1-1	Natural	No	0.03	Dry Condition	0.03	Dry Season
	Unit 3-1	Natural	No	0.008	Dry Condition	0	Dry Season
	Unit 11-1	Natural	No	0.07	Dry Condition	0	Dry Season
	Unit 11-26	Natural	No	0.04 0.01	Dry Condition	0	Dry Season
	Unit 26-1B	Natural	No	0.14 0.03	Dry Condition	0.14 0.03	Dry Season
	Unit 27-4S	Natural	No	0.04	Dry Condition	0.04	Dry Season
	Unit 33-4	Natural	No	0.11	Dry Condition	0	Dry Season
	Unit 35-2	Natural	No	0.05	Dry Condition	0.05	Dry Season
Existing Temporary Route Renovation / Reconstruction (Fully Decommission after use*: Block, rip, water bar, seed and mulch)	Unit 1-2	Natural	No No	0.41 0.02	Dry Condition	0.41 0.02	Dry Season
	Unit 11-1	Natural	No	0.05	Dry Condition	0	Dry Season
	Unit 11-25	Natural	No	0.04	Dry Condition	0.04	Dry Season
	Unit 26-1B	Natural	No	0.12	Dry Condition	0.12	Dry Season
	Unit 27-4S	Natural	No	0.15	Dry Condition	0.15	Dry Season
	Unit 27-12	Natural	No	0.10	Dry Condition	0.10	Dry Season
	Unit 33-4	Natural	No	0.13	Dry Condition	0	Dry Season
	Unit 35-3	Natural	No	0.58	Dry Condition	0.58	Dry Season
Maintenance & Haul	31-3-19.4	Aggregate	Yes	0.32	Dry Condition	0.32	Dry Condition
	31-3-19.5	Aggregate	Yes	0.14	Dry Condition	0.14	Dry Condition
	31-3-19.6	Aggregate	Yes	0.12	Dry Condition	0.00	Dry Condition
	31-3-31.0	Aggregate	Yes	1.81	Dry Condition	1.81	Dry Condition
	31-4-14.0	Aggregate	Yes	0.51	Dry Condition	0.51	Dry Condition
	31-4-19.7	Aggregate	Yes	0.15	Dry Condition	0.15	Dry Condition
	31-4-21.5	Aggregate	Yes	0.06	Dry Condition	0.06	Dry Condition

Road Work Activities	Road Number/Unit Access	Surface Type	All Weather Surfacing Present	Alt 2 Miles	Alt 2 Season of Use	Alt 3 Miles	Alt 3 Season of Use
	31-4-23.1	Aggregate	Yes	0.30	Dry Condition	0.30	Dry Condition
	31-4-23.2	Aggregate	Yes	0.07	Dry Condition	0.07	Dry Condition
	31-4-23.3	Aggregate	Yes	0.27	Dry Condition	0.27	Dry Condition
	31-4-23.3 Spur	Natural	No	0.11	Dry Condition	0.11	Dry Season
	31-4-24.2	Aggregate	Yes	0.40	Dry Condition	0.40	Dry Condition
	31-4-24-Spur	Aggregate	Yes	0.05	Dry Condition	0.05	Dry Condition
	31-4-25.0	Aggregate	Yes	2.03	Dry Condition	2.03	Dry Condition
	31-4-25.0 Spur	Aggregate	Yes	0.03	Dry Condition	0.03	Dry Condition
	31-4-25.2	Aggregate	Yes	1.91	Dry Condition	1.91	Dry Condition
	31-4-25.5	Natural	No	0.49	Dry Condition	0.49	Dry Season
	31-4-26.0	Natural	No	0.22	Dry Condition	0.00	Dry Season
	31-4-27.0	Aggregate	Yes	4.49	Dry Condition	4.49	Dry Condition
	31-4-27.0 Spur	Aggregate	Yes	0.26	Dry Condition	0.26	Dry Condition
	31-4-27.4	Aggregate	Yes	0.05	Dry Condition	0.05	Dry Condition
	31-4-27.6	Natural	No	0.10	Dry Condition	0.10	Dry Season
	31-4-30.0	Natural	No	0.43	Dry Condition	0.43	Dry Season
	31-4-31.0	Aggregate	Yes	0.79	Dry Condition	0.79	Dry Condition
	31-4-32.0	Aggregate	Yes	0.91	Dry Condition	0.91	Dry Condition
	31-4-34.0	Aggregate	Yes	1.56	Dry Condition	1.56	Dry Condition
	31-4-34.3	Aggregate	Yes	0.13	Dry Condition	0.13	Dry Condition
	31-4-34.4	Aggregate	Yes	0.11	Dry Condition	0.11	Dry Condition
	31-4-35.4 Spur	Aggregate	Yes	0.07	Dry Condition	0.07	Dry Condition

Road Work Activities	Road Number/Unit Access	Surface Type	All Weather Surfacing Present	Alt 2 Miles	Alt 2 Season of Use	Alt 3 Miles	Alt 3 Season of Use
	31-4-35.5 Spur	Aggregate	Yes	0.05	Dry Condition	0.05	Dry Condition
	31-4-36.0	Aggregate	Yes	0.16	Dry Condition	0.16	Dry Condition
	31-5-35.0	Aggregate	Yes	0.78	Dry Condition	0.78	Dry Condition
	31-5-35.0	Natural	No	0.39	Dry Condition	0.39	Dry Season
	31-5-35.0	Natural	No	1.13	Dry Condition	0.00	Dry Season
	31-5-35.0	Aggregate	Yes	0.21	Dry Condition	0.00	Dry Condition
	31-5-35.0	Natural	No	0.80	Dry Condition	0.00	Dry Season
	32-4-1.0	Natural	No	1.84	Dry Condition	1.84	Dry Season
	32-4-1.0	Aggregate	Yes	0.14	Dry Condition	0.14	Dry Condition
	32-4-1.3	Natural	No	0.28	Dry Condition	0.28	Dry Season
	32-4-1.4	Natural	No	0.42	Dry Condition	0.42	Dry Season
	32-4-1.5	Natural	No	0.02	Dry Condition	0.02	Dry Season
	32-4-11.0	Natural	No	0.98	Dry Condition	0.98	Dry Season
	32-4-11.3	Aggregate	Yes	0.16	Dry Condition	0.16	Dry Condition
	32-4-11.5	Aggregate	Yes	1.37	Dry Condition	0.85	Dry Condition
	32-4-12.4	Aggregate	Yes	0.01	Dry Condition	0.00	Dry Condition
	32-4-13.0	Aggregate	Yes	0.73	Dry Condition	0.73	Dry Condition
	32-4-13.2	Aggregate	Yes	0.97	Dry Condition	0.27	Dry Condition
	32-4-13.3	Aggregate	Yes	0.15	Dry Condition	0.15	Dry Condition
	32-4-13.4	Aggregate	Yes	0.39	Dry Condition	0.04	Dry Condition
	32-4-15.0	Aggregate	Yes	1.18	Dry Condition	1.18	Dry Condition
	32-4-17.0	Aggregate	Yes	0.55	Dry Condition	0.55	Dry Condition

Road Work Activities	Road Number/Unit Access	Surface Type	All Weather Surfacing Present	Alt 2 Miles	Alt 2 Season of Use	Alt 3 Miles	Alt 3 Season of Use
	32-4-17.2	Aggregate	Yes	0.61	Dry Condition	0.61	Dry Condition
	32-4-17.3	Aggregate	Yes	0.27	Dry Condition	0.00	Dry Condition
	32-4-2.0	Aggregate	Yes	1.77	Dry Condition	1.77	Dry Condition
	32-4-20.1	Aggregate	Yes	1.63	Dry Condition	1.63	Dry Condition
	32-4-22.0	Aggregate	Yes	1.58	Dry Condition	1.23	Dry Condition
	32-4-23.0	Aggregate	Yes	0.41	Dry Condition	0.41	Dry Condition
	32-4-27.3	Aggregate	Yes	0.19	Dry Condition	0.19	Dry Condition
	32-4-3.0	Aggregate	Yes	1.61	Dry Condition	0.70	Dry Condition
	32-4-3.1	Aggregate	Yes	0.45	Dry Condition	0.45	Dry Condition
	32-4-3.4	Aggregate	Yes	0.70	Dry Condition	0.00	Dry Condition
	32-4-3.4 Spur	Natural	No	0.02	Dry Condition	0.02	Dry Season
	32-4-4.0	Aggregate	Yes	3.20	Dry Condition	3.20	Dry Condition
	32-4-6.0	Aggregate	Yes	4.86	Dry Condition	4.86	Dry Condition
	32-4-6.1	Aggregate	Yes	0.07	Dry Condition	0.07	Dry Condition
	32-4-7.2	Aggregate	Yes	5.68	Dry Condition	5.68	Dry Condition
	32-4-7.3	Aggregate	Yes	2.54	Dry Condition	2.54	Dry Condition
	32-4-8.1	Aggregate	Yes	0.86	Dry Condition	0.86	Dry Condition
	32-4-9.0	Aggregate	Yes	5.45	Dry Condition	5.45	Dry Condition
	32-4-9.3	Aggregate	Yes	0.70	Dry Condition	0.70	Dry Condition
	32-5-1.0	Aggregate	Yes	0.19	Dry Condition	0.19	Dry Condition

Appendix I Unit Table

♦For a description of the Silvicultural Prescription (RX) associated with Alternatives 2 and 3; see Chapter 2 of the EA and Appendix G: Silvicultural Prescriptions.
†Harvest systems – Ground based (GB), Cable (C), Helicopter (H)
*****Format (Number – Feature – Buffer Distance). Riparian Reserves (RR) widths are determined based on a 200 foot site potential tree for the Upper Cow watershed. Intermittent (I) and perennial streams with no known fish potential (PNF) have a one-tree 200 foot buffer. Perennial fish (PF) bearing streams are assigned a two-tree 400 foot buffer. Ecological Protection Zone (EPZ) to protect stream banks from erosion along intermittent streams, with a 35 or 60 foot buffer depending on field surveys. Perennial streams with no know fish potential have an 85 foot EPZ to protect the primary shade zone and provide an undisturbed vegetation buffer for reducing sedimentation and increase infiltration near the streams. Perennial streams with fish have a 120 foot buffer to allow for the recruitment of large woody debris and protect fish habitat. Springs and seeps (S) have a 25 foot buffer.

Township Range Section	Unit Number	Age	Acres	Alternative 2 Rx♦	Harvest system†	Alternative 3 Rx♦	Harvest system †	NSO Habitat Type	Riparian Reserve Acres	Ecological Protection Zones*
T32S-R05W-01	1-1	70	48	RT - 40	GB(10) C(38)	RT - 40	GB(10) C(38)	Foraging/ Dispersal	0	No RR in Unit
T32S-R04W-11	11-1	80/90	21	DM - 60	C(9) H(12)	No Treatment		Foraging	5	1 – PF – 120ft 2 - I - 35ft 1 – S – 25ft
T32S-R04W-11	11-25	60	5	VDT - 60	C(5)	VDT - 60	C(5)	Foraging	1	1 - I - 35ft
T32S-R04W-11 T32S-R04W-13 T32S-R04W-14	11-26	80	20	DM- 60	C(20)	No Treatment		Foraging	0	No RR in Unit
T32S-R04W-11 T32S-R04W-14	11-34	80/90	2	DM - 60	C(2)	No Treatment		Foraging	1	1 - I - 35ft

♦For a description of the Silvicultural Prescription (RX) associated with Alternatives 2 and 3; see Chapter 2 of the EA and Appendix G: Silvicultural Prescriptions.
†Harvest systems – Ground based (GB), Cable (C), Helicopter (H)
*****Format (Number – Feature – Buffer Distance). Riparian Reserves (RR) widths are determined based on a 200 foot site potential tree for the Upper Cow watershed. Intermittent (I) and perennial streams with no known fish potential (PNF) have a one-tree 200 foot buffer. Perennial fish (PF) bearing streams are assigned a two-tree 400 foot buffer. Ecological Protection Zone (EPZ) to protect stream banks from erosion along intermittent streams, with a 35 or 60 foot buffer depending on field surveys. Perennial streams with no know fish potential have an 85 foot EPZ to protect the primary shade zone and provide an undisturbed vegetation buffer for reducing sedimentation and increase infiltration near the streams. Perennial streams with fish have a 120 foot buffer to allow for the recruitment of large woody debris and protect fish habitat. Springs and seeps (S) have a 25 foot buffer.

Township Range Section	Unit Number	Age	Acres	Alternative 2 Rx♦	Harvest system†	Alternative 3 Rx♦	Harvest system †	NSO Habitat Type	Riparian Reserve Acres	Ecological Protection Zones*
T32S-R04W-10 T32S-R04W-11 T32S-R04W-14	11-6	60/70	24	VDT - 60	GB(4) H(35)	VDT - 60	H(32)	Foraging	0	No RR in Unit
		70 – 8 acres 80 – 7 acres	15	DM - 60		DM - 60 (8 acres)			0	No RR in Unit
T32S-R05W-01	1-1B	70	44	RT - 40	GB(3) C(41)	RT - 40	GB(3) C(41)	Dispersal	1	1 - I - 35ft
T32S-R04W-01	1-2	30/40	44	VDT - 30	C(44)	VDT - 30	C(44)	Dispersal	9	4 - PNF-85ft 2 – I – 60ft 4 – S – 25ft
T32S-R04W-13	13-37	80	26	DM/UR - 60	GB(26)	UR - 60		Foraging	1	1 - I - 35ft 1 – S – 25ft
T32S-R04W-13	13-4	70	18	VDT - 60	GB(18)	VDT - 60	GB(18)	Foraging	0	1 – S – 25ft

♦For a description of the Silvicultural Prescription (RX) associated with Alternatives 2 and 3; see Chapter 2 of the EA and Appendix G: Silvicultural Prescriptions.
†Harvest systems – Ground based (GB), Cable (C), Helicopter (H)
*****Format (Number – Feature – Buffer Distance). Riparian Reserves (RR) widths are determined based on a 200 foot site potential tree for the Upper Cow watershed. Intermittent (I) and perennial streams with no known fish potential (PNF) have a one-tree 200 foot buffer. Perennial fish (PF) bearing streams are assigned a two-tree 400 foot buffer. Ecological Protection Zone (EPZ) to protect stream banks from erosion along intermittent streams, with a 35 or 60 foot buffer depending on field surveys. Perennial streams with no know fish potential have an 85 foot EPZ to protect the primary shade zone and provide an undisturbed vegetation buffer for reducing sedimentation and increase infiltration near the streams. Perennial streams with fish have a 120 foot buffer to allow for the recruitment of large woody debris and protect fish habitat. Springs and seeps (S) have a 25 foot buffer.

