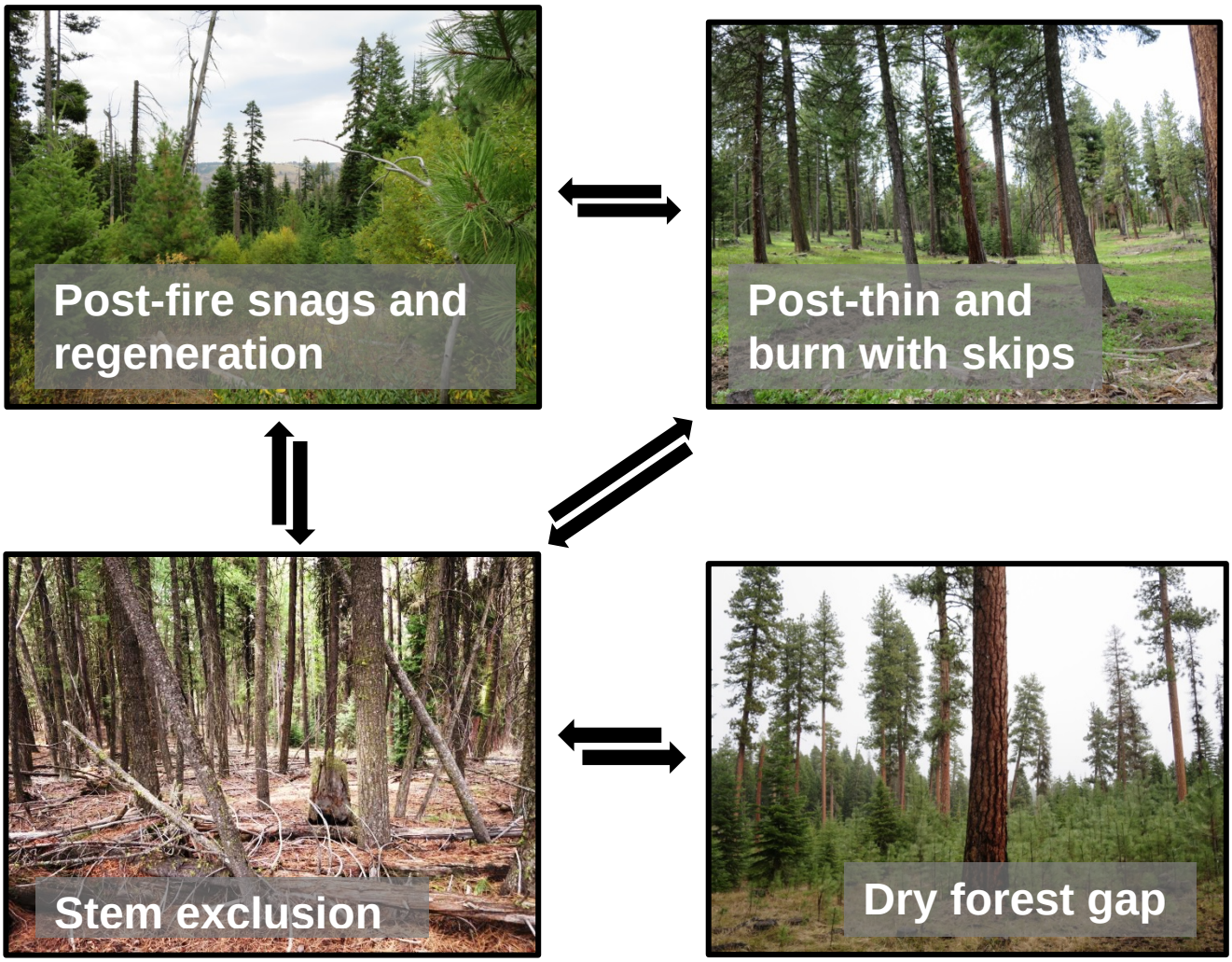
United States Department of Agriculture

Lower Joseph Creek Restoration Project

Final Environmental Impact Statement



In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at http://www.ascr.usda.gov/complaint_filing_cust.html and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by mail to U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Ave SW, Washington, D.C. 20250-9410; fax: (202) 690-7442; or email: program.intake@usda.gov.

USDA is an equal opportunity provider, employer, and lender.

Lower Joseph Creek Restoration Project
Final Environmental Impact Statement
Wallowa County, Oregon

Lead Agency: USDA Forest Service

Cooperating Agency: Wallowa County

Responsible Official: TOM MONTOYA, FOREST SUPERVISOR
1550 Dewey Ave., Suite A
Baker City, OR 97814

For Information Contact: MARRIANNE THOMAS, TEAM LEAD
72510 Coyote Rd.
Pendleton, OR 97801
541-278-3762

Abstract

This analysis addresses the impacts of implementing the Lower Joseph Creek Restoration Project (LJCRP). Action alternatives include the Modified Proposed Action, where thinning and mechanical fuel treatments across approximately 15,750 acres would encourage the development of landscape resilience, including large tree structure, understory plant diversity, forage productivity, characteristic fire and insect and pathogen disturbances, natural forest patterns, and provide income and opportunities for local communities to experience natural resource-dependent lifestyles. Thinning of largely younger trees across an additional 5,400 acres, which are in the process of recovery after stand replacement disturbance, would encourage the development of spatial heterogeneity and increase the proportion of early seral tree species toward a more resilient condition, consistent with historical reference conditions. 31 acres of meadow restoration to remove encroaching trees is also proposed. Prescribed burning on up to 90,000 acres (48,200 high priority acres) would reduce both natural fuel accumulations and those resulting from thinning; increase understory productivity and diversity; allow fire to perform its natural ecological role; and increase resilience to disturbance. The Modified Proposed Action and one additional alternative respond to issues related to the transportation system and vegetation treatments, particularly those within large tree dominated stands, or within designated old growth management areas, inventoried roadless areas, and Category 4 (intermittent, non-fish bearing streams) riparian habitat conservation areas.

Foreword

Joseph Creek Canyon is cut deeply into the flanks of the Blue Mountain geologic province north of the Wallowa Mountains. Just as deep are the closely held traditions and values of the diverse people who live in this rugged and remote part of the Pacific Northwest.

Located in the sparsely populated area where Idaho, Washington and Oregon touch borders, the land historically saw change measured in the passing of natural events including limited human use. Since "time immemorial", ancestors of the Nez Perce tribe traversed the Lower Joseph Creek landscape, hunting, fishing and gathering in the grasslands, forests and tributaries of Joseph Creek. Today, tribal members continue these traditions in the LJCRP area, along with members of the recreating public. The practice of intentional burning to improve the abundance of native plants and forage for game animals is seen in the charcoal traces left in soil, snags and stumps. Through this and other types of analysis, scientists are able to piece together a landscape that existed in historic times: one that was able to sustain forest and range plants; provide shelter and food for wildlife; and enable native people to hunt, fish and gather food to meet their needs.

Historic assemblages of plant communities, combined with forest stand age, structure, and the dispersal of plant communities are on the landscape, are considered to be indicative of optimal conditions for a sustainable environment. In the following document you will see this referred to as the "historic range of variability for potential vegetation groups" (HRV and PVG), or simply "range of variability" (RV).

Over the last two hundred years, increased human use that included the building of roads, increased grazing, suppression of fire and harvesting timber began to take a toll on the ability of the land to maintain optimal, sustainable health. People who love this landscape recognize the need to find a way to return Lower Joseph Creek Canyon to a condition that will ensure its ability to thrive through the centuries to come. In such a condition, the landscape is better able to endure and survive change such as longer drought, invasive plants and insects, and uncharacteristic fire. This protective quality is called "ecosystem resilience". Modern, forest management practices can make it possible to move toward this healthy, sustainable condition while also incorporating human needs and interactions.

In the Pacific Northwest (PNW), the current rate of restoration of forest resilience is not keeping pace with the need, particularly as it relates to the unintended effects of fire suppression on ecological health, public safety, and protection of resource values. Increased forest densification and shifts in tree species composition are ubiquitous conditions across the PNW. Hence, in 2013, the PNW Region of the U.S. Forest Service established the Eastside Restoration Strategy[1] (ERS). The ERS focuses on accelerating restoration of ecosystem resilience at ecologically-significant scales, and breaking barriers to restoration related to traditional planning and project implementation processes. The ERS included the establishment of a dedicated interdisciplinary team (Blue Mountains Restoration IDT) to plan two large scale, accelerated forest restoration projects in the PNW region's first geographic priority – the Blue Mountains of northeast Oregon and southeast Washington. The LJCRP is one of two regionally sponsored projects the Blue Mountains IDT is using to increase the landscape available for restoration, and increase the pace of planning. This project was intentionally designed to encompass a large scale – 100,000 acres versus the typical project size of tens of thousands of acres – and consciously test new planning processes, learn from successes and mistakes, and adapt.