Township Range Section	Unit Number	Age	Acres	Alternative 2 Rx♦	Harvest system†	Alternative 3 Rx♦	Harvest system †	NSO Habitat Type	Riparian Reserve Acres	Ecological Protection Zones*
T32S-R04W-11 T32S-R04W-14	14-3	80	10	DM - 60	C(10)	No Treatment		Foraging	0	No RR in Unit
T32S-R04W-15	15-19	80	6	DM - 60	H(6)	No Treatment		Foraging	0	No RR in Unit
T32S-R04W-17	17-1	110	21	UR		UR		Foraging	2	1 – PF – 120ft 2 – S – 25ft
T32S-R04W-17	17-1A	100	30	UR		UR		Foraging	6	2 – PNF – 85ft 3 – I – 35ft
T32S-R04W-17	17-1B	80	12	DM - 40	GB(9) C(3)	No Treatment		Dispersal	0	No RR in Unit
T32S-R04W-17	17-1C	70	16	VDT/UR - 40	GB(12) C(4)	VDT/UR - 40	GB(12) C(4)	Dispersal	5	3 – PNF – 85ft 1 – I – 35ft 1 – S – 25ft
T32S-R04W-17	17-1D	90	35	UR		UR		Foraging	13	2 – PNF – 85ft

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†Harvest systems – Ground based (GB), Cable (C), Helicopter (H)
*****Format (Number – Feature – Buffer Distance). Riparian Reserves (RR) widths are determined based on a 200 foot site potential tree for the Upper Cow watershed. Intermittent (I) and perennial streams with no known fish potential (PNF) have a one-tree 200 foot buffer. Perennial fish (PF) bearing streams are assigned a two-tree 400 foot buffer. Ecological Protection Zone (EPZ) to protect stream banks from erosion along intermittent streams, with a 35 or 60 foot buffer depending on field surveys. Perennial streams with no know fish potential have an 85 foot EPZ to protect the primary shade zone and provide an undisturbed vegetation buffer for reducing sedimentation and increase infiltration near the streams. Perennial streams with fish have a 120 foot buffer to allow for the recruitment of large woody debris and protect fish habitat. Springs and seeps (S) have a 25 foot buffer.

Township Range Section	Unit Number	Age	Acres	Alternative 2 Rx♦	Harvest system†	Alternative 3 Rx♦	Harvest system †	NSO Habitat Type	Riparian Reserve Acres	Ecological Protection Zones*
										2 – I – 35ft
T32S-R04W-17	17-1E	50	6	UR		UR		Foraging	5	2 – PNF – 85ft
T32S-R04W-17	17-4	60	20	VDT - 60	GB(8) C(12)	VDT - 60	GB(8) C(12)	Foraging	2	2 – I – 35ft
T31S-R03W-19	19-3	40	17	VDT 40	GB(3) C(17)	VDT - 40	GB(3) C(17)	Dispersal	2	1 – PF – 120ft 1 – PNF – 85ft
		70	3	VDT - 60		VDT - 60		Foraging		
T31S-R03W-19	19-4	70	4	DM – 60	C(4)	DM - 60	C(4)	Foraging	0	No RR in Unit
T31S-R03W-19	19-4A	100	4	UR		No Treatment		Foraging	0	No RR in Unit
T31S-R03W-19	19-9	40	15	VDT - 40	GB(14) C(1)	VDT - 40	GB(14) C(1)	Dispersal	0	No RR in Unit 1 – S – 25ft

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†Harvest systems – Ground based (GB), Cable (C), Helicopter (H)
*****Format (Number – Feature – Buffer Distance). Riparian Reserves (RR) widths are determined based on a 200 foot site potential tree for the Upper Cow watershed. Intermittent (I) and perennial streams with no known fish potential (PNF) have a one-tree 200 foot buffer. Perennial fish (PF) bearing streams are assigned a two-tree 400 foot buffer. Ecological Protection Zone (EPZ) to protect stream banks from erosion along intermittent streams, with a 35 or 60 foot buffer depending on field surveys. Perennial streams with no know fish potential have an 85 foot EPZ to protect the primary shade zone and provide an undisturbed vegetation buffer for reducing sedimentation and increase infiltration near the streams. Perennial streams with fish have a 120 foot buffer to allow for the recruitment of large woody debris and protect fish habitat. Springs and seeps (S) have a 25 foot buffer.

Township Range Section	Unit Number	Age	Acres	Alternative 2 Rx♦	Harvest system†	Alternative 3 Rx♦	Harvest system †	NSO Habitat Type	Riparian Reserve Acres	Ecological Protection Zones*
T31S-R04W-21	21-12	60	11	RT/UR 60	GB(11)	RT/UR 60	GB(11)	Foraging	7	1 – PF – 120ft 3 – PNF – 85ft
T31S-R04W-21	21-2	110	8	DM - 60	C(8)	No Treatment		Foraging	0	2 – S – 25ft
T31S-R04W-23 T31S-R04W-24	23-1	40/60	16	VDT - 40	C(16)	VDT - 40	C(16)	Dispersal	9	5 – PNF – 85ft 4 – I – 60ft 1 – S – 25ft
T32S-R04W-23	23-10	50	21	VDT/UR - 40	H(21)	VDT/UR - 40	H(21)	Dispersal	17	1 – PF – 120ft
T31S-R04W-23	23-2	50	10	VDT - 40	C(10)	VDT - 40	C(10)	Dispersal	0	No RR in Unit
T31S-R04W-23	23-2B	60	8	VDT - 40	GB(2) C(6)	VDT - 40	GB(2) C(6)	Dispersal	0	No RR in Unit
T31S-R04W-23	23-3N	40	19	VDT - 40	C(19)	VDT - 40	C(19)	Dispersal	8	1 – PF – 120ft

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†Harvest systems – Ground based (GB), Cable (C), Helicopter (H)
*****Format (Number – Feature – Buffer Distance). Riparian Reserves (RR) widths are determined based on a 200 foot site potential tree for the Upper Cow watershed. Intermittent (I) and perennial streams with no known fish potential (PNF) have a one-tree 200 foot buffer. Perennial fish (PF) bearing streams are assigned a two-tree 400 foot buffer. Ecological Protection Zone (EPZ) to protect stream banks from erosion along intermittent streams, with a 35 or 60 foot buffer depending on field surveys. Perennial streams with no know fish potential have an 85 foot EPZ to protect the primary shade zone and provide an undisturbed vegetation buffer for reducing sedimentation and increase infiltration near the streams. Perennial streams with fish have a 120 foot buffer to allow for the recruitment of large woody debris and protect fish habitat. Springs and seeps (S) have a 25 foot buffer.

Township Range Section	Unit Number	Age	Acres	Alternative 2 Rx♦	Harvest system†	Alternative 3 Rx♦	Harvest system †	NSO Habitat Type	Riparian Reserve Acres	Ecological Protection Zones*
										4 – PNF – 85ft 3 – I – 35ft 1 – S – 25ft
T31S-R04W-23	23-6N	60	3	VDT - 30	C(3)	VDT - 30	C(3)	Dispersal	0	No RR in Unit
T32S-R04W-23	23-7SA	50	3	RT/UR - 40	GB(3)	RT/UR - 40	GB(3)	Dispersal	1	1 – PF – 120ft
T32S-R04W-23	23-8	80	5	DM -60	C(5)	No Treatment		Foraging	4	3 – PNF – 85ft 4 – I – 35ft
T31S-R04W-24	24-1	40/60	85	VDT - 40	C(14) H(71)	VDT - 40	C(14) H(71)	Dispersal	3	1 – I – 60ft 1 – I – 35ft
T31S-R04W-24 T31S-R04W-25	24-3	60	12	VDT - 40	C(7) H(5)	VDT - 40	C(7) H(5)	Dispersal	3	2 – I – 35ft
T31S-R04W-25	25-12	30	20	VDT - 30	GB(2)	VDT - 30	GB(2)	Dispersal	2	1 – S – 25ft

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†Harvest systems – Ground based (GB), Cable (C), Helicopter (H)
*****Format (Number – Feature – Buffer Distance). Riparian Reserves (RR) widths are determined based on a 200 foot site potential tree for the Upper Cow watershed. Intermittent (I) and perennial streams with no known fish potential (PNF) have a one-tree 200 foot buffer. Perennial fish (PF) bearing streams are assigned a two-tree 400 foot buffer. Ecological Protection Zone (EPZ) to protect stream banks from erosion along intermittent streams, with a 35 or 60 foot buffer depending on field surveys. Perennial streams with no know fish potential have an 85 foot EPZ to protect the primary shade zone and provide an undisturbed vegetation buffer for reducing sedimentation and increase infiltration near the streams. Perennial streams with fish have a 120 foot buffer to allow for the recruitment of large woody debris and protect fish habitat. Springs and seeps (S) have a 25 foot buffer.

Township Range Section	Unit Number	Age	Acres	Alternative 2 Rx♦	Harvest system†	Alternative 3 Rx♦	Harvest system †	NSO Habitat Type	Riparian Reserve Acres	Ecological Protection Zones*
					C(18)		C(18)			
T31S-R04W-25	25-1B	100	4	LTC - 40	GB(4)	No Treatment		Dispersal	0	No RR in Unit
T31S-R04W-25 T31S-R04W-26	25-37	80	8	DM - 60	C(8)	No Treatment		Foraging	0	No RR in Unit
T31S-R04W-25	25-37	40	3	VDT - 30	GB(2) C(1)	VDT - 30	GB(2) C(1)	Dispersal	0	No RR in Unit
T31S-R04W-25	25-7	40	9	VDT - 30	C(9)	VDT - 30	C(9)	Dispersal	1	1 – I – 60ft
T31S-R04W-26	26-1	60	27	RT - 60	GB(27) H[1]	RT - 60	GB(27) H[1]	Foraging	3	2 – PNF – 85ft

1 Unit 26-1 will use ground based equipment to pre-bunch trees marked for removal. The trees will then be yarded to a landing with a helicopter. The 27 acres associated with unit 26-1 were analyzed as ground based harvesting.

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†Harvest systems – Ground based (GB), Cable (C), Helicopter (H)
*****Format (Number – Feature – Buffer Distance). Riparian Reserves (RR) widths are determined based on a 200 foot site potential tree for the Upper Cow watershed. Intermittent (I) and perennial streams with no known fish potential (PNF) have a one-tree 200 foot buffer. Perennial fish (PF) bearing streams are assigned a two-tree 400 foot buffer. Ecological Protection Zone (EPZ) to protect stream banks from erosion along intermittent streams, with a 35 or 60 foot buffer depending on field surveys. Perennial streams with no know fish potential have an 85 foot EPZ to protect the primary shade zone and provide an undisturbed vegetation buffer for reducing sedimentation and increase infiltration near the streams. Perennial streams with fish have a 120 foot buffer to allow for the recruitment of large woody debris and protect fish habitat. Springs and seeps (S) have a 25 foot buffer.

Township Range Section	Unit Number	Age	Acres	Alternative 2 Rx♦	Harvest system†	Alternative 3 Rx♦	Harvest system †	NSO Habitat Type	Riparian Reserve Acres	Ecological Protection Zones*
T31S-R04W-25 T31S-R04W-26 T31S-R04W-35	26-1B	60	5	VDT - 40	GB(6) C(12)	VDT - 40	C(5)	Foraging	0	No RR in Unit
		80/100	11	DM - 40		No Treatment		Foraging/ Dispersal	0	No RR in Unit
		100	2	LTC - 40		No Treatment		Dispersal	0	No RR in Unit
T31S-R04W-26	26-3	80	18	DM - 60	C(4) H(14)	No Treatment		Foraging	0	No RR in Unit
T31S-R04W-26	26-3A	70	5	UR		UR		Foraging	0	No RR in Unit
T31S-R04W-27	27-12	50	16	VDT - 40	GB(16)	VDT - 40	GB(16)	Dispersal	2	2 – PNF – 85ft 3 – S – 25ft
T32S-R04W-27	27-4S	50	17	VDT/UR - 40	C(17)	VDT/UR - 40	C(17)	Dispersal	6	2 – PNF – 85ft 1 – I – 35ft

♦For a description of the Silvicultural Prescription (RX) associated with Alternatives 2 and 3; see Chapter 2 of the EA and Appendix G: Silvicultural Prescriptions.
†Harvest systems – Ground based (GB), Cable (C), Helicopter (H)
*****Format (Number – Feature – Buffer Distance). Riparian Reserves (RR) widths are determined based on a 200 foot site potential tree for the Upper Cow watershed. Intermittent (I) and perennial streams with no known fish potential (PNF) have a one-tree 200 foot buffer. Perennial fish (PF) bearing streams are assigned a two-tree 400 foot buffer. Ecological Protection Zone (EPZ) to protect stream banks from erosion along intermittent streams, with a 35 or 60 foot buffer depending on field surveys. Perennial streams with no know fish potential have an 85 foot EPZ to protect the primary shade zone and provide an undisturbed vegetation buffer for reducing sedimentation and increase infiltration near the streams. Perennial streams with fish have a 120 foot buffer to allow for the recruitment of large woody debris and protect fish habitat. Springs and seeps (S) have a 25 foot buffer.

Township Range Section	Unit Number	Age	Acres	Alternative 2 Rx♦	Harvest system†	Alternative 3 Rx♦	Harvest system †	NSO Habitat Type	Riparian Reserve Acres	Ecological Protection Zones*
T31S-R04W-29 T31S-R04W-32	29-1	60/70	24	VDT - 60	H(24)	VDT - 60	H(24)	Foraging	0	No RR in Unit
T31S-R04W-30	30-2	50	11	VDT - 40	C(11)	VDT - 40	C(11)	Dispersal	1	1 – PNF – 85ft 1 – I – 60ft
T32S-R04W-03	3-1	80	6	DM - 60	GB(1) C(5)	No Treatment		Foraging	0	No RR in Unit
T31S-R04W-30 T31S-R04W-31 T31S-R05W-25	31-2	40/50/60	18	VDT - 40	GB(2) C(14) H(2)	VDT - 40	GB(2) C(14) H(2)	Dispersal	4	2 – PNF – 85ft 1 – I – 35ft 1 – S – 25ft
T31S-R04W-31	31-2NW	60	32	UR		UR		Dispersal	23	1 – PF – 120ft 8 – PNF – 85ft 1 – I – 60ft
T31S-R04W-31	31-2S	60	48	UR		UR		Dispersal	43	4 – PF – 120ft 2 – PNF – 85ft

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†Harvest systems – Ground based (GB), Cable (C), Helicopter (H)
*****Format (Number – Feature – Buffer Distance). Riparian Reserves (RR) widths are determined based on a 200 foot site potential tree for the Upper Cow watershed. Intermittent (I) and perennial streams with no known fish potential (PNF) have a one-tree 200 foot buffer. Perennial fish (PF) bearing streams are assigned a two-tree 400 foot buffer. Ecological Protection Zone (EPZ) to protect stream banks from erosion along intermittent streams, with a 35 or 60 foot buffer depending on field surveys. Perennial streams with no know fish potential have an 85 foot EPZ to protect the primary shade zone and provide an undisturbed vegetation buffer for reducing sedimentation and increase infiltration near the streams. Perennial streams with fish have a 120 foot buffer to allow for the recruitment of large woody debris and protect fish habitat. Springs and seeps (S) have a 25 foot buffer.