The Forest Service team that helped facilitate the discussions leading to this document has seen the willingness of citizens to take a broader view of the landscape they use and cherish, and consider compromises. Although the groups and individuals who helped put this report together represent diverse needs and world views, they share in common the desire to rebuild and sustain this magnificent canyon ecosystem for future generations.

1 The Eastside Restoration Strategy is focused on accelerating the pace and scale of forest restoration on National Forest Systems lands throughout eastern Washington and Oregon to promote forest and community health.

Chapter 1 states the purpose for the project and explains the environmental reasons (need) for the project. An overview of the LJCRP area introduces some of the important ecological concepts that will be used throughout the report.

Chapter 2 describes the landscape that would be affected by the project. You will learn about Lower Joseph Creek Canyon, its history, location and how it has changed from historic, desired conditions to the current conditions. Specific details have been included to explain these changes from the perspective of the physical environment (including climate, soils and streams), biological environment (plants, birds, animals) and social environment (the heritage, interests, impacts and needs of people).

Chapter 3 will take you through the collaborative process applied to the development of this project. It will talk about the different groups who came together to work on the needs and issues described in chapter one; the steps that were taken to identify areas of agreement and disagreement about management techniques for addressing the needs of the landscape. These discussions lead to a number of alternative ideas for how to reach a “resilient” ecosystem. Ultimately, three alternatives were analyzed. Alternative one would be to take no action. Alternative two represents a modified version of the initial Forest Service proposal for the project area. Accordingly, this option is also referred to as the “modified proposed action”. Alternative three differs from two in the “key areas of disagreement” (roads, maximum size of harvested trees and locations of active forest management).

Chapter 4 will examine the direct and indirect consequences of following each of the alternatives. This information describes the specific impacts that each alternative would have on the physical, biological and social environments referenced in chapter one. Of the three alternatives, the Forest Service has selected Alternative 2 as providing the best scenario for moving the land within the Lower Joseph Creek Restoration Project area from current conditions to desired conditions while also integrating human needs, traditions and values.

Following Chapter 4 is a section of information on the individuals, teams and other agencies that worked together to develop the alternatives and analyses presented in this document.

Maps are included in a separate map packet (Appendix A). Explanatory sidebars, a glossary and a list of acronyms are provided to help the reader obtain a fuller understanding of the project. Extensive and detailed background information regarding specific environmental issues is included in the appendix and project record.

Project Record

Additional documentation, including detailed specialist reports underlying the background and analyses supporting this FEIS, is available from the administrative record (project record) at:

Wallowa Mountains Office, 201 East Second Street/P.O. Box 905, Joseph, OR 97846
541-426-5546.

The format of this FEIS follows the Council on Environmental Quality (CEQ) recommended content (40 CFR 1502.10). This report will tell the story of the Lower Joseph Creek Restoration Project in four chapters.

Summary

The purpose of the Lower Joseph Creek Restoration Project (LJCRP) is to restore, maintain, and enhance forest resiliency to natural disturbances; protect natural resources at risk to uncharacteristic

wildfires and insect and disease outbreaks; contribute to local economic and social vitality; modify fire behavior potential; and improve future forest, and fire management.

In addition to the desired outcomes expressed in Forest Service plans and policies, the recommendations in this document were guided by input from tribes, cooperating governments, interest groups, and the public.

The Forest Service facilitated a collaborative process which identified three significant issues impacting management options considered for the area targeted by LJCRP:

1. **Selecting the best vegetation treatments** to restore forest structure and composition toward a more resilient condition, in-part represented by the historic range of variation (HRV; particularly regarding the size and species of trees to retain or harvest);
2. **Choosing the type of forest management needed** in designated old growth management areas (Management Area 15), inventoried roadless areas, and riparian habitat conservation areas to move toward HRV; and
3. **Identifying the best network of roads** to allow for recreation, harvesting forest products, fire management, accessing private inholdings, administration, and other uses, while also reducing or eliminating the adverse impacts that roads may have on forest habitats and riparian resources.

Scoping generated one alternative (Alternative 3) to the proposed action for achieving the purpose and addressing the needs of the project, while also addressing the significant issues noted above. The FEIS analyses three alternatives, including the no action (Alternative 1) and two action plans (Alternatives 2 and 3). Key differences between Alternatives 2 and 3 include:

- The extent of upland forest thinning
- Acreage to be treated in riparian habitat conservation areas and old forest management allocations
- The number of acres treated in inventoried roadless areas
- The extent of high priority prescribed burning
- The length of the road network for open, closed, and decommissioned roads.

The effects of restoration and related activities were assessed between the action alternatives, and the beneficial and adverse effects of alternative management approaches have been summarized.

Alternative 2 is the preferred alternative.

Acronyms

AQI - Air Quality Index
BA – Biological Assessment
BE – Biological Evaluation
BMP – Best Management Practice
BO – Biological Opinion
CEQ – Council on Environmental Quality
CFR – Code of Federal Regulations
CMP – Comprehensive Management Plan
CWPP - County Wildfire Protection Plan
DSC – Detrimental Soil Conditions
DBH – diameter breast height
DCH – Designated Critical Habitat
DecAID - Decayed Wood Advisor
DEIS – Draft Environmental Impact Statement
DOGMA – Dedicated Old Growth Management Area
DSC – Detrimental Soil Conditions
DUF – Dry Upland Forest
EIS – Environmental Impact Statement
ENSO - El Nino Southern Oscillation
EPA – Environmental Protection Agency
ERS – Eastside Restoration Strategy
ESA – Endangered Species Act
FEIS – Final Environmental Impact Statement
FRCC – Fire Regime Condition Class
FSH – Forest Service Handbook
GHG – Green House Gas
GIS – Geographic Information System
GS - Group selection
HCNRA – Hells Canyon National Recreation Area
HEI – Habitat Effectiveness Index
HRV – Historic Range Of Variability
ICBEMP –Interior Columbia Basin Ecosystem Management Project
IPCC - Intergovernmental Panel on Climate Change
IRA – Inventoried Roadless Area
IT – Intermediate treatment
LJCRP – Lower Joseph Creek Restoration Project
LOS - Late-Old Structural Stages
LRMP – Land and Resources Management Plan
LWD – Large Woody Debris
MA – Management Area
MCR -Middle Columbia River
MIS – Management Indicator Species
MUF – Moist Upland Forest
MVUM – Motor Vehicle Use Map
NAAQS - National Ambient Air Quality Standards
NEPA – National Environmental Policy Act
NHPA - National Historic Preservation Act
NFMA – National Forest Management Act
NTMBS - Neotropical Migratory Bird Species

NOI – Notice of Intent
NFPORS - National Fire Plan Operations and Reporting System
NFS – National Forest System
OFMS - Old Forest Multi-Strata
OFSS - Old Forest Single Strata
OHV – Off-Highway Vehicle
PFA – Post-fledgling area (goshawk)
PCE - Primary Cavity Excavators
PVG – Potential Vegetation Group
PWA - Potential Wilderness Area
RACR - Roadless Area Conservation Rule
RHCA – Riparian Habitat Conservation Area
RMO - Riparian Management Objectives
RNA – Research Natural Area
ROD – Record of Decision
ROS – Recreational Opportunity Spectrum
RV – Range of variability
SI – Stand improvement
STS – Single tree selection
TES – Threatened and endangered species
USDA – United States Department of Agriculture
USFWS – US Fish and Wildlife Service
WEPP -Water Erosion Prediction Project
WMU – Wildlife Management Unit
WUI -Wildland Urban Interface
WWNF – Wallowa-Whitman National Forest

Acknowledgements
In addition to those who helped prepare this FEIS (see “Preparers”, following Chapter 4), the Blue Mountains Restoration Strategy Interdisciplinary Team would like to acknowledge the input, collaborative efforts, inspiration, and support of the following people and organizations: Wallowa-Whitman Forest Collaborative, Wallowa Resources, Blue Mountains Coalition of Collaboratives, Jimmy Kagan, Institute for Natural Resources, Mark Stern, The Nature Conservancy, Nicole Valliant, Western Wildland Environmental Threat Assessment Center, U.S. Forest Service Region 6 and Forest Health Protection staff, and Kevin Martin, Forest Supervisor, and his staff at the Umatilla National Forest.

Contents

Abstract....iii
Foreword....iii
Project Record....v
Summary....5
Acronyms....7
CHAPTER 1 Purpose and Need for Action....1
Summary....1
The Need for Restoration and Project Purpose....1
The Lower Joseph Creek Landscape…A story of vegetation, water and fire....2
CHAPTER 2 Affected Environment....7
Summary....7
Biological Environment....7
Vegetation and Disturbance....7
Physical Environment....35
Climate....35
Social Environment....40
Socioeconomics....40
Tribal Relations....41
Heritage Resources....42
Research Natural Areas....43
Recreation....43
Scenery....44
Inventoried Roadless Areas....47
Potential Wilderness Areas....50
Other Undeveloped Lands....51
Areas Identified as Roadless by Oregon Wild (OW)....53
CHAPTER 3 Public Involvement, Issues, the Proposed Action and Alternatives....55
Summary....55
Proposed Forest Plan Amendments....55
Significant Issues....56
Non-Significant Issues....56
Background....58
Forest Plan Direction, Travel Management Planning, and other Key Planning Policies....58
Decision Framework....60
Public Involvement....60
Tribal Consultation....61
Alternative Development Process....61
Monitoring and Learning....62
Alternatives Considered in Detail....65
Alternative 1....65
Alternative 2 – The Modified Proposed Action....65
Alternative 3....74
Summary of Key Thematic Differences between the Alternatives....76
Activities Common to All Action Alternatives....77
Alternatives Considered but Eliminated from Detailed Study....80
Summary of Alternatives....81
CHAPTER 4 Environmental Consequences....83
Summary....83

Direct, Indirect, and Cumulative Effects by Alternative 84
Spatial and Temporal Context for Project Level Effects Analyses 84
Past, Present, and Reasonably Foreseeable Actions 85
Comparison of Effects of the Alternatives 86
Alternative 1: Direct, Indirect, and Cumulative Effects 88
The Physical Environment 88
The Biological Environment 89
The Social Environment 101
Cumulative Effects 108
Unavoidable Adverse Effects 108
Alternatives 2 and 3 108
Effects Common to all Action Alternatives 108
The Physical Environment 108
The Biological Environment 117
Effects Common to all Habitats 124
The Social Environment 134
Cumulative Effects Common to Alternatives 2 and 3 145
Short-term Uses/Long-term Productivity 161
Unavoidable Adverse Effects 161
Irreversible/Irretrievable Commitments of Resources 161
Alternative 2: Direct, Indirect, and Cumulative Effects 162
The Physical Environment 162
The Biological Environment 162
The Social Environment 185
Cumulative Effects 203
Unavoidable Adverse Effects 209
Irreversible/Irretrievable Commitments of Resources 209
Alternative 3: Direct, Indirect, and Cumulative Effects 209
The Physical Environment 209
The Biological Environment 210
The Social Environment 226
Cumulative Effects 233
Unavoidable Adverse Effects 237
Irreversible/Irretrievable Commitments of Resources 237
Alternatives 2 and 3 – Effects of Not Amending the Forest Plan 237
Other Required Disclosures 238
CHAPTER 5 Preparers and Contributors 240
U.S. Forest Service Blue Mountains Restoration Strategy Interdisciplinary Team 240
Federal, State, and Local Agencies 240
Tribes 240
Agencies, Organizations, and Persons to whom Copies of the Statement were Sent 242
Distribution of the Environmental Impact Statement 242
Agencies 242
Organizations 242
Individuals 243
Tribes 243
Index 244
Bibliography 246
Glossary 260
Appendix A – Maps (In a separate map packet) 306
Appendix B - Forest Plan Direction, and Other policies, Laws, Regulations, and Agreements 307

Tiering and Incorporating by Reference 307
Forest Plan Management Direction 307
Policies, Treaties and Regulations Pertinent to the LJCRP 308
Legal Requirements and Required Disclosures 309
Plan Amendments 314
Appendix C - Landscape Modeling Methods 317
State-and-transition Modeling Overview 317
Reference Condition by Land Type Association 326
Climate Informed Modeling 330
Effects of Past, Present and Projected Potential Future Forest Treatments on Large Tree Numbers 336
Appendix D – Burn probability modeling methods and summary of results 350
Inputs 350
Outputs 350
Appendix E – Proposed, Threatened, Endangered, Sensitive Wildlife and Aquatic Species (TES) 355
Appendix F - Region 6 Sensitive Plants documented on the Wallowa-Whitman National Forest and effects calls the LJCRP 360
Appendix G - Nez Perce Tribe (NPT) Consultation and Coordination Record 369
Appendix H. Non-native Invasive Plants Documented in LJCRP area 373
Appendix I – Response to Comments on the DEIS 376
Content Analysis Process 376
Coding Structure 377
Organized Response Report 380
Summary of Comments and Responses by Category 381
Comment Letters from Agencies 506
Appendix J - Project Design Features, Mitigation Measures and Best Management Practices 540
Project Design Features 540
Sensitive Plants 540
Special Habitats 540
Noxious Weeds 541
Range 542
Soils 542
Tribal Relations 544
Heritage Resources 545
Scenery 546
Wildlife 547
Vegetation Management 552
Prescribed Fire 557
Best Management Practices – Water Quality 557
General Planning Activities 557
Aquatic Ecosystems Management Activities 560
Chemical Use Management Activities 566
Road Management Activities 569
Facilities and Nonrecreation Special Uses Management 586
Wildland Fire Management Activities 587
Minerals Management Activities 592
Mechanical Vegetation Management Activities 596
Appendix K – Roads Analysis 606

List of Tables

Table 1. Comparison of existing and desired conditions of selected attributes for the Lower Joseph Creek Restoration project area 6
Table 2. Extent of major vegetation types in the Lower Joseph Creek Restoration project area 8
Table 3. 2004 to 2013 – Approximate acres of forest vegetation management activities and wildfire in the Lower Joseph Creek Restoration Project area 9
Table 4. Status of ongoing projects in the Lower Joseph Creek Restoration Project Area aside from forest vegetation management. 9
Table 5. Description of fire regime groups (from Barrett et al 2010). 12
Table 6. Desired and existing fire regimes for the major vegetation types within the project area (Adapted from Barrett et al. 2010 and Stine et al. 2014). 12
Table 7. Severity class and effects to upper level canopy replacement. 13
Table 8. Existing and desired fire severity probabilities for the dry and moist upland forest potential vegetation groups. 14
Table 9. Prioritization scheme for identifying the highest ecological benefit to re-introduce fire. 14
Table 10. Insect and disease susceptibility in the Lower Joseph Creek Restoration Project area 16
Table 11. Distribution of forest structural stages in the Lower Joseph Creek Restoration Project area 18
Table 12. Current forest cover type distribution for the Lower Joseph Creek Restoration Project, and the natural range of variation in cover types for the Blue Mountains. 19
Table 13. Distribution of tree density classes in the Lower Joseph Creek Restoration Project area 20
Table 14. Tree size class distribution in the Lower Joseph Creek Restoration Project area. 20
Table 15. Diversity by plant communities, species richness, percent native species and Shannon diversity index for LJCRP 21
Table 16. Wildlife management indicator species identified in the Wallowa-Whitman Forest Plan. 25
Table 17. HEI and Cover percentages for desired (Forest Plan) and existing conditions within the Lower Joseph project area. 27
Table 18. Population Trend data Rocky Mountain Elk (ODFW 2014) 28
Table 19. USDA Forest Service Region 6 Regional Forester's sensitive wildlife species with habitat suspected or known to be in the LJCRP area, and descriptions of desired conditions 30
Table 20. Riparian Management Objectives for the LJCRP. 37
Table 21. Results of aquatic habitat surveys for streams within the Lower Joseph project area. 37
Table 22. Water quality limited waters associated with the Lower Joseph Creek Restoration Project analysis area. 38
Table 23. Generalized vegetation by soil type for the LJCRP 39
Table 24. Size class and acres of other undeveloped lands in the LJCRP Area 52
Table 25. Acres of Oregon Wild's roadless area that overlaps with other lands identified in LJCRP. . 53
Table 26. Forest Plan Management Areas within the LJCRP boundary. 59
Table 27. Acres of harvest and stand improvement by Forest Plan management area for Alternative 2. 67
Table 28. Percent of amendment area (percent of 5,000 acres) by existing and projected post-treatment conditions. 71
Table 29. Acres of harvest and stand improvement by Forest Plan management area for Alternative 3. 74
Table 30. Descriptions of alternatives for the Lower Joseph Creek Restoration Project 76
Table 31. Description of forest vegetation treatment types 77
Table 32. Comparison of restoration actions and effects by alternative 81
Table 33. Comparison of selected effects of the alternatives 86