Township Range Section	Unit Number	Age	Acres	Alternative 2 Rx♦	Harvest system†	Alternative 3 Rx♦	Harvest system †	NSO Habitat Type	Riparian Reserve Acres	Ecological Protection Zones*
										5 – I – 35ft
T31S-R04W-31	31-2W	60	18	VDT/UR - 40	C(18)	VDT/UR - 40	C(18)	Dispersal	8	2 – PF – 120ft 4 – PNF – 85ft 1 – I – 35ft
T31S-R04W-31	31-3	50	8	VDT/UR - 40	GB(1) C(64) H(9)	VDT/UR - 40	C(2) H(6)	Dispersal	0.3	1 – S – 25ft 1 – I – 60ft
		80/90	66	DM/UR - 60		UR		Foraging	0	No RR in Unit
T31S-R04W-31	31-6	50	17	VDT - 40	C(6) H(11)	VDT - 40	C(6) H(11)	Dispersal	0	1 – S – 25ft
T32S-R04W-03	3-1A	80	53	UR		UR		Foraging	8	1 – PNF – 85ft 3 – I – 35ft 1 – S – 25ft
T31S-R04W-32 T32S-R04W-05	32-12	30/50	2	VDT/UR - 40	GB(2)	VDT/UR - 40	GB(2)	Dispersal	1	1 – PNF – 85ft

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†Harvest systems – Ground based (GB), Cable (C), Helicopter (H)
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										1 – I – 60ft 1 – I – 35ft
T31S-R04W-32	32-4	30	9	VDT - 40	C(9)	VDT - 40	C(9)	Dispersal	3	1 – PNF – 85ft 3 – I – 60ft 2 – I – 35ft
T31S-R04W-32	32-7N	110	1	LTC - 60	C(1)	No Treatment		Foraging	0	No RR in Unit
T31S-R04W-32	32-7S	120	3	RT - 60	GB(3)	No Treatment		Foraging	0	No RR in Unit
T31S-R04W-33	33-4	140	17	DM/UR - 60	GB(1) C(16)	UR		Foraging	0	No RR in Unit
T31S-R04W-34	34-1	100	11	DM -60	C(11)	No Treatment		Foraging	0	No RR in Unit
T31S-R04W-35	35-1	90	21	UR		UR		Foraging	13	10 – PNF – 85ft

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†Harvest systems – Ground based (GB), Cable (C), Helicopter (H)
*****Format (Number – Feature – Buffer Distance). Riparian Reserves (RR) widths are determined based on a 200 foot site potential tree for the Upper Cow watershed. Intermittent (I) and perennial streams with no known fish potential (PNF) have a one-tree 200 foot buffer. Perennial fish (PF) bearing streams are assigned a two-tree 400 foot buffer. Ecological Protection Zone (EPZ) to protect stream banks from erosion along intermittent streams, with a 35 or 60 foot buffer depending on field surveys. Perennial streams with no know fish potential have an 85 foot EPZ to protect the primary shade zone and provide an undisturbed vegetation buffer for reducing sedimentation and increase infiltration near the streams. Perennial streams with fish have a 120 foot buffer to allow for the recruitment of large woody debris and protect fish habitat. Springs and seeps (S) have a 25 foot buffer.

Township Range Section	Unit Number	Age	Acres	Alternative 2 Rx♦	Harvest system†	Alternative 3 Rx♦	Harvest system †	NSO Habitat Type	Riparian Reserve Acres	Ecological Protection Zones*
										1 – I – 60ft
T31S-R04W-35	35-15	70	21	RT - 40	C(21)	RT - 40	C(21)	Foraging	1	1 – PNF – 85ft
T31S-R04W-35	35-15A	70	4	UR		UR		Foraging	3	2 – I – 60ft
T31S-R04W-35	35-1B	60	10	VDT - 60	H(11)	VDT - 60	H(10)	Foraging	0	No RR in Unit
T31S-R04W-35		90	1	DM - 60		No Treatment		Foraging	1	1 – I – 60ft
T31S-R04W-35	35-1F	80	4	LTC/UR - 60	GB(4)	UR		Nesting	0.3	1 – PNF – 85ft
T31S-R04W-35	35-2	70	6	VDT - 40	C(6)	VDT - 40	C(6)	Dispersal/Foraging	0	No RR in Unit
T31S-R04W-35	35-3	70	7	VDT - 40	C(7)	VDT - 40	C(7)	Dispersal	1	1 – PF – 120ft

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†Harvest systems – Ground based (GB), Cable (C), Helicopter (H)
*****Format (Number – Feature – Buffer Distance). Riparian Reserves (RR) widths are determined based on a 200 foot site potential tree for the Upper Cow watershed. Intermittent (I) and perennial streams with no known fish potential (PNF) have a one-tree 200 foot buffer. Perennial fish (PF) bearing streams are assigned a two-tree 400 foot buffer. Ecological Protection Zone (EPZ) to protect stream banks from erosion along intermittent streams, with a 35 or 60 foot buffer depending on field surveys. Perennial streams with no know fish potential have an 85 foot EPZ to protect the primary shade zone and provide an undisturbed vegetation buffer for reducing sedimentation and increase infiltration near the streams. Perennial streams with fish have a 120 foot buffer to allow for the recruitment of large woody debris and protect fish habitat. Springs and seeps (S) have a 25 foot buffer.

Township Range Section	Unit Number	Age	Acres	Alternative 2 Rx♦	Harvest system†	Alternative 3 Rx♦	Harvest system †	NSO Habitat Type	Riparian Reserve Acres	Ecological Protection Zones*
T31S-R04W-35	35-5	90	17	DM - 60	GB(4) C(15)	No Treatment		Foraging	9	4 – PNF – 85ft 1 – I – 60ft
T31S-R04W-35		60	2	VDT - 60		VDT - 60	C(2)	Foraging	3	1 – PNF – 85ft 1 – I – 60ft
T31S-R04W-35	35-5A	80	2	UR		No Treatment		Foraging	0.2	1 – I – 60ft
T31S-R04W-35	35-7	90	41	UR		No Treatment		Foraging	14	3 – I – 60ft 1 – S – 25ft
T31S-R04W-32 T32S-R04W-05	5-4	50	35	VDT/UR - 40	GB(35)	VDT/UR - 40	GB(35)	Dispersal	1	2 – PNF – 85ft 1 – I – 60ft
T32S-R04W-08	8-6	50	9	VDT - 60	C(9)	VDT - 60	C(9)	Foraging	0	No RR in Unit
T32S-R04W-09	9-1	60	6	RT/UR - 60	GB(6)	RT/UR - 60	GB(6)	Foraging	6	1 – PNF – 85ft

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†Harvest systems – Ground based (GB), Cable (C), Helicopter (H)
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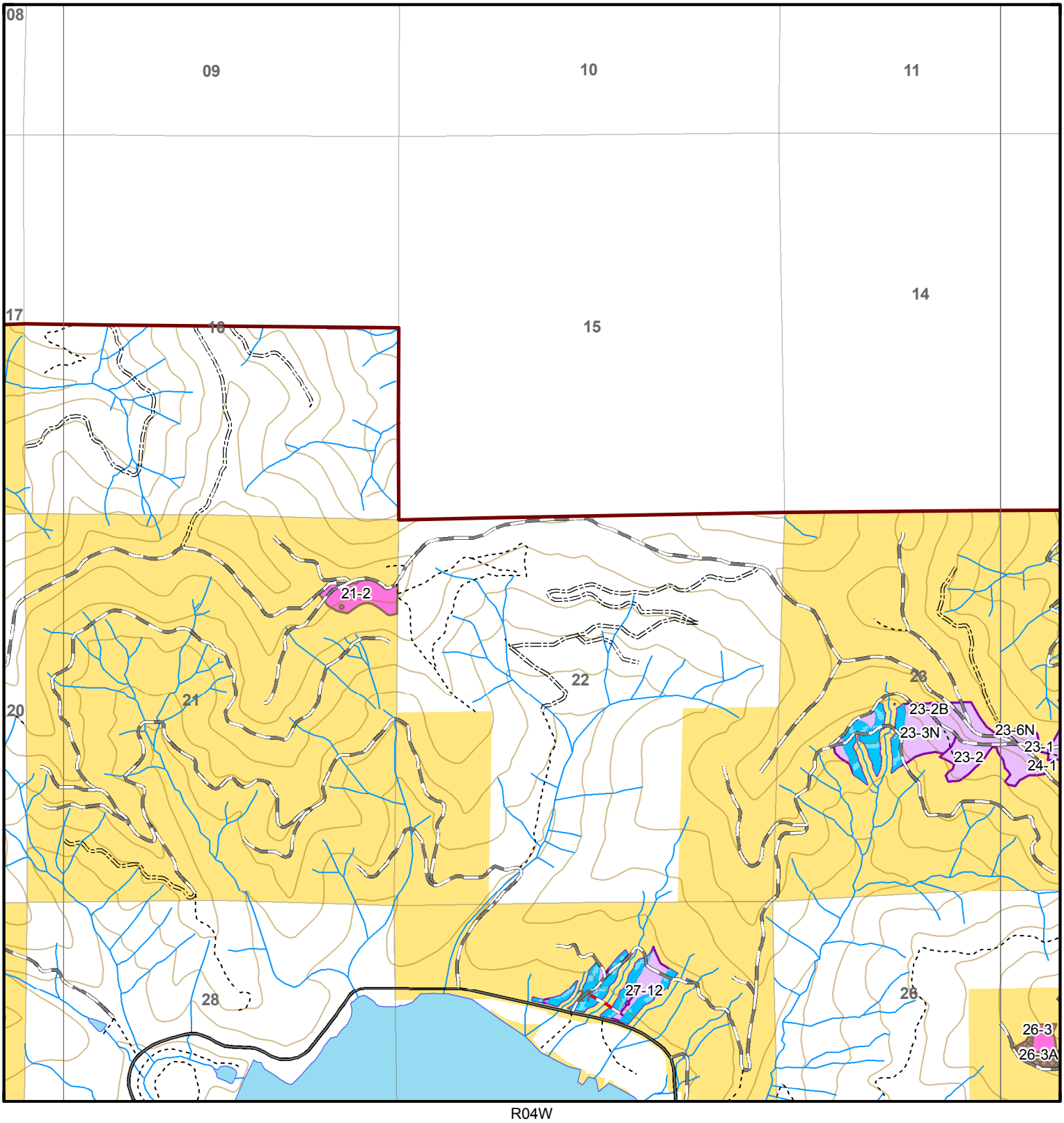
Township Range Section	Unit Number	Age	Acres	Alternative 2 Rx♦	Harvest system†	Alternative 3 Rx♦	Harvest system †	NSO Habitat Type	Riparian Reserve Acres	Ecological Protection Zones*
										1 – I – 35ft
T32S-R04W-09	9-19	60	9	VDT/UR - 60	GB(3) C(6)	VDT/UR - 60	GB(3) C(6)	Foraging	0	2 – S – 25ft
T32S-R04W-09	9-22	60	9	VDT - 60	C(9)	VDT - 60	C(9)	Foraging	5	2 – I – 60ft 2 – S – 25ft
T32S-R04W-09	9-24	130	6	DM - 60	C(6)	No Treatment		Foraging	0	No RR in Unit
T32S-R04W-09	9-26	60	6	VDT/UR - 60	GB(6)	VDT/UR - 60	GB(6)	Foraging	5	2 – PNF – 85ft 1 – I – 35ft

The calculations in this table may vary and are dependent upon where in the process the numbers were rounded. These numbers are approximations and may vary from the final numbers in the Decision Record.

Appendix J Riparian Thinning Maps

Upper Cow Late Successional Reserve Project
Riparian Treatments



Temporary Route

Surface Type

- Paved Road
- Rocked Road
- Natural Surface Road
- Not Known

Alternative 2 Proposed Treatments

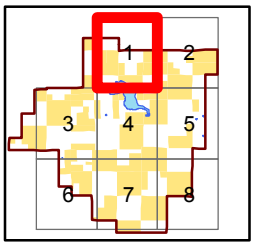
- Variable Density Thinning
- Understory Reduction
- Density Management
- Upper Cow Riparian Treatments Alt 2

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

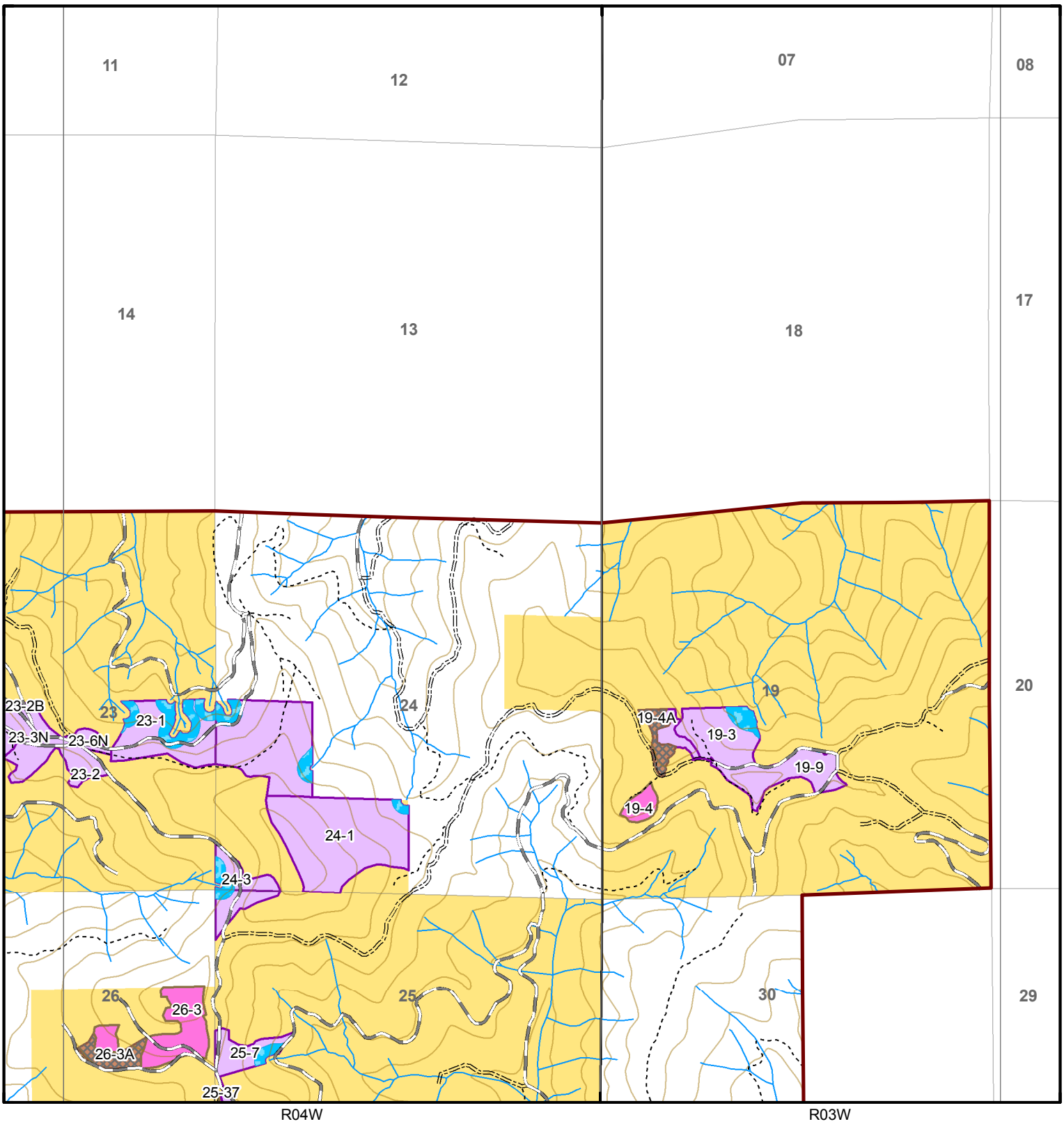
Miles

0 0.125 0.25 0.5

N W E S



Upper Cow Late Successional Reserve Project
Riparian Treatments



Surface Type

- Rocked Road
- Natural Surface Road
- Not Known

Alternative 2 Proposed Treatments

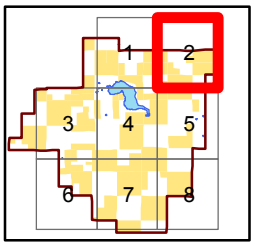
- Variable Density Thinning
- Understory Reduction
- Density Management
- Upper Cow Riparian Treatments Alt 2