Table 34. Pileated woodpecker source habitat conditions by alternative 94
Table 35. Northern goshawk source habitat conditions by alternative 95
Table 36. Source habitat for American marten by alternative 96
Table 37. Habitat effectiveness index and cover percentages for the alternatives within the LJCRP area 97
Table 38. Road densities by management area and subwatershed currently and by alternative for the Lower Joseph project area. 97
Table 39. TES wildlife species effects by alternative. 100
Table 40. Nez Perce Concerns Considered for Analysis 103
Table 41. PM10 emissions in the Grande Ronde Basin for prescribed fire and wildfire 116
Table 42. Relationship of treatment intensity to the desired post treatment density class 119
Table 43. Summary of impacts to American marten habitat (acres) by alternative at the scale of the project area as well as the entire Wallowa-Whitman NF. 127
Table 44. Summary of impacts to pileated woodpecker habitat by Alternative (acres of source habitat) 128
Table 45. Summary of impacts to Northern Goshawk habitat (acres) by alternative 129
Table 46. Activity restrictions according to the Blue Mountains Project Design Criteria 132
Table 47. High priority prescribed fire areas by action alternative. 142
Table 48. Amount of high priority prescribed fire within potential wilderness areas by action alternative. 144
Table 49. Alternative 2 – Acres by cutting treatment type in the LJCRP area 164
Table 50. Alternative 2 - Acres by logging system 165
Table 51. Alternative 2 – Post treatment distribution of forest cover types in the LJCRP area 166
Table 52. Alternative 2 – Post treatment distribution of forest structural stages in the LJCRP area 166
Table 53. Alternative 2 – Post treatment distribution of tree density classes in the LJCRP area 167
Table 54. Alternative 2 – Post treatment tree size class distribution in the LJCRP area 167
Table 55. Alternative 2 – Post treatment insect and disease susceptibility in the LJCRP area 169
Table 56. Total road density by subwatershed within the Upper Joseph Watershed by alternative 175
Table 57. Total road density by subwatershed within the Lower Joseph Watershed by alternative 175
Table 58. Percentage of treated forest in Alternative 2 where trees >21 in. dbh could potentially be removed. 179
Table 59. Acres of forest treatments by potential vegetation group (PVG) within MA 15 in Alternative 2 183
Table 60. Distribution of structural stages in old growth preservation areas (MA15) currently and by alternative for the LJCRP area 183
Table 61. Forest treatment acres within connectivity corridors by alternative for the LJCRP 183
Table 62. Present net value for Alternative 2. 185
Table 63. Projected employment by major industry for the proposed alternative 186
Table 64. Acres of harvest and stand improvement treatment by IRA in Alternative 2. 195
Table 65. Affected acres in potential Wilderness areas. 201
Table 66. Change in acres of other undeveloped land in Alternative 2. 202
Table 67. Acres of harvest and stand improvement within unroaded areas identified by Oregon Wild 203
Table 68. Alternative 3 – Acres by cutting treatment type in the Lower Joseph Creek Restoration Project area 212
Table 69. Alternative 3 - Acres by logging system 212
Table 70. Alternative 3 – Post treatment distribution of forest cover types in the Lower Joseph Creek Restoration Project area 213
Table 71. Alternative 3 – Post treatment distribution of forest structural stages in the Lower Joseph Creek Restoration Project area 214

Table 72. Alternative 3 – Post treatment distribution of tree density classes in the Lower Joseph Creek Restoration Project area 214
Table 73. Alternative 3 - Tree size class distribution in the Lower Joseph Creek Restoration Project area 215
Table 74. Alternative 3 – Post treatment insect and disease susceptibility in the Lower Joseph Creek Restoration Project area 217
Table 75. Present net value for alternative 3 226
Table 76. Projected employment by major industry for Alternative 3 227
Table 77. Acres of harvest and stand improvement within OW outside of PWA, IRA and Other Undeveloped Land under Alternative 3. 233
Alternative 2Alternative 2Alternative 2Alternative 2Alternative 2Alternative 2Alternative 2Alternative 2Alternative 2Alternative 2Alternative 2Alternative 2Alternative 2

List of Maps (Appendix A)

Map 1. Location of the Lower Joseph Creek Restoration Project
Map 2. Watershed Condition Framework ratings for the LJCRP area
Map 3. Lower Grande Ronde subbasin and watersheds of the Lower Joseph Creek Restoration Project
Map 4. Droughty soils within the Lower Joseph Creek Restoration Project
Map 5. Non-native invasive plant species found within the LJCRP area
Map 6. Current level of connectivity between designated old groth (MA15) and other late seral old forest.
Map 7. Current forest canopy cover classes across the LJCRP area.
Map 8.Water quality limited waters associated with the Lower Joseph Creek Restoration Project
Map 9. Soils of the Lower Joseph Creek Restoration Project
Map 10. Five Panel Map illustrating application of FSH 1909.12 Chapter 71 potential wilderness criteria
Map 11a. Wallowa-Whitman Forest Plan management areas and proposed Alternative 2 treatments within the Lower Joseph Creek Restoration Project boundaries
Map 11b. Wallowa-Whitman Forest Plan management areas and proposed Alternative 3 treatments within the Lower Joseph Creek Restoration Project boundaries
Map 12. Existing condition – road status
Map 13. Alternative 1 - Road status
Map 14. Alternative 2 -Forest vegetation treatments
Map 15. Alternative 2 - Road network
Map 16. Alternative 3 - Vegetation treatments
Map 17.Alternative 3 - Road network
Map 18. Landforms of the Lower Joseph Creek Restoration Project
Map 19. Grazing allotments of the Lower Joseph Creek Restoration Project and Alternative 2 vegetation treatments
Map 20. Alternative 2 - Prescribed fire priorities
Map 21. Alternative 3 - Prescribed fire priorities
Map 22. Overlap of vegetation treatments under alternatives 2 and 3 with IRA, PWA, and other undeveloped lands
Map 23. Overlap of vegetation treatments under alternatives 2 and 3 with areas identified as unroaded by Oregon Wild
Map 24. Sensitive plant surveys and locations in the Lower Joseph Creek Restoration Project area

List of Figures

Figure 1. Dry forest “stringers” interspersed with grasslands in the Lower Joseph Creek Restoration Project area. 3
Figure 2. Dry old forest multistory condition in the LJCRP area. Remnant old ponderosa pine trees stand over recently established Douglas-fir and grand fir, illustrating increased fuel loads, and the vulnerability of old trees to loss to uncharacteristic fire. 11
Figure 3. Description of forest structural stages. 18
Figure 4. Nez Perce Indian Claims Commission Boundary and 1855 and 1863 Treaty Lands Cessions (adapted from Nez Perce 2013) 42
Figure 5. Developed recreation within the LJCRP area. 45
..... 78
Figure 6. Example of single tree selection and prescribed fire post-treatment in dry forest. 78
..... 78
Figure 7. Example of a group selection about 10 years post-treatment. 78
Figure 8. Active restoration opportunities by seral stage for the LJCRP within and outside of IRAs. 196
Figure 9: LJCRP inventory of cut and leave trees under Alternative 2 within the Joseph Canyon, Wildhorse, and Cook Ridge IRAs. 197

This page intentionally left blank.

CHAPTER 1 Purpose and Need for Action

Summary

The purpose of the Lower Joseph Creek Restoration Project (LJCRP) is to restore ecological resilience to the project area while addressing human needs and uses. The area looks different from historical conditions in many ways, and the most relevant changes with respect to this project are changes in vegetation structure, species composition, species distribution, and disturbance regimes.

The past land management practices, while considered appropriate for the time, have resulted in changes in the forest landscape that are now not considered healthy, resilient, or sustainable. A warming climate, with reduced snowpack and longer dry periods, will only accentuate the effect of these changes on forest health. Furthermore, the current rate of restoration of forest resilience in the PNW Region is not keeping pace with the rate of ecosystem degradation, creating a need to accelerate restoration at ecologically-significant scales.

There is an opportunity to use the tools of active forest management (excess tree removal and landscape burning) to restore resilience to these systems, while supporting local economies with raw material and jobs.

Table 1 succinctly displays the difference between the existing and desired conditions. There is a need to:

- Increase ponderosa pine coverage
- Reduce the amount of Douglas-fir and white fir in mixed stands
- Increase the amount of single-story, old forest stands, and reduce the mid-story and understory of multi-story old forest stands
- Improve opportunities to manage fire at characteristic frequencies and severities.

The LJCRP is on the Wallowa Valley Ranger District of the Wallowa-Whitman National Forest (WWNF), in the Blue Mountains of northeast Oregon (Map 1, Appendix A). The project area includes only NFS lands within the larger analysis area. The analysis area for this FEIS encompasses the entire Lower Joseph Creek watershed, and portions of the Upper Joseph Creek watershed - or as defined specifically by resource - and defines the area considered in the evaluation of direct, indirect, and cumulative effects. Alternative management actions analyzed in this FEIS only apply to NFS lands.

The Forest Service has prepared this environmental impact statement in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. This Environmental Impact Statement discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The environmental consequences of the agency's proposed action and the alternative actions are compared and contrasted in Chapter 3.

The Need for Restoration and Project Purpose

Due primarily to increased populations, and the types of land management following European settlement (e.g., fire suppression, timber harvest, domestic livestock grazing, road construction), current conditions of the LJCRP area differ from desired conditions to varying degrees. Over the last few decades, land managers have increasingly understood the unintentional adverse consequences of

some land management policies and tactics such as selectively harvesting the largest trees, overgrazing, and fire suppression, and have adjusted management techniques to be more ecologically appropriate. Nonetheless, the LJCRP area continues to exhibit reduced health and resiliency as a result of the past policies, and is in need of restoration. Local communities remain natural resource dependent to some degree, and need the raw material and jobs provided by restoration work and continued maintenance. This project is expected to move the Lower Joseph Creek landscape toward a more desirable, resilient condition that will support lasting human resource uses, forest structure and pattern, forest health, natural disturbance regimes, vegetation composition and diversity, soil productivity, fish and wildlife habitat, and watershed function. By applying effective land management techniques, the project aims to move from current to desired, sustainable environmental conditions for future generations.

The Lower Joseph Creek Landscape…A story of vegetation, water and fire

The LJCRP lies on the eastern side of the Blue Mountains ecoregion, which extends from the Redmond area of Central Oregon, to Hells Canyon on the Snake River. The Blue Mountains are lower and more open than the neighboring Cascades and Northern Rocky Mountains.

The area sits on the northern boundary of the WWNF, approximately 20 miles north of Enterprise, Wallowa County, Oregon (Map 1). It is bounded by Cold Springs Ridge to the northeast, Forest Road 46 to the east, Elk Mountain to the south, and Oregon Highway 3 on the west. The northeast side of the project area includes portions of the Hells Canyon National Recreation Area (HCNRA).

Other lands adjacent to the LJCRP analysis area are either under private ownership (to the west, north and southwest), federal jurisdiction in the Hells Canyon National Recreation Area (HCNRA) (to the east), or part of the WWNF (to the south and southeast). Lands under private ownership are managed primarily for grazing, timber production, and hunting. An analysis conducted during the Watershed Condition Framework Assessment by the WWNF indicate slightly more impaired watershed function on some adjacent private lands than that of the federal lands and those lands managed by the Nez Perce (Map 2). The Nez Perce are actively engaged in restoration activities on lands known as Precious Lands to the north of the project area (Map 1). The HCNRA has lower road densities and its management has been less intensive than much of the surrounding federal lands. The surrounding Forest Service lands have been managed with similar overall intensity and its watershed function was similarly classified as “functioning at risk”.

The LJCRP contains NFS lands in the upper reaches of the Joseph Creek drainage, which is a tributary to the Grande Ronde River (Map 3). The project area is characterized by deep forested canyons interspersed with very steep, grass-covered side slopes and jagged basalt outcrops. Joseph Canyon is the birthplace of Chief Joseph and is the traditional homeland of the Chief Joseph Band of the Nez Perce tribe. Prior to European settlement, the Nez Perce used the canyon bottomlands as a travel corridor during their seasonal rounds – the annual pattern of following food production - traveling between summer camp sites in the Wallowa Valley to winter camp sites along the Grande Ronde and Snake rivers. Elk, bighorn sheep, and mule deer were plentiful, as well as native plant foods associated with bunchgrass habitat.

Vegetation of the LJCRP is generally composed of dry and moist coniferous forest (56% of project area), and grasslands and shrublands (43%) (Table 2). Elevations range from about 3,600 to 5,000 feet in the project area (NFS lands). The LJCRP project area provides habitat for a number of Forest Service management indicator species (MIS) and sensitive species, such as the northern goshawk,

pileated woodpecker, American marten, white-headed woodpecker, fringed myotis, Lewis' woodpecker, peregrine falcon, gray wolf, Townsend's big-eared bat, spotted bat, Rocky Mountain tailed frog, bald eagle, Snake River steelhead, redband trout, and Columbian spotted frog. Nez Perce lands on the northern boundary provide similar habitat for many of the same species (Sondenaa and Kozusko 2003).

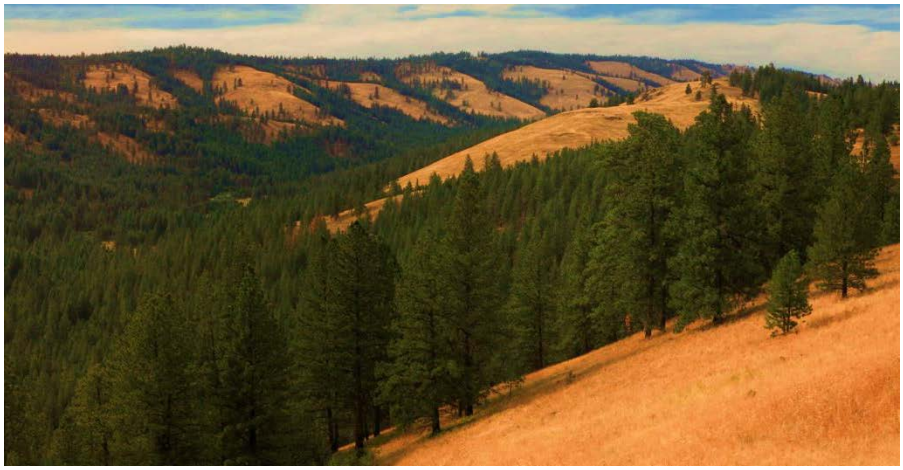


Figure 1. Dry forest "stringers" interspersed with grasslands in the Lower Joseph Creek Restoration Project area.

Natural ecosystems have been supporting the traditional cultural and socioeconomics of human populations for at least 10,000 years in North America, and natural ecosystem structures and functions have, at the same time, been affected by humans in both beneficial and adverse ways. Prior to Euro-American settlement, and continuing into the treaty era and present day, the Nez Perce Tribe has played a significant role in shaping the physical environment of their aboriginal homelands. "Wild" horticulture involving intentional "firing" of forests and prairies was used to improve hunting and "berrying" as well as increase the quantity and quality of camas, and other root and bulb species (Marshall 1999). Between the 1400s and 1800s, eastern Columbia plateau Indian tribes had a relatively light impact due to nomadic lifeways and reliance on predictable, managed and sustainable subsistence resources. In the 1700s, the Nez Perce began grazing horses, and in the 1830s began grazing cattle on the canyon grasslands. European settlement and increased population levels introduced more intensive resource uses and ecological impacts. Beginning in the mid-1800s, pioneer settlers homesteaded in the area, grazing sheep and cattle, raising hogs and planting fruit orchards. The watershed has been grazed continuously to some extent since the 1730s. However, the rocky terrain prohibited extensive agricultural production (Sondenaa and Kozusko 2003). The Wallowa Forest Reserve was established in 1905, and through additional reserves and consolidations of public lands, subsequently the area became part of the WWNF.