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

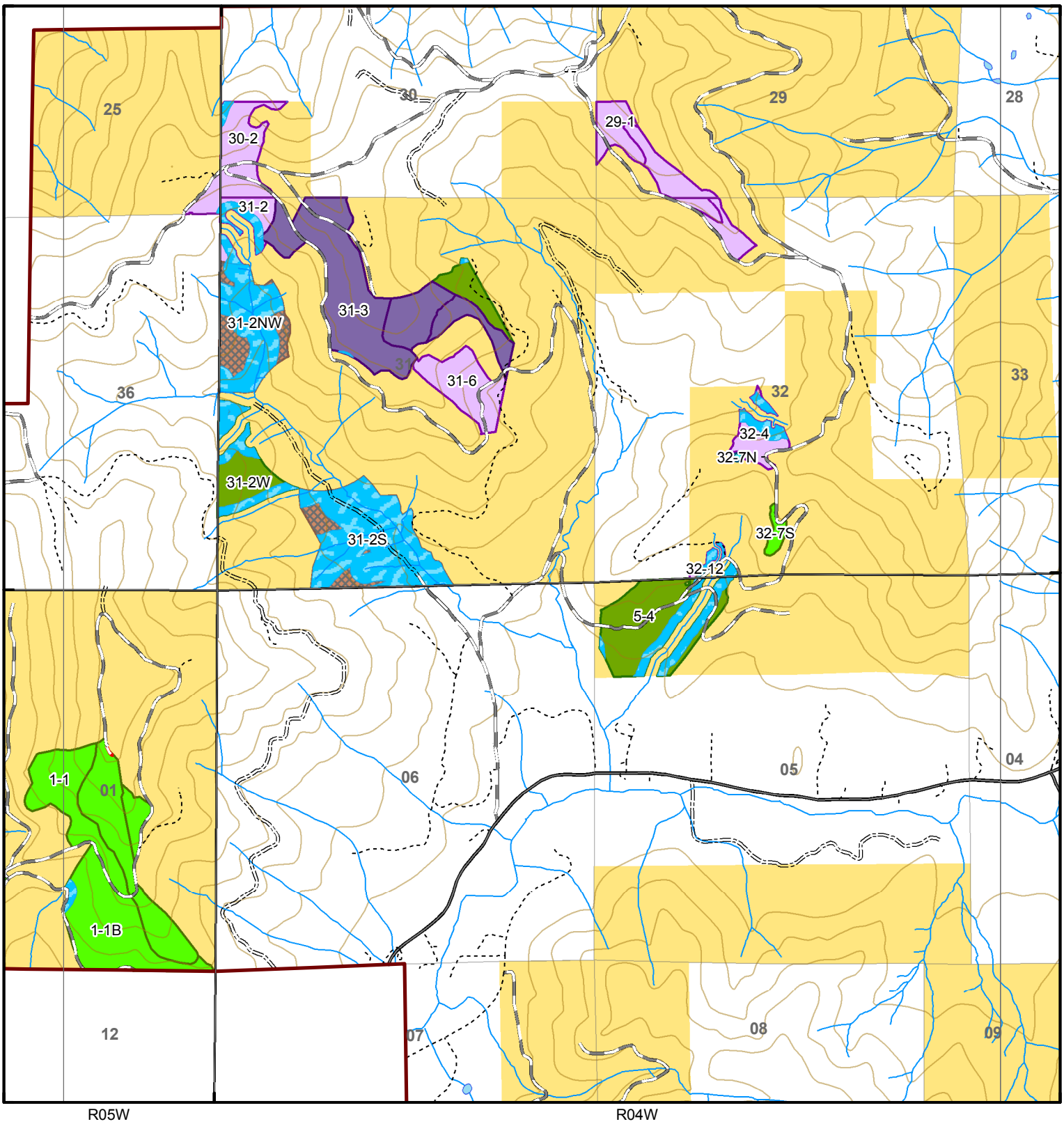
Miles

0 0.125 0.25 0.5

N W E S



Upper Cow Late Successional Reserve Project
Riparian Treatments



Temporary Route

Surface Type
- Paved Road
- Rocked Road
- Natural Surface Road
- Not Known

Alternative 2 Proposed Treatments
- Variable Density Thinning / Understory Reduction
- Variable Density Thinning
- Understory Reduction
- Restoration Thinning
- Legacy Tree Culturing
- Density Managment / Understory Reduction
- Upper Cow Riparian Treatments Alt 2

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N
W E
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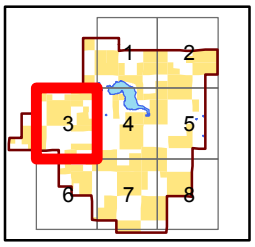
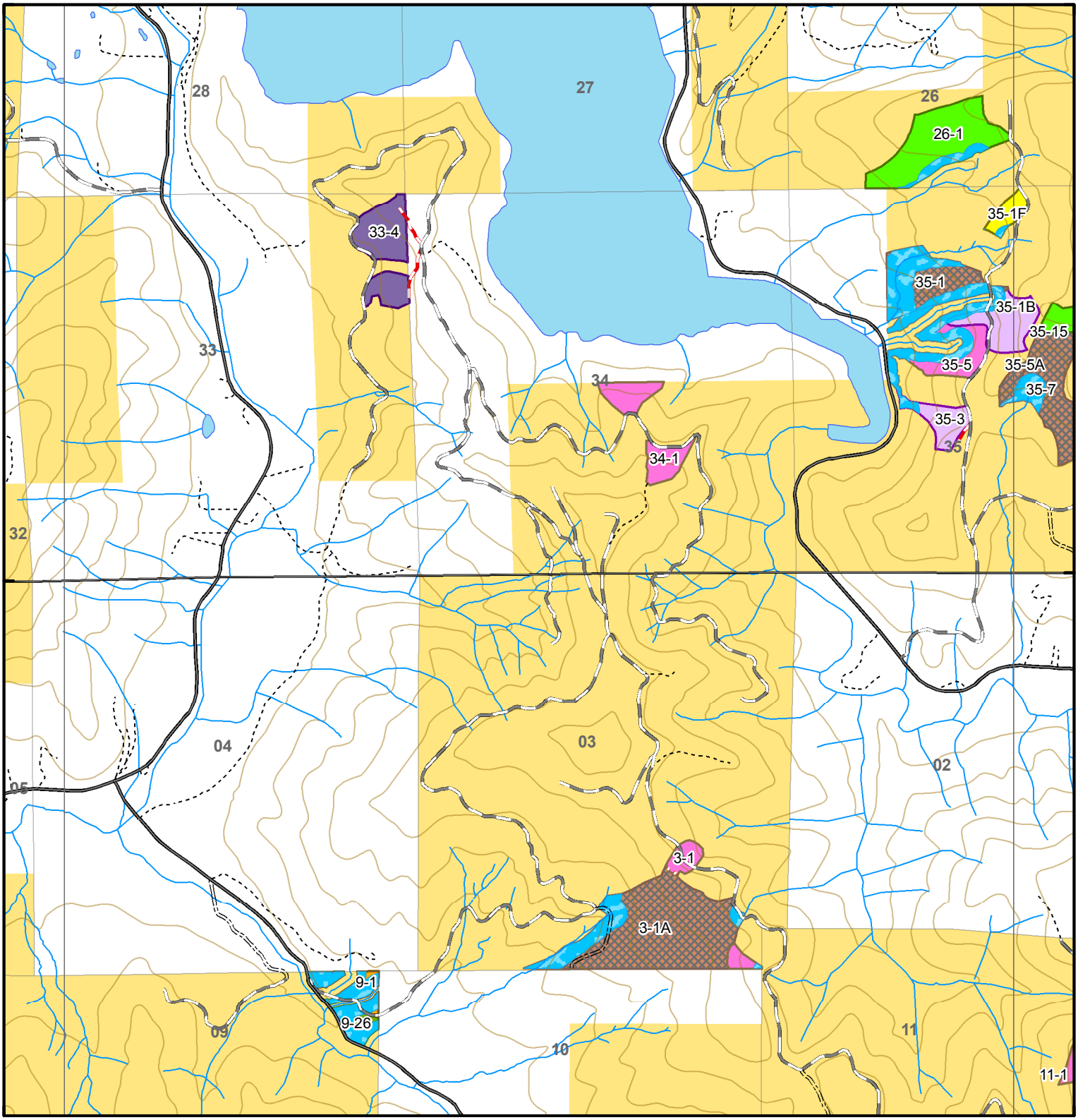
Miles
0 0.125 0.25 0.5



Upper Cow Late Successional Reserve Project
Riparian Treatments



Temporary Route

Surface Type

- Paved Road
- Rocked Road
- Natural Surface Road
- Not Known

Alternative 2 Proposed Treatments

- Variable Density Thinning / Understory Reduction
- Variable Density Thinning
- Restoration Thinning / Understory Reduction
- Understory Reduction
- Restoration Thinning
- Density Management
- Legacy Tree Culturing / Understory Reduction
- Density Managment / Understory Reduction
- Upper Cow Riparian Treatments Alt 2

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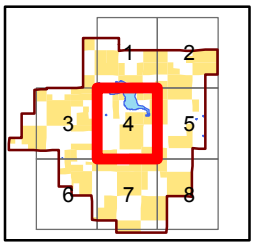
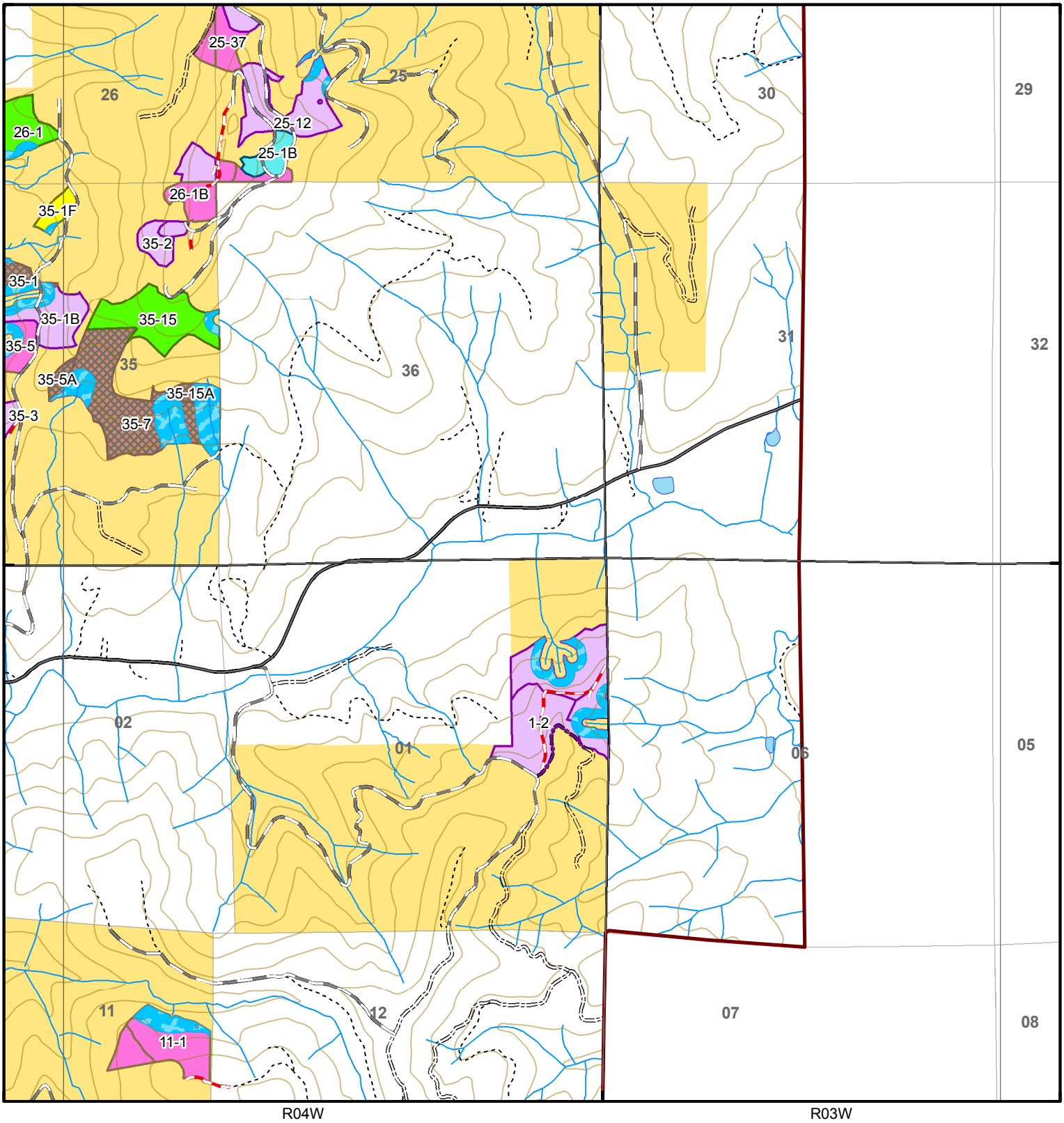
Miles

0 0.125 0.25 0.5

N W E S



Upper Cow Late Successional Reserve Project
Riparian Treatments



Temporary Route

Surface Type
- Paved Road
- Rocked Road
- Natural Surface Road
- Not Known

Alternative 2 Proposed Treatments
- Variable Density Thinning
- Understory Reduction
- Restoration Thinning
- Density Management
- Legacy Tree Culturing / Understory Reduction
- Legacy Tree Culturing
- Upper Cow Riparian Treatments Alt 2

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Miles
0 0.125 0.25 0.5

N
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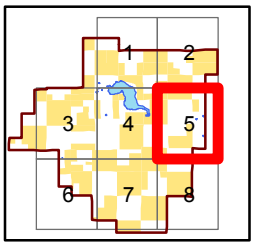
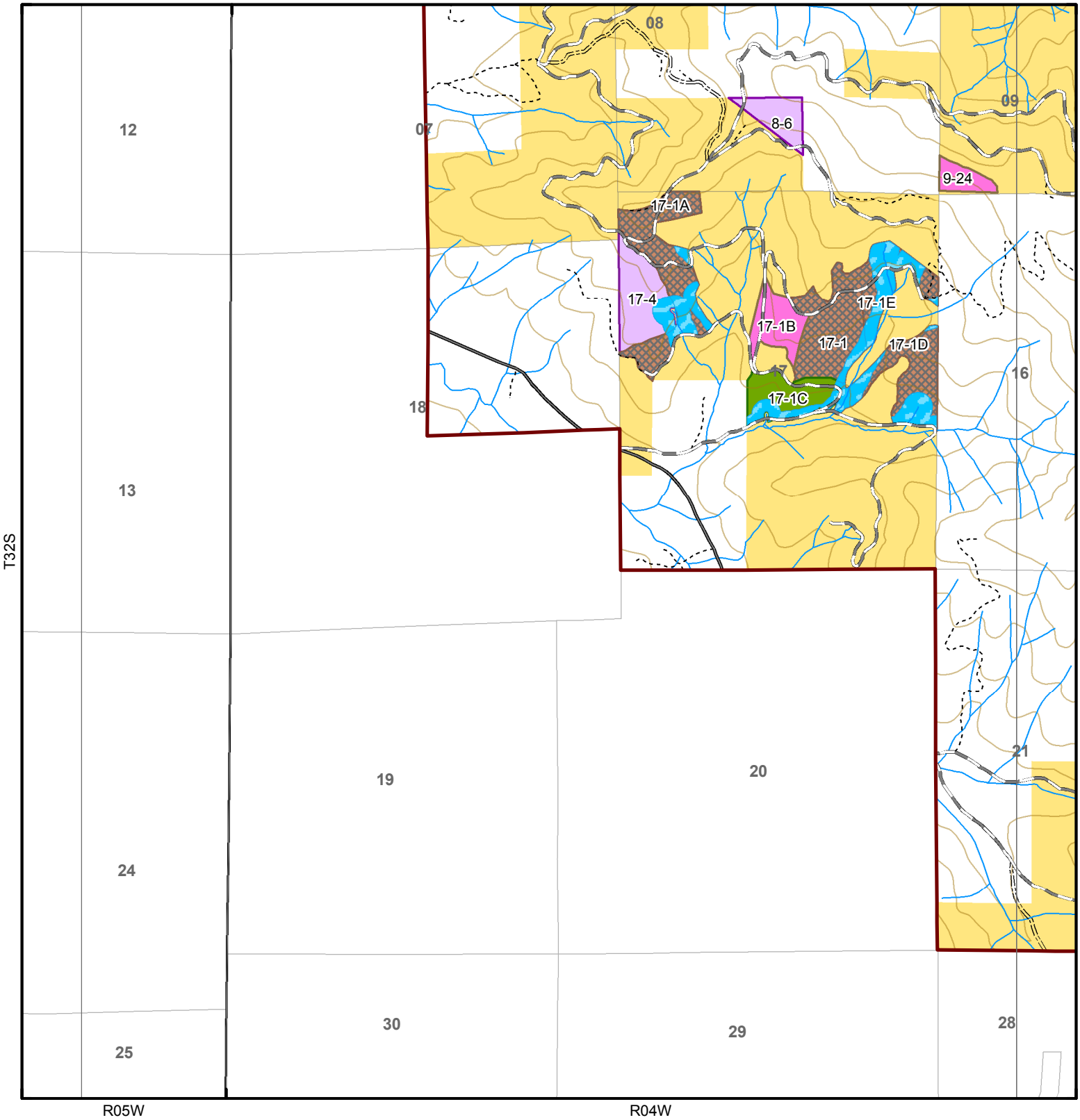


Upper Cow Late Successional Reserve Project
Riparian Treatments



Surface Type
- Paved Road
- Rocked Road
- Natural Surface Road
- Not Known

Alternative 2 Proposed Treatments
- Variable Density Thinning / Understory Reduction
- Variable Density Thinning
- Understory Reduction
- Density Management
- Upper Cow Riparian Treatments Alt 2

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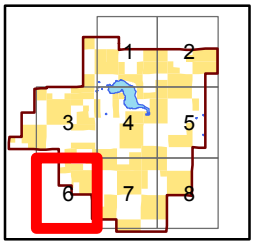
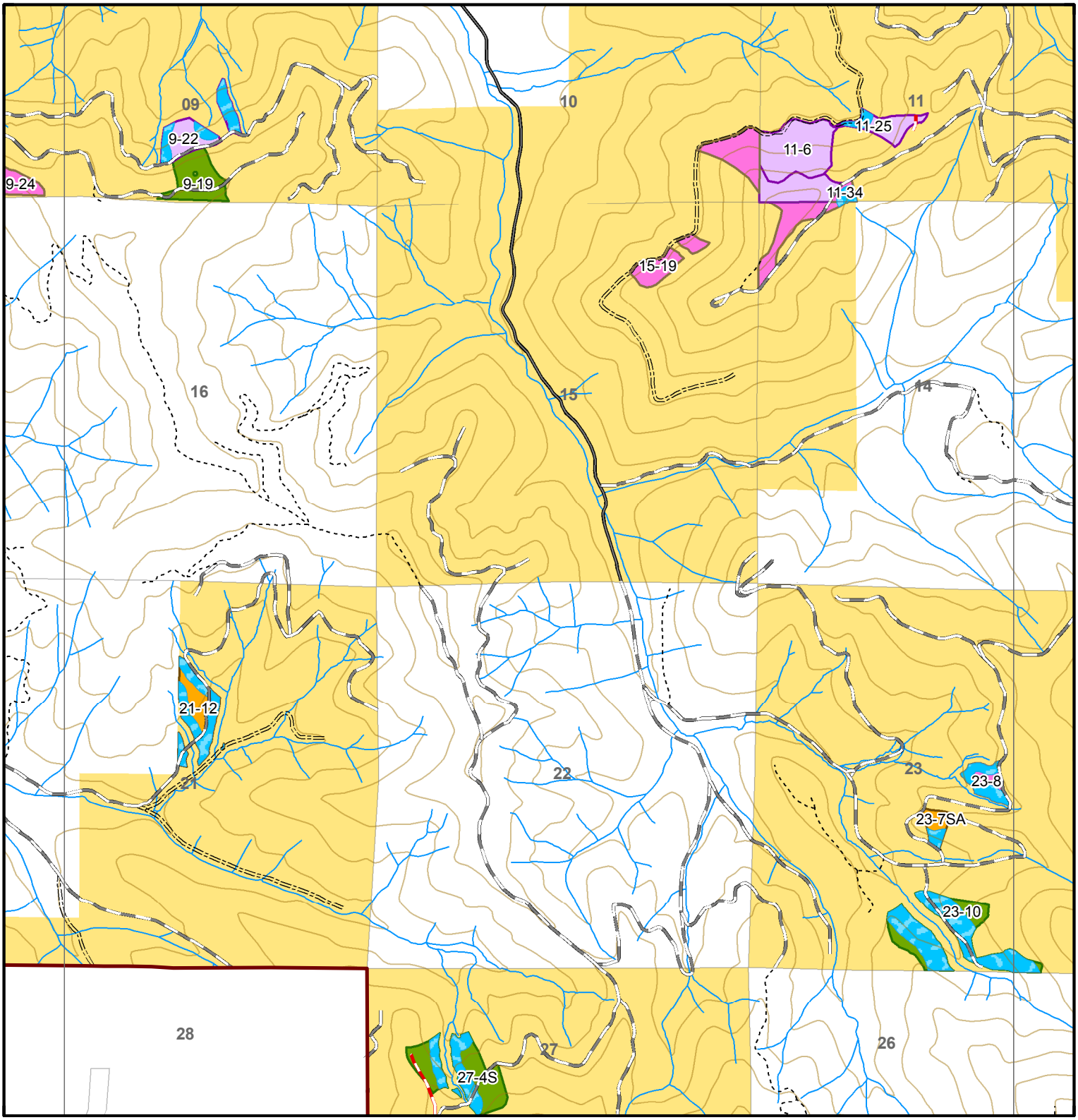
Miles
0 0.125 0.25 0.5

N W E S



Upper Cow Late Successional Reserve Project
Riparian Treatments



Temporary Route

Surface Type

- Paved Road
- Rocked Road
- Natural Surface Road
- Not Known

Alternative 2 Proposed Treatments

- Variable Density Thinning / Understory Reduction
- Variable Density Thinning
- Restoration Thinning / Understory Reduction
- Density Management
- Upper Cow Riparian Treatments Alt 2

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N
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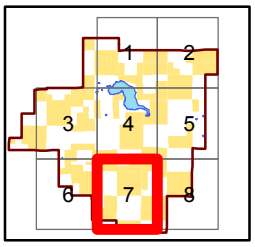
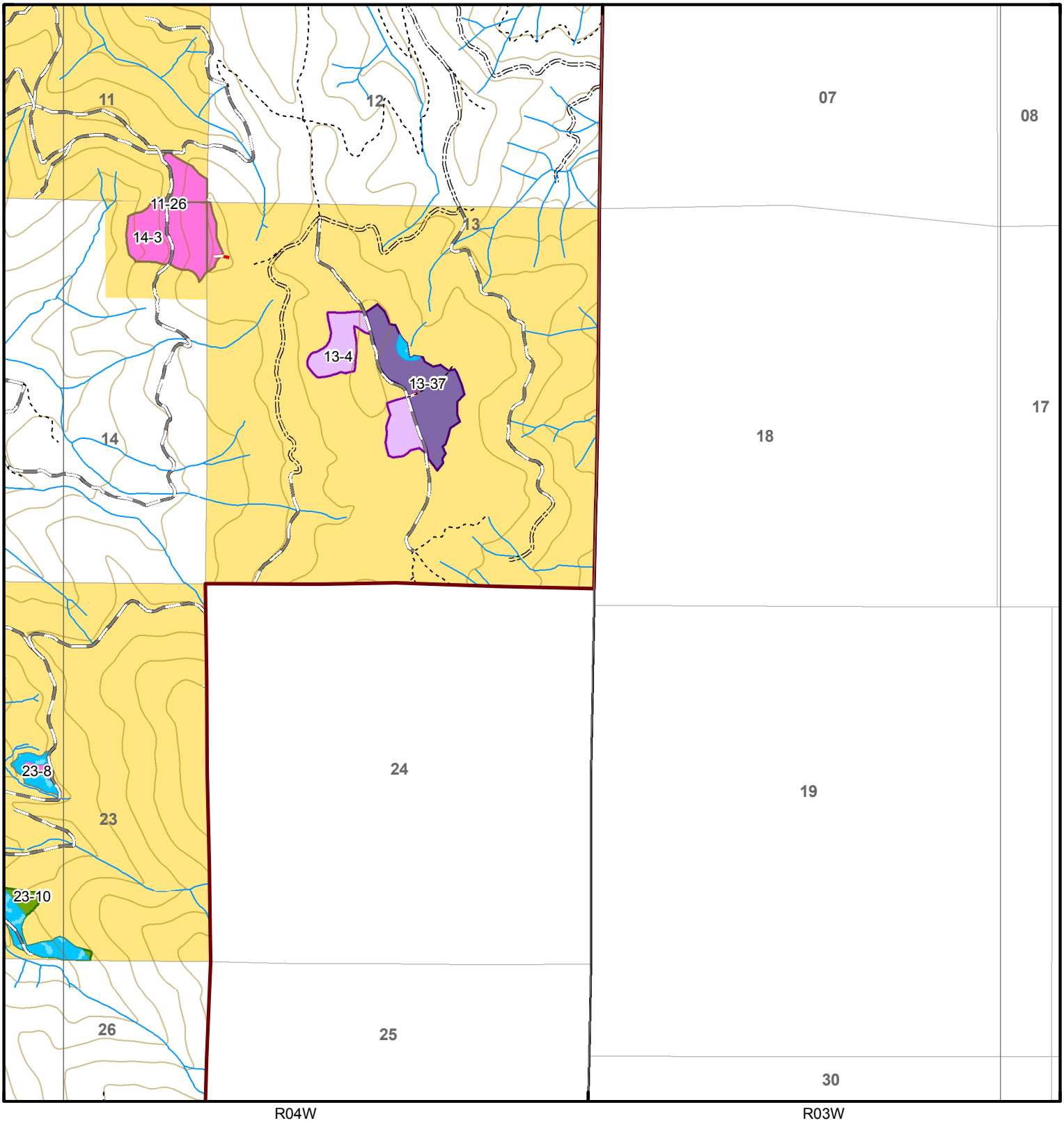
Miles
0 0.125 0.25 0.5



Upper Cow Late Successional Reserve Project
Riparian Treatments



Temporary Route

Surface Type
- Rocked Road
- Natural Surface Road
- Not Known

Alternative 2 Proposed Treatments
- Variable Density Thinning / Understory Reduction
- Variable Density Thinning
- Density Management
- Density Managment / Understory Reduction
- Upper Cow Riparian Treatments Alt 2