The LJCRP area experiences annual precipitation totals generally below 20 inches per year. Highest normal precipitation totals tend to be in winter and late spring. Monthly precipitation distribution is relatively uniform throughout the year. Drought is a common occurrence, and conditions are generally moisture-limited for tree growth. Annual temperature variations tend to be relatively large. Mean maximum temperatures are mostly in the 80's (^{0}F) in summer months and in the 30's in winter. The dry, clear summer days are usually followed by cool nights; nighttime lows generally average in the 40's (National Oceanic and Atmospheric Administration 2014).

Climate across the project area and the greater Blue Mountains is changing, and these changes will influence local ecosystems and their role in human communities.

Distinctive features of the LJCRP area include:

- Joseph Creek, which is the primary drainage for the analysis area and is fed by several other minor tributaries before terminating in the Grande Ronde River, less than five miles before it meets the Snake River. Joseph Creek is a designated stronghold[2] by the Nez Perce tribe for Snake River steelhead (Nez Perce Tribe 2013).
- Vegetation mosaics of dry and moist forest, ponderosa pine savanna, and grassland. Vegetation displays moderate departure from natural ranges of variation in structure and composition.
- Canyons with high runoff potential, capped by more stable and highly productive incised plateaus with higher water infiltration, and lower runoff potential.
- Rich mollisol soils, a temperate climate, and historically frequent low severity fire regimes, which in the absence of fire suppression, naturally favor largely open, fire-adapted forests and grasslands.
- Snake River Steelhead, which is listed as threatened under the Endangered Species Act (ESA).
- Five plant species listed as sensitive on the USFS Regional Forester's sensitive species list.
- Populations of big game, such as Rocky Mountain elk, and habitat for other wildlife species of interest such as pileated woodpecker, American marten, northern goshawk, and flammulated owls.
- Approximately 42 miles of designated Forest Service trails, and 328 miles of NFS roads.
- Eighteen domestic grazing allotments and sources of wood fiber for the forest products industry.
- Remoteness from human population centers, and relatively low visitation. Aside from use by domestic grazing permittees, human use occurs mainly during the hunting season and consists primarily of horseback riding, hiking, firewood cutting, and motorized vehicle use.

Ecosystem Resilience

Resilience is maintained by a dynamic range of species, structure, vegetation patterns, and patch size distributions that emerge under the constraints of the climate, geology, disturbance regimes, and biota of the area.

This project draws on some key ecological factors that provide a foundation for analysis of departure between current and desired conditions.

- **Disturbance Regimes:** Insect infestations, flood, fire and drought are some examples of "disturbance regimes" or categories of short-term changes that can have long-term environmental consequences.
- **Ecosystem Resilience:** Highly resilient ecosystems are better able to survive natural disturbances such as fire, insects, diseases, and climate change than less resilient ones (USDA Forest Service 2013). Ecosystems are most resilient and resistant to disturbance when they are similar to conditions under which they developed over the long term (Morgan et al. 1994).

[2] Designated strongholds represent areas with historically high production, focal areas for recent tribal harvest, and are viewed as essential for long term population persistence.

A system in which natural levels of variation have been reduced will be less resilient to change than one exhibiting more natural variation (Holling and Meffe 1996).

- **Natural or Historic Range of Variation (RV or HRV)**: By restoring and maintaining natural ranges of ecosystem structures and functions, forest health and sustainability, and ecological resilience will be improved across the landscape. Information about historical ranges of variation often provides the best, if not the only, indication of natural, ecologically sustainable ranges of variation. Broad-scale assessments completed for the Blue Mountains physiographic province and the interior Columbia River basin suggest that upland forest ecosystems could be characterized as healthy, sustainable, and resilient if three of their ecosystem components – species composition, forest structure, and tree density – are within the natural, or historic range of variation (NRV, HRV), which developed under historical disturbance regimes (Gast et al. 1991, Caraher et al. 1992, Lehmkuhl et al. 1994, Quigley et al. 1996).

Table 1 compares existing and desired conditions for a suite of representative indicators of ecological health and resilience. Desired conditions are based on scientifically-derived, ecologically-based reference conditions, when available, and desired conditions in the Wallowa-Whitman National Forest Plan. Reference conditions (natural and/or historical ranges of variation) for forested and riparian vegetation, wildlife habitat, and disturbance processes have been estimated for the Blue Mountains National Forests through literature review (Powell 2012), and localized state-and-transition simulation modeling (Appendix C). Ecologically-based references for forest patterns were based on literature reviews, expert opinion, and quantitative analysis of historical patch size distributions from aerial photographs (Hessburg et al. 1999). Chapter 2 (Affected Environment) provides more information on the ranges in reference conditions and desired conditions used in this FEIS. These ranges of variation in conjunction with the Forest Plan and other policies and guidance, and collaboration with tribes, Wallowa County, and the public were used as the primary basis for developing the desired conditions for the LJCRP.

Table 1. Comparison of existing and desired conditions of selected attributes for the Lower Joseph Creek Restoration Project area

Indicator	Metrics	Units	Existing condition	Long-term desired condition
Vegetation structure and composition	Ponderosa pine cover type (% of dry upland forest)	%	28	50-80
	Douglas-fir cover type (% of dry upland forest)	%	51	5-20
	Old forest single story structure[3] (% of dry upland forest)	%	0	40-60
	Old forest single story structure (% of moist upland forest)	%	0	10-20
	Young forest and understory reinitiation structure (% of dry upland forest)	%	45	5-10
	Young forest and understory reinitiation structure (% of moist upland forest)	%	36	10-20
	High density class (% of dry upland forest)	%	33	5-15
	High density class (% of moist upland forest)	%	45	15-30
Insects and Pathogens	% of dry upland forest highly susceptible to defoliators	%	39	5-15
	% of dry upland forest highly susceptible to Douglas-fir bark beetle	%	45	10-25
	% of dry upland forest highly susceptible to Douglas-fir dwarf mistletoe	%	47	20-35
Ecological resiliency – fire	% Fire regime departure (vegetation departure) from HRV summarized at 5th field watershed level	%	29-39	<33
Riparian management objectives (RMO)	Qualitative measure of departure from HRV	Cate-gorical	Outside the acceptable range	Meet RMOs
Road Network	Open road density Management Area 1	Miles/sq mile	2.53-4.34	≤ 2.5
	Open road density Management Area 3		0.20-1.44	≤ 1.5
	Open road density HCNRA		0.54-1.37	≤ 1.35
	Total road density by subwatershed		0.7-3.3	≤ 2.0

[3] See Figure 5 for a description of forest structural stages.

CHAPTER 2 Affected Environment

Summary

This chapter summarizes the project area in terms of the physical, biological, and social environment. Forest ecosystems developed under the influence of disturbances, particularly fire, weather, insects, and diseases. Management practices have altered the influence of some of these processes, resulting in generally more continuous and dense stand structure, less old forests, and an increase in shade-tolerant, fire intolerant species. At the same time, there is a reduction in open forests, shrub, herb, and grassland habitats. Forest thinning and prescribed burning are two tools that can be used to restore landscape heterogeneity and resilience to natural and characteristic disturbances. The inherent assumption is that restoring the landscape toward historic, reference conditions will support healthier forests and more sustainable habitats for robust fish and wildlife populations.

The area is experiencing warmer temperatures, reduced snowpack, and a change in the annual distribution of precipitation compared to historical conditions, with effects on fire severity, stream flows and water temperatures, and vegetation distribution – further emphasizing the need to create resilient forest landscapes for the future. While reference conditions based on historical climate may be different from future reference conditions, the current conditions are enough departed from either reference condition that active management now will move the landscape toward either reference condition.

Affected Environment

This project affects physical, biological, and social and economic environments. Examples of these include:

Physical: soils, water, air, and climate

Biological: trees, grasses and forbs, invasive plants, mammals, birds, fish, and amphibians

Social/Economic: recreation, jobs, forest access, scenery, and tribal and cultural

Traditional, historic, and current uses of the area by humans are understood in terms of the importance of the area to the Nez Perce tribe and other county residents for exercising treaty rights, traditional recreational pursuits, and economic activity.