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Miles
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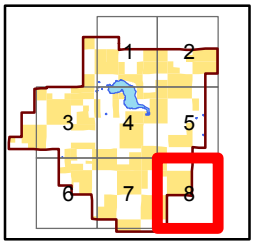
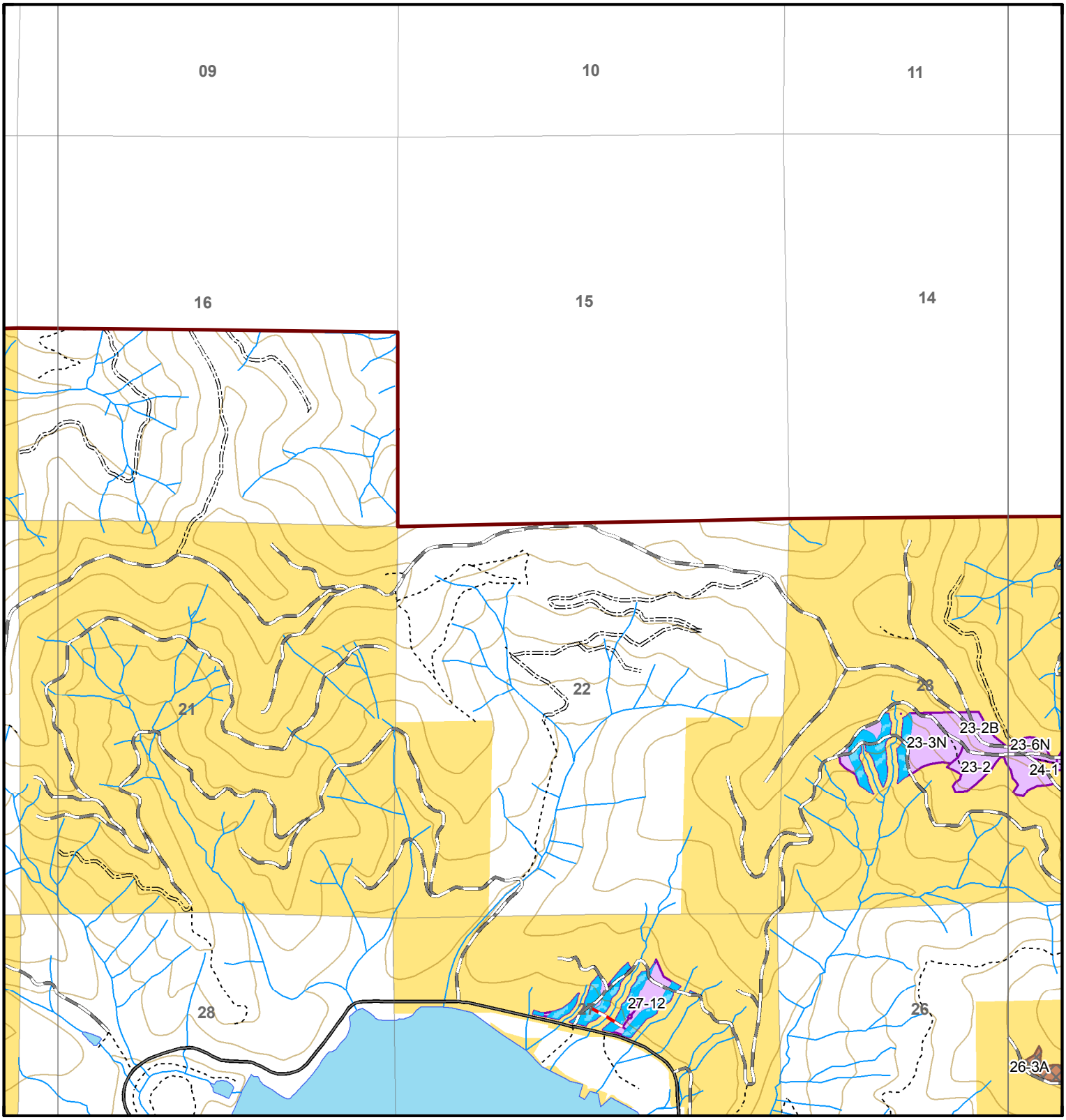


Upper Cow Late Successional Reserve Project
Riparian Treatments



Temporary Route

Surface Type
- Paved Road
- Rocked Road
- Natural Surface Road
- Not Known

Alternative 3 Proposed Treatments
- Veriable Density Thinning
- Understory Reduction
- Upper Cow Riparian Treatments Alt 2

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Miles
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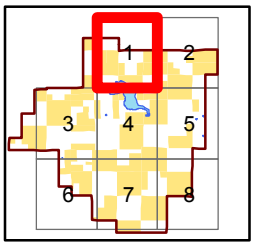
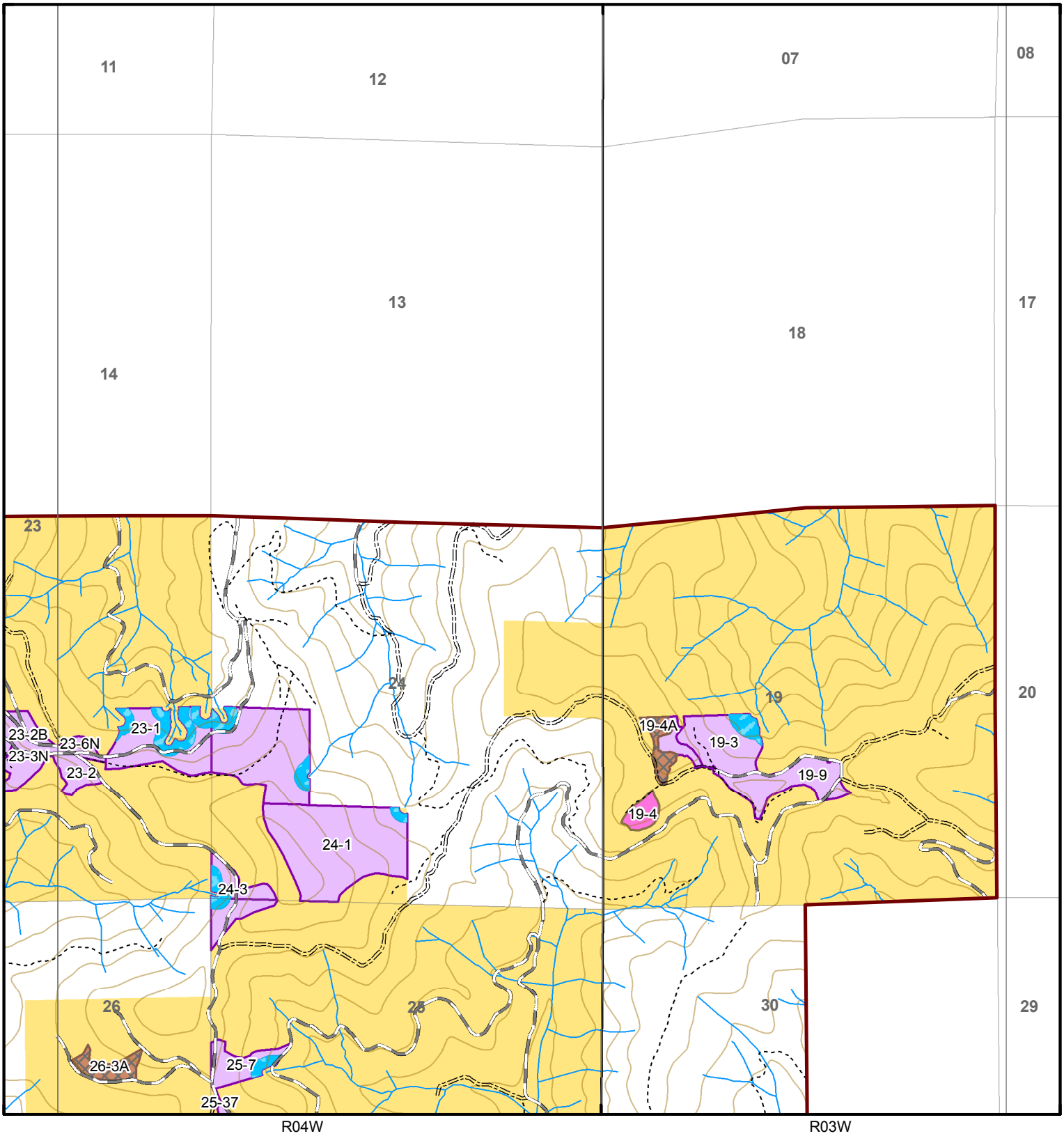


Upper Cow Late Successional Reserve Project
Riparian Treatments



Surface Type

- Rocked Road
- Natural Surface Road
- Not Known

Alternative 3 Proposed Treatments

- Veriable Density Thinning
- Understory Reduction
- Density Managment
- Upper Cow Riparian Treatments Alt 2

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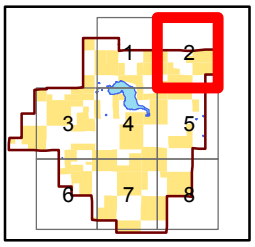
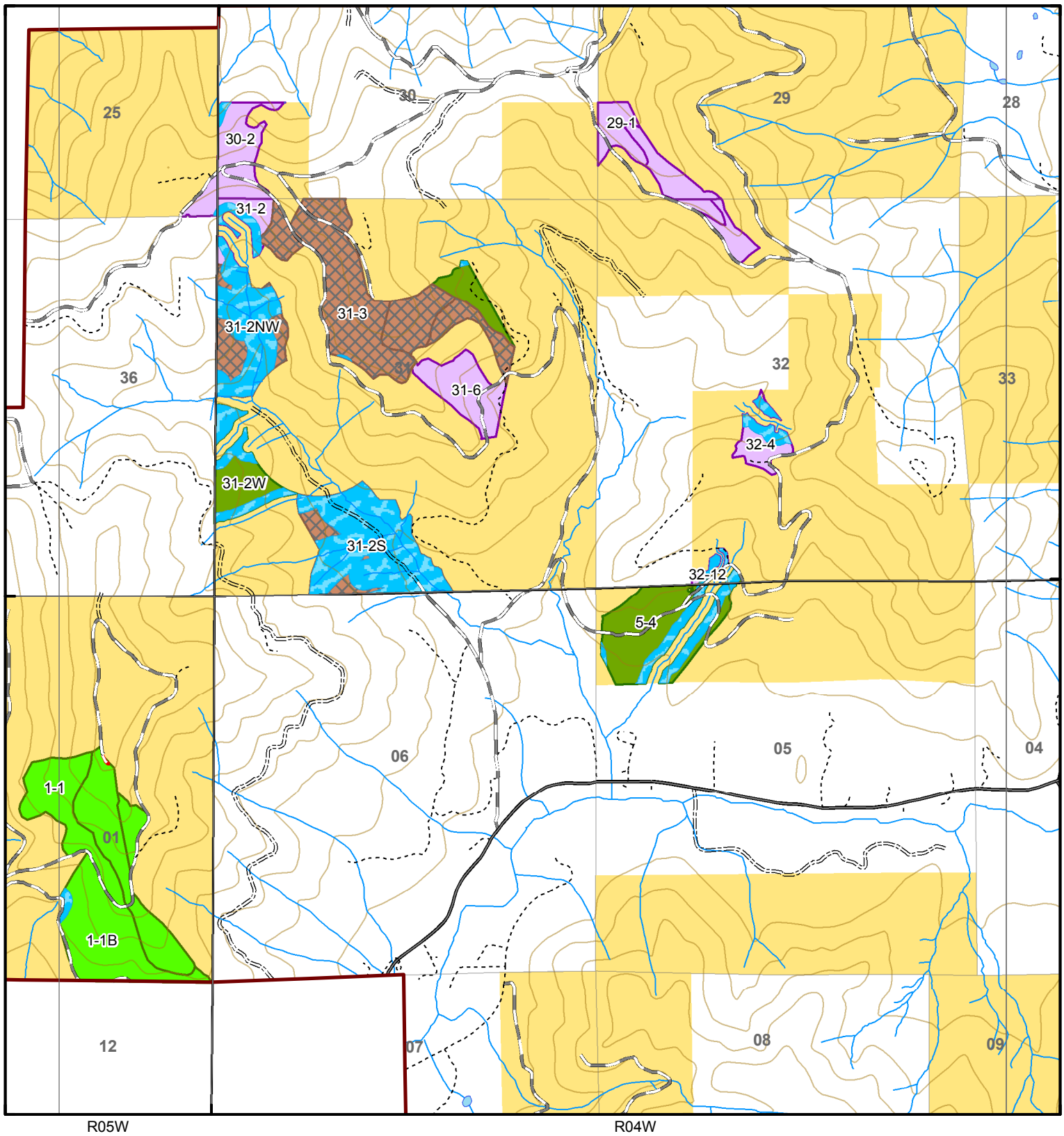
Miles

0 0.125 0.25 0.5

N W E S



Upper Cow Late Successional Reserve Project
Riparian Treatments



Temporary Route

Surface Type
- Paved Road
- Rocked Road
- Natural Surface Road
- Not Known

Alternative 3 Proposed Treatments
- Veriable Density Thinning / Undetstory Reduction
- Veriable Density Thinning
- Understory Reduction
- Restoration Thinning
- Upper Cow Riparian Treatments Alt 2

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Miles
0 0.125 0.25 0.5

N
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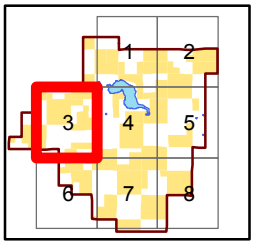
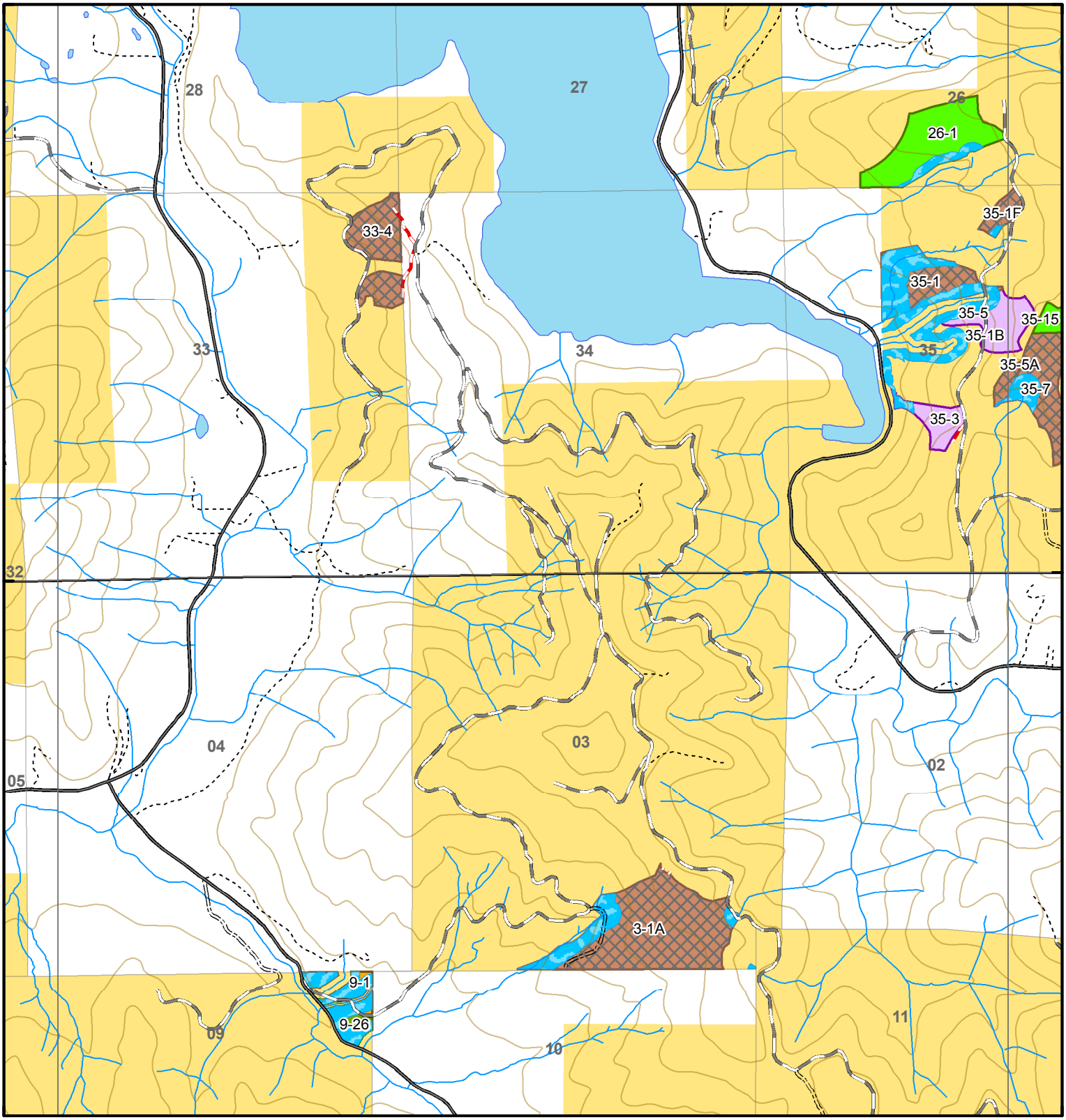