Biological Environment

Vegetation and Disturbance

This section describes the differences between desired and existing vegetation and disturbance conditions for the LJCRP area. One key focus of the project, as determined by project scoping and Forest Service regional and forest priorities, is the need for restoration of forest structure and composition. Other related considerations include the viability of threatened, endangered and sensitive plant, wildlife, and aquatic species; forested habitats supporting wildlife species; and forested riparian habitats supporting aquatic

Potential Vegetation Group

Potential vegetation is the vegetation that would occur in a particular place given the underlying environmental factors and natural disturbance regimes, unaltered by human intervention (Ramankutty, N. and J.A. Foley. 2010)

Potential vegetation groups define broad categories of vegetation with common species compositions.

systems and species. Table 2 summarizes the extent of potential vegetation groups (PVGs) (Powell et al. 2007) in the project area.

Table 2. Extent of major vegetation types in the Lower Joseph Creek Restoration Project area

Physiognomic Type	Potential Vegetation Group	Acres	% of Project Area (Physiognomic Type)	% of Project Area (Potential Vegetation Group)
Conifer		55,700	56%	
	Dry upland forest (DUF)	42,300		43%
	Moist upland forest (MUF)	13,000		13%
	Other	400		<1%
Non-Conifer		42,300	43%	
	Cold upland herb	30		<1%
	Moist upland herb	4,200		4%
	Dry upland herb	37,000		38%
	Dry upland shrub	950		1%
	Other	140		<1%
Unknown				
Totals		98,000	100%	100%

Present and Foreseeable Future Vegetation Management Activities

There are no forest vegetation management, fuels treatment, or prescribed burning activities that are ongoing (as of 2015) or are foreseeable within the project area.

Past Vegetation Management, Wildfires, and Ongoing Management Activities

Past harvest, fuels treatment, prescribed fire and wildfire have influenced the character of the natural fire regimes found in the LJCRP area. Table 3 lists approximate acres of the various vegetation management, fuels treatment and prescribed burning activities as well as wildfires that have occurred within the project area from 2004 to 2013. Table 4 summarizes ongoing non-vegetation management activities in the LJCRP area.

Vegetation management activities that have occurred in the project area over the last ten years includes 159 acres of tree planting after harvest and 826 acres of precommercial thinning within young, post disturbance stands. Mechanical vegetation management activities have mainly consisted of tree thinning. This includes 1,320 acres with an emphasis on improving forest structure, health and growth, 113 acres of uneven-aged management thinning of all age classes, and establishment of a new generation of trees.

Fuels treatments that have been accomplished in association with mechanical vegetation management treatments included 179 acres of thinning for hazardous fuels reduction, as well 583 acres of treatments with a primary focus of rearranging and reducing activity generated fuels (slash lopping, crushing, piling and jackpot burning) and 636 acres of pile burning.

Prescribed burns have been implemented on 868 acres to improve wildlife habitat, reduce natural fuels accumulations, and to reintroduce fire to fire adapted ecosystems.

Wildfires from 2004 to 2013 have burned on approximately 23,800 acres of the project area. These fires all burned within the same vicinity on the eastside of the project area and have substantial overlap between them. Of the acres burned, it is estimated that the overall average burn severity to the forested vegetation was 20 percent high severity, 60 percent mixed severity and 20 percent low severity. There is wide variability among these percentages from fire to fire due to these fires burning the same area multiple times.

Table 3. 2004 to 2013 – Approximate acres of forest vegetation management activities and wildfire in the Lower Joseph Creek Restoration Project area

Treatment	Treatment Type	Approximate Acres
Cultural	Tree Planting	160
	Precommercial Thin	800
Total Cultural:		**960**
Mechanical Vegetation Management	Commercial Thin	1,300
	Single-tree Selection Cut (UA/RH/FH)	40
	Group Selection Cut (UA/RH/FH)	80
	Sanitation Cut	3
Total Mechanical:		**1,420**
Fuels Treatments	Thinning for Hazardous Fuels Reduction	180
	Yarding - Removal of Fuels by Carrying or Dragging	90
	Piling of Fuels, Hand or Machine	460
	Rearrangement of Fuels	40
	Burning of Piled Material	640
Total Fuels Treatments:		**1,410**
Prescribed Burn	Broadcast Burn (Majority of Unit) - Wildlife Habitat	590
	Under burn (Majority of Unit) - Low Intensity	280
Total Prescribed Burn:		**870**
Wildfire	Jim Creek - 2006	360
	Cottonwood - 2007	8,400
	Cache Creek - 2012	15,000
Total Wildfire:		**23,760**

Table 4. Status of ongoing projects in the Lower Joseph Creek Restoration Project area aside from forest vegetation management.

Action or Activity	Treatment	Status
Range Management		
18 Livestock Allotments	Domestic grazing (The LJCRP area is part of the Joseph Creek Rangeland Planning Area. The Lost Cow, Jim Creek, Chesnimnus, Crow Creek, and the Chico Horse Pasture allotments have less than 200 acres each in the project area.)	Ongoing
Recreation and Public Uses		
Designated Campgrounds	Camping, recreational driving, hunting, collecting forest products	Ongoing
Regulation of Hunting Seasons	ODFW regulation of tags for the big game management units	Ongoing
Dispersed Camping	Camping, gathering firewood, recreational driving, and collecting forest products	Ongoing
Noxious Weed Treatment		
Treatments of New Weed Sites	Treating new noxious weed sites with herbicides as approved by the WWNF Invasive Species EIS.	Decision signed 2016
Treatment of Existing Weed Sites	Treating new noxious weed sites with herbicides as approved by the WWNF Invasive Species EIS.	Decision signed 2016
Transportation		
Road Maintenance	Grade roads 4600, 4602, 4605, 4615, 4650, 4655, 4680,. Clean culverts and ditches on all roads as needed	Ongoing

Natural and human-caused disturbance

Natural disturbances are those under which ecosystems developed and were maintained over the long-term (Hardy et al. 2001, Schmidt et al. 2002). Fire is the dominant natural disturbance regime in the project area. Disturbance regimes (e.g., fire, insects, disease, and weather events, including droughts and floods) can be described as a combination of frequencies and severities. Fire regime groups, naturally-occurring combinations of fire frequency and severity (Barrett et al. 2010) are a relevant way to describe fire regime conditions and effects at the scale of the LJCRP. Table 5 describes the characteristics of fire regime groups. Tables 5 and 6 compare desired and existing fire regimes, and probabilities of different fire severities for the major vegetation types within the project area. Current fire severity probabilities were modeled specifically for this project area (see Appendix D for modeling methods). This model uses historical fire ignition points and weather recorded for the day of the start. It does not model the 97th percentile extreme weather events that may coincide with fire ignition. This is especially important in the moist upland forest (13% of the LJCRP area) when considering the existing burn probability and the wide margin for average return intervals for each fire severity class (Table 5). Desired probability and average interval were derived from Landfire Rapid Assessment modeling and validated by local experts.

As a consequence of the past timber harvest, fire suppression, introduction of non-native plant species, and livestock grazing, the National Forests within the Blue Mountains are substantially different from those that existed a century ago (Munger 1917). Dry upland forests (43% of the LJCRP area) have experienced the greatest amount of departure from historical conditions. Fire history research across the Blue Mountains and western United States has provided support for local efforts to establish historical fire return intervals through fire and mechanical means (Hall 1977,

Crane and Fischer 1986, Agee and Maruoka 1994, Maruoka and Agee 1994, Heyerdahl and Agee 1996, Heyerdahl 1997, Olson 2000, Stephens et al. 2009, McIver et al. 2012). Dry upland forests have now missed several natural fire cycles due to over a century of fire exclusion and suppression, which has resulted in increases in fuel loadings and the number of smaller trees. The departure in dry forests from the range of variation (RV) in the HCNRA, in-part due to past wildfire, generally differs from the rest of the LJCRP area in that there is a greater abundance of younger forests in need of increased structural diversity and growth toward larger size classes. Additionally, historic grazing removed the fine fuels that carried low severity surface fires (Zimmerman and Neuenschwander 1984). Without competition from grasses, tree regeneration increased substantially (Kolb and Robberecht 1996). Tree regeneration that historically would have been thinned by fire continued to grow into dense stands and form multi-storied, closed canopies. The historically open stands within dry upland forest, with their mosaic pattern of tree clumps or patches and openings, have now filled in with younger trees, resulting in a more uniform stand structure, increased ladder fuels, increased stand densities, increased fuel continuity, and decreased spatial heterogeneity. Increased stand densities and a reduction in low severity fire events on dry sites have also contributed to a shift from shade intolerant, fire tolerant tree species, such as ponderosa pine and western larch, to more shade tolerant, fire intolerant species, such as grand fir (Figure 2). Increased stand densities have also contributed to a decrease in the abundance and diversity of understory grasses, forbs, and shrubs.