Upper Cow Late Successional Reserve Project
Riparian Treatments



Temporary Route

Surface Type
- Paved Road
- Rocked Road
- Natural Surface Road
- Not Known

Alternative 3 Proposed Treatments
- Veriable Density Thinning / Undetstory Reduction
- Veriable Density Thinning
- Restoration Thinning / Understory Reduction
- Understory Reduction
- Restoration Thinning
- Upper Cow Riparian Treatments Alt 2

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Miles
0 0.125 0.25 0.5

N
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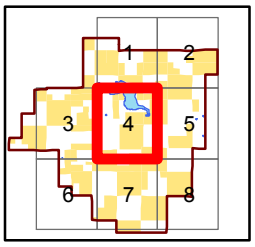
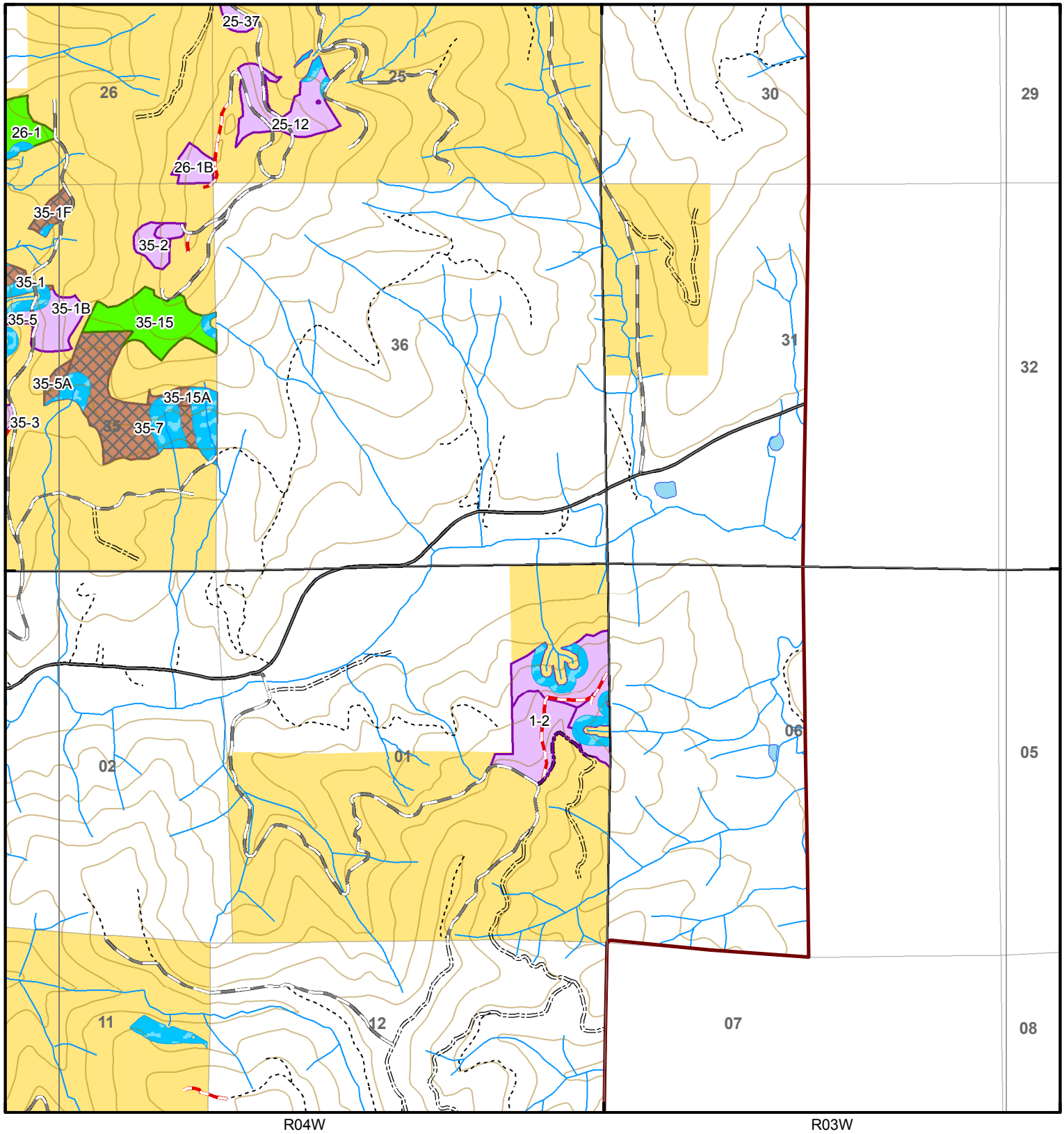


Upper Cow Late Successional Reserve Project
Riparian Treatments



Temporary Route

Surface Type
- Paved Road
- Rocked Road
- Natural Surface Road
- Not Known

Alternative 3 Proposed Treatments
- Veriable Density Thinning
- Understory Reduction
- Restoration Thinning
- Upper Cow Riparian Treatments Alt 2

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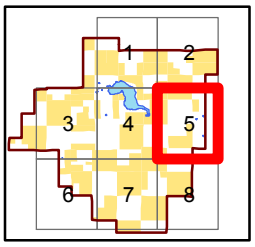
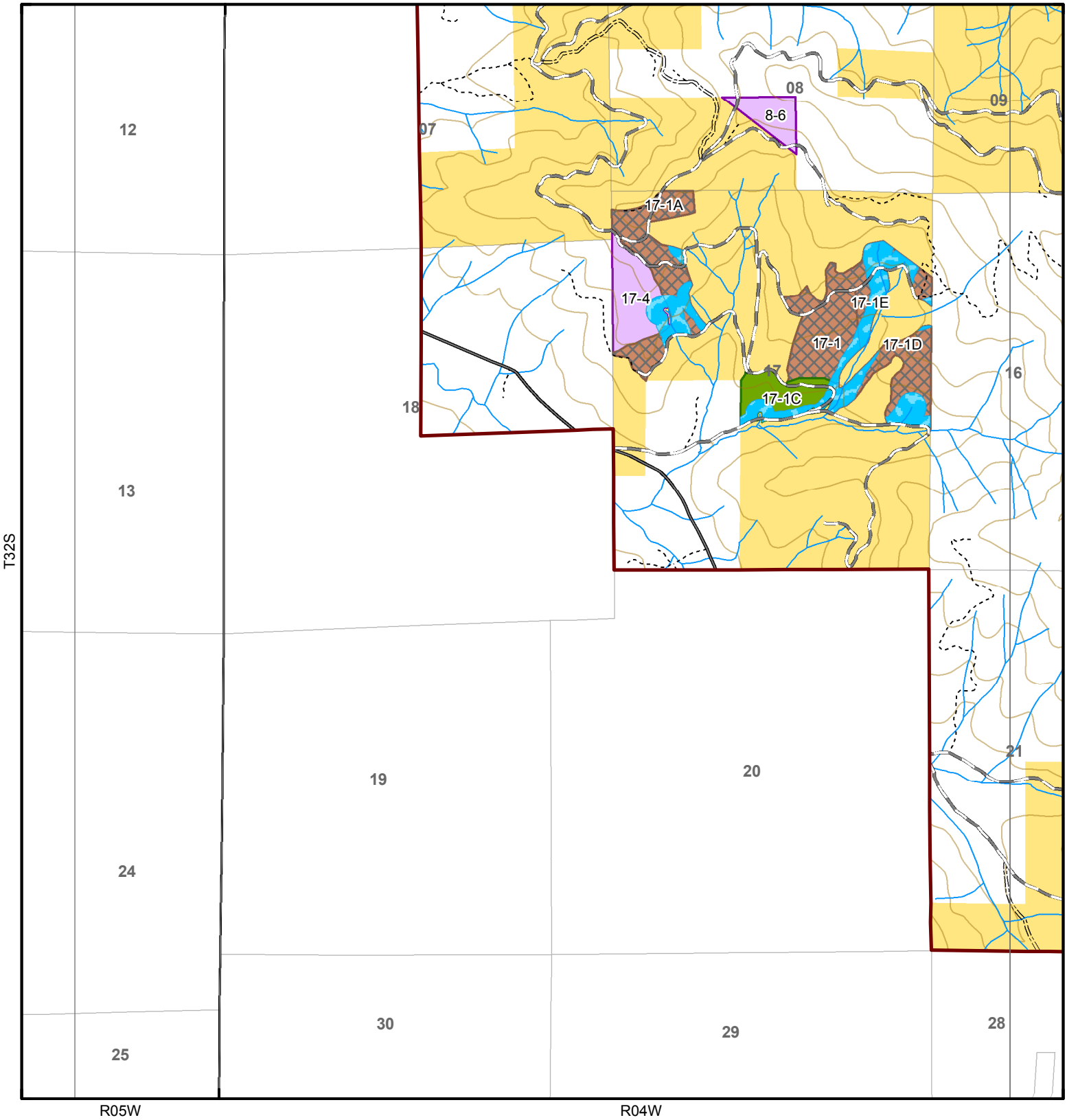
Miles
0 0.125 0.25 0.5

N W E S



Upper Cow Late Successional Reserve Project
Riparian Treatments



Surface Type

- Paved Road
- Rocked Road
- Natural Surface Road
- Not Known

Alternative 3 Proposed Treatments

- Veriable Density Thinning / Undetstory Reduction
- Veriable Density Thinning
- Understory Reduction
- Upper Cow Riparian Treatments Alt 2

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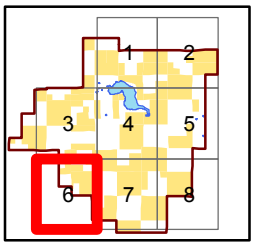
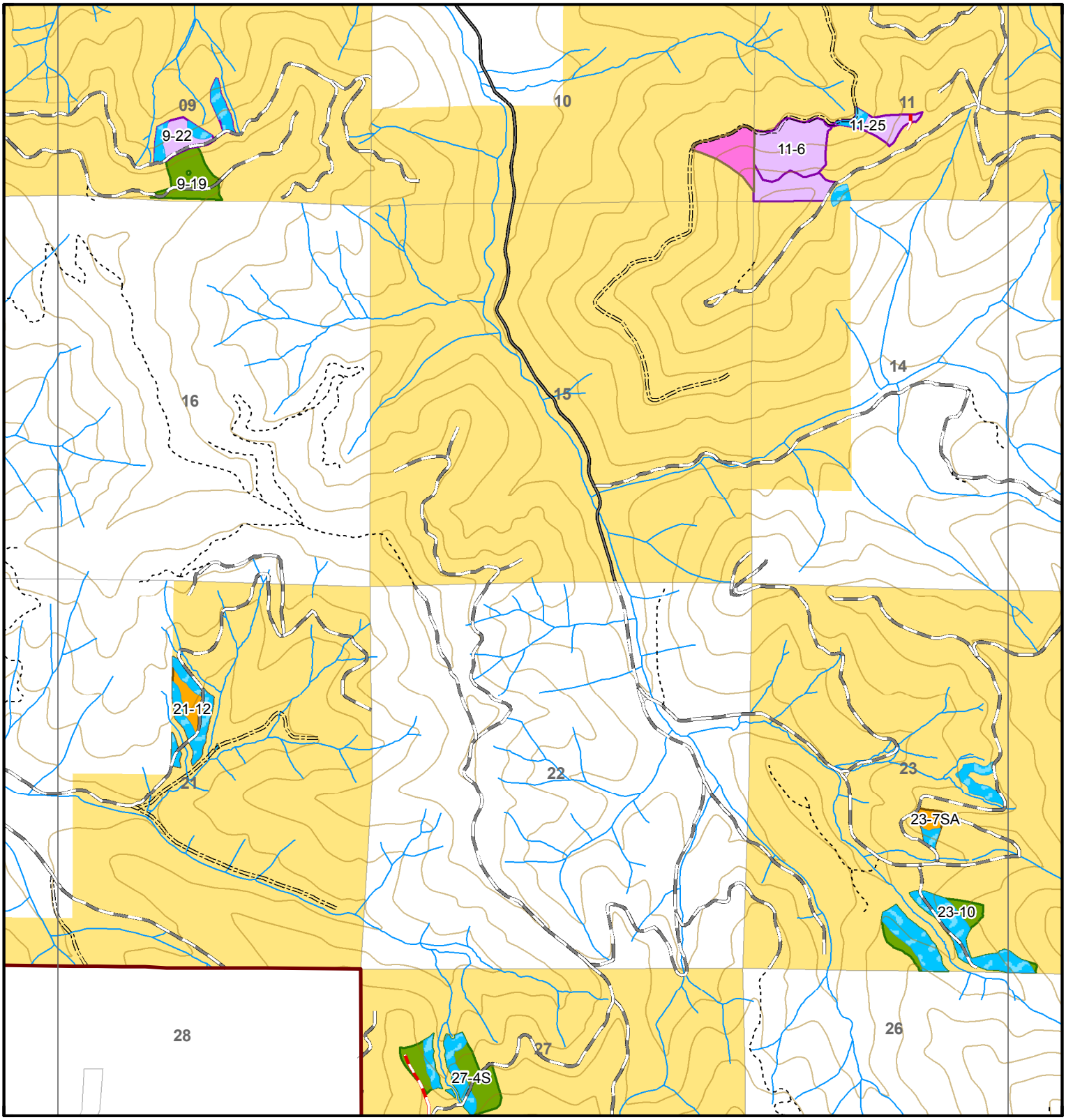
Miles

0 0.125 0.25 0.5

N W E S



Upper Cow Late Successional Reserve Project
Riparian Treatments



Temporary Route

Surface Type
- Paved Road
- Rocked Road
- Natural Surface Road
- Not Known

Alternative 3 Proposed Treatments
- Veriable Density Thinning / Undetstory Reduction
- Veriable Density Thinning
- Restoration Thinning / Understory Reduction
- Density Managment
- Upper Cow Riparian Treatments Alt 2

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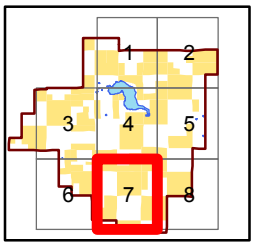
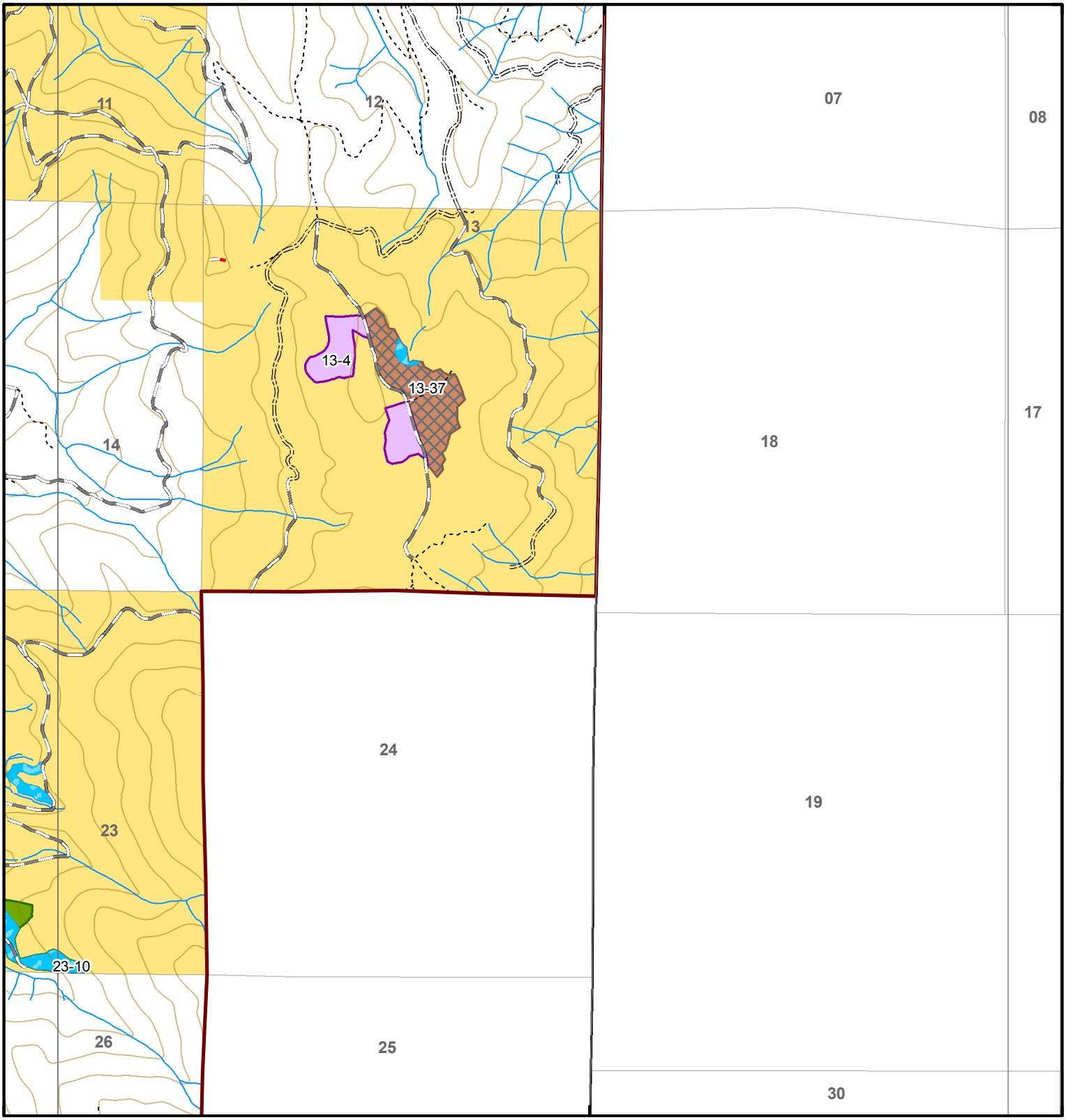
Miles
0 0.125 0.25 0.5

N W E S



Upper Cow Late Successional Reserve Project
Riparian Treatments



Temporary Route

Surface Type
- Rocked Road
- Natural Surface Road
- Not Known

Alternative 3 Proposed Treatments
- Veriable Density Thinning / Undetstory Reduction
- Veriable Density Thinning
- Understory Reduction
- Upper Cow Riparian Treatments Alt 2

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Miles
0 0.125 0.25 0.5

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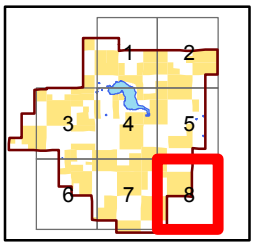
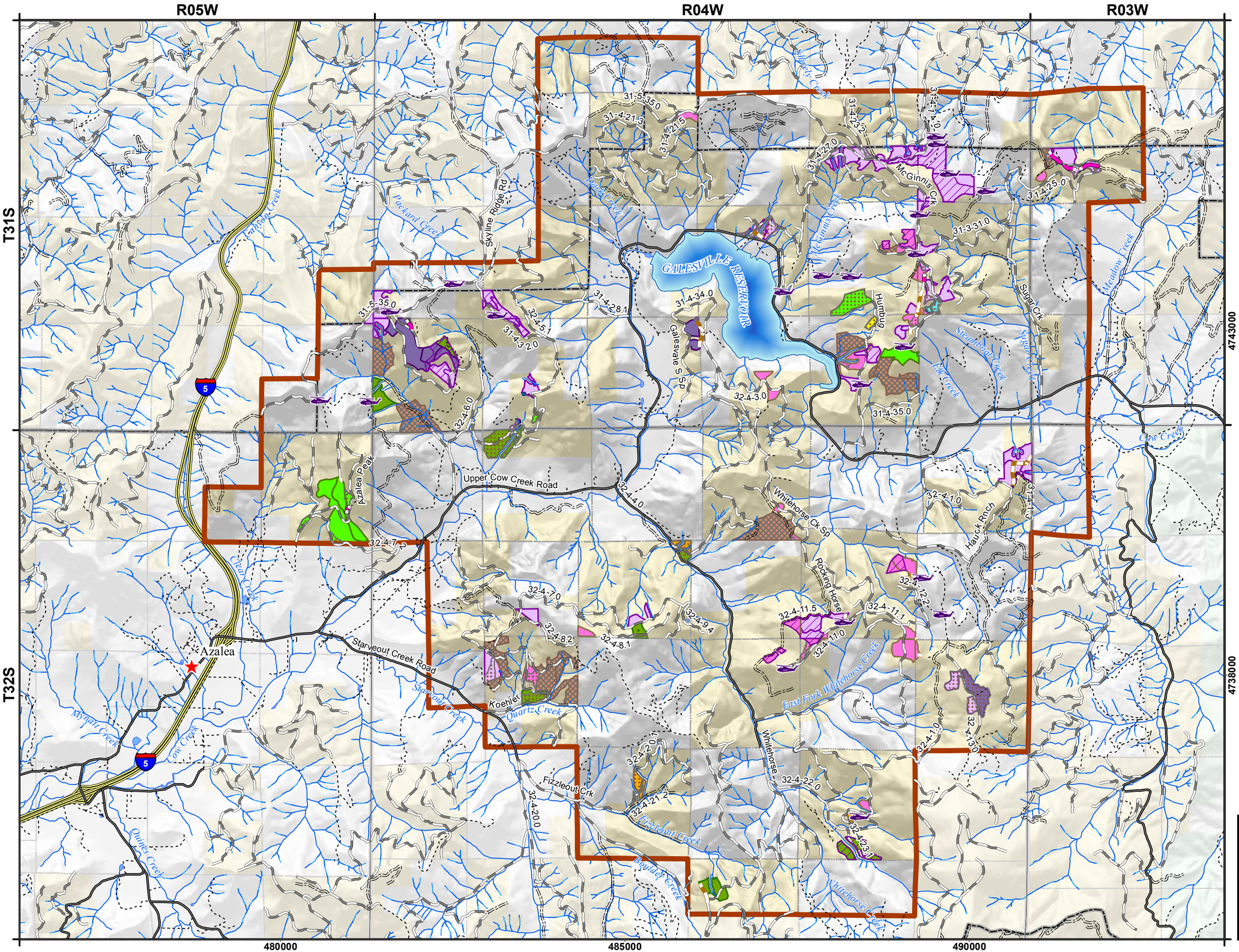


Appendix K Alternative Maps

Upper Cow EA Alternative 2

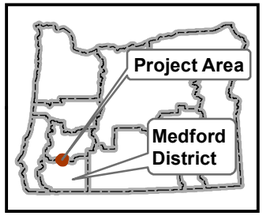
11/4/2015



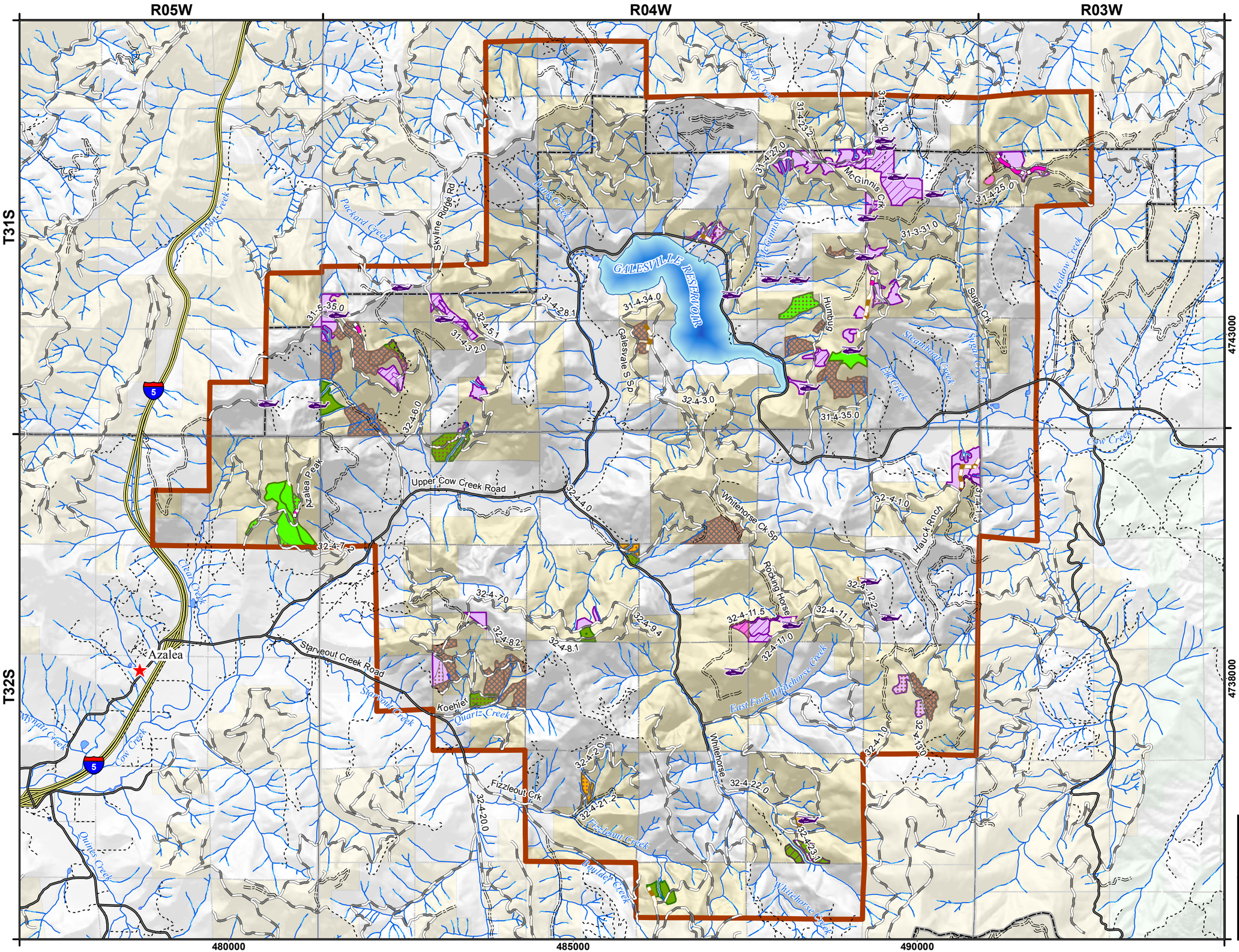
- Planning Area
- Resource Area Boundary
- Bureau of Land Management
- Variable Density Thinning / Understory Reduction
- Variable Density Thinning
- Restoration Thinning / Understory Reduction
- Understory Reduction
- Restoration Thinning
- Density Management
- Legacy Tree Culturing / Understory Reduction
- Legacy Tree Culturing
- Density Managment / Understory Reduction
- Cable Yarding
- Ground Base Yarding
- Helicopter Yarding
- Helicopter Landing
- Swing Roads
- Temporary Routes
- Interstate Highway
- Paved Road
- Rocked Road
- Natural Surface Road
- Not Known

0 0.5 1 Miles

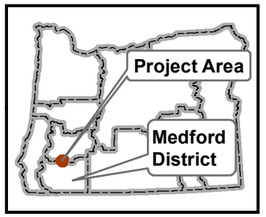
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.



Upper Cow EA
Alternative 3
11/4/2015



- Planning Area
- Resource Area Boundary
- Bureau of Land Management
- Variable Density Thinning / Undestory Reduction
- Variable Density Thinning
- Restoration Thinning / Understory Reduction
- Understory Reduction
- Restoration Thinning
- Density Management
- Ground Based Yarding
- Cable Yarding
- Helicopter Yarding
- Helicopter Landing
- Swing Roads
- Temporary Routes
- Interstate Highway
- Paved Road
- Rocked Road
- Natural Surface Road
- Not Known

0 0.5 1 Miles

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