Figure 2. Dry old forest multistory condition in the LJCRP area. Remnant old ponderosa pine trees stand over recently established Douglas-fir and grand fir, illustrating increased fuel loads, and the vulnerability of old trees to loss to uncharacteristic fire.

Fire severity describes the effect of fire to the upper level canopy cover (Barrett et al. 2010) in terms of the percentage of replacement. Table 7 shows the severity classes and their respective levels of replacement. Shifts in the vegetation structure and composition of dry forests (single to multi-storied), density (ingrowth), and composition (increase of shade tolerant species) affect fire severity in several ways including increasing the likelihood of replacement severity crown fire due to increased fuel

loading and reduction in distance between surface and canopy fuels. An increase in fire intolerant species results in higher fire severity ratings due to their susceptibility to mortality as a result of fire.

Moist upland forest is one of the most variable PVGs in the Blue Mountains relative to species composition. Therefore it is also variable in associated disturbance regimes (frequency, severity and size). Fire behavior and effects to overstory vegetation are strongly related to seasonal drought stress, topography, existing cover composition and over-riding climatic factors, such as El Nino Southern Oscillation (ENSO) influences. Additionally the relative juxtaposition of these forests in relation to lower elevation dry upland forest and non-forest (grass and shrubland) influence the composition, frequency of disturbance and severity to overstory vegetation. The biophysical landscape within LJCRP indicates a high interrelationship between dry and moist upland forest and non-forest disturbance. Table 8 summarizes existing and historical fire severity probabilities by PVG for the Blue Mountains. Relatively frequent low to mixed severity fire would be expected to occur more often and replacement severity fire to occur more infrequently in the LJCRP area than indicated in Table 8 in moist upland forest, due to the patchy pattern of moist forest within the surrounding, more abundant matrix of dry forest. In general, replacement severity regimes in moist upland forests usually result in heterogeneous landscapes. Large, high-severity fires affecting large areas (10,000-100,000 acres) are usually rare events, and, subsequent mixed-severity fires are important for creating landscape heterogeneity. Within these landscapes a mix of stand ages and size classes are important characteristics; generally the landscape is not dominated by one or two age classes (Stine et al. 2014).

To restore fire-related disturbance regimes toward desired conditions in the LJCRP area, fuels must be strategically reduced in appropriate locations. Tools available to reduce fuels include thinning toward more natural forest structures, and the ecologically- and socially-appropriate use of planned and unplanned fire. For more detail on disturbance regimes of the project area, see the Vegetation/Disturbance specialist's report.

Table 5. Description of fire regime groups (from Barrett et al 2010).

Fire Regime Group	Frequency (years)	Severity	Severity Description
I	0 - 35	Low / Mixed	Generally low-severity fires replacing less than 25% of the dominant overstory vegetation; can include mixed-severity fires that replace up to 75% of the overstory
II	0 - 35	Replacement	High-severity fires replacing greater than 75% of the dominant overstory vegetation
III	35 - 200	Mixed / Low	Generally mixed-severity; can include low severity fires
IV	35 - 200	Replacement	High-severity fires
V	200+	Replacement / any severity	Generally replacement-severity; can include any severity type in this frequency range

Table 6. Desired and existing fire regimes for the major vegetation types within the project area (Adapted from Barrett et al. 2010 and Stine et al. 2014).

Vegetation Type	Existing Fire Regime (see table 33)	Desired Fire Regime (see table 33)	Description
Dry Upland Forest	Fire Regime Group III (IIIa)	Fire Regime Group I	Existing fire regime displays a higher proportion of the landscape experiencing moderate/mixed severity fire than characteristic of the vegetation type. Restoration of forest characteristics including fuel reduction would move the landscape toward a higher percent of low severity fire although some mixed and high would still be a desirable part of the vegetation type.
Moist Upland Forest	Fire Regime Group III (IIIb/IIIa)	Fire Regime Group III (IIIa)	Existing fire regime displays a lower proportion of replacement severity in this vegetation type than historically relative to the Blues as a whole; but a lower than average proportion may be characteristic for the LJCRP. However, effects would be uncharacteristic when compared to the desired Fire Regime Group of IIIa, which is typified by the majority of moist upland forest that exists in the LJCRP area as described by Stine et al. 2014. Fire return intervals have been missed but not at the same magnitude as the dry upland forest (DUF), however fuels accumulation rates far exceed DUF due to higher productivity soils and higher moisture availability. This means it takes fewer missed return intervals to create an uncharacteristic fuel loading and resultant fire behavior.
Non-Forest	Fire Regime Group II	Fire Regime Group II	The non-forest systems are dominated by replacement severity fire disturbance that consumes the majority (>75%) of the overstory vegetation (e.g. grass, shrub, etc.). The bunchgrasses, however, rarely die in fires, and most of the shrub species, with the exception of sagebrush and bitterbrush are rhizomatous and root/crown sprout after fire. Fire effects to overstory vegetation have not departed from historical or desired conditions; however, grazing and presence of invasive species have changed the system such that certain areas are highly vulnerable to undesirable effects from fire . Fire exclusion in these areas has been effective in creating a similar number of missed intervals as the dry upland forest sites as evidenced by the intermixing of the landscape in grass tree mosaic and extensive lithosol areas. Lithosol communities produce little biomass and probably had less frequent fires than other grasslands, but pre- and post-fire vegetation is very similar (this does not include the rigid sage portions of the lithosols, which if burned take years to recover).

Table 7. Severity class and effects to upper level canopy replacement.

Severity Class	Effects
No Fire Effects	< 5 percent replacement
Low (non-lethal)	6 – 25 percent replacement
Mixed (mixed severity)	26 – 75 percent replacement
Replacement (stand replacement)	> 75 percent replacement

Table 8. Existing and desired fire severity probabilities for the dry and moist upland forest potential vegetation groups.

Fire severity class	Existing Probability (% of all fires) (local model)	Historical Severity Probability (% of all fires) (LANDFIRE data)	Average Interval (years) (LANDFIRE data)
Dry upland forest (DUF)			
Replacement	5	5 – 14	115 – 125
Moderate/Mixed	49	13 – 21	50 – 75
Low	46	64 – 82	8 - 25
Moist upland forest (MUF)			
Replacement	3	14 – 35	125 – 200
Moderate/Mixed	47	21 – 47	75 – 150
Low	52	18 – 64	25 – 50

A prioritization strategy for prescribed fire has been developed that identifies high, moderate, and low ecological priorities for re-introducing fire to the forested system (Table 9). In the proposed RNAs, as a general guide, extinguish as quickly as possible fires that endanger Research Natural Areas using means that would cause minimal damage to the area (FSM 4063.41). Allow natural fires to burn only within a prescription designed to accomplish objectives of the specific natural area (FSM 4063.32).

While this prioritization can be used to locate the most socially and ecologically appropriate locations to use fire to meet the purpose and need of the LJCRP, it does not exclude implementing fire in the lower priority areas. This is particularly true where the landscape has a high degree of interaction and spatial connection amongst these areas. Prior to implementation, burn plans would be developed in an interdisciplinary setting to maximize ecological benefit providing for public and fire personnel safety and ease of control.

Table 9. Prioritization scheme for identifying the highest ecological benefit to re-introduce fire.

Prioritization Level[1]	**Description**
High	All mechanical treatment acres are included in high priority for prescribed fire. Findings in McIver et al. (2012) indicate the importance of using prescribed fire and mechanical vegetation treatment together when restoration of fire adapted systems is part of the desired condition. All dry upland forest acres are included.
Moderate	Acres of moist upland forest that do not receive forest vegetation treatments. There is growing recognition that moist forest systems, that are spatially influenced and interconnected with dry upland forest, exhibit similar disturbance regimes (Stine et al. 2014). These areas provide opportunities in the LJCRP to

Prioritization Level[1]	Description
	restore fire as an ecological process that shapes composition, density, structure and pattern to meet desired landscape condition.
Low	Acres designated as non-forest vegetation that do not have harvest or SI treatments. Restoration of the forested system is the objective of the LJCRP; hence, non-forest areas represent the lowest priority to use prescribed fire as a restoration tool for forest resilience. It is recognized that these areas are important to the overall landscape and influence fire spread and behavior, and portions would be included in all prescribed fire activity.

1/ Project Design Criteria also influence where prescribed fire can be used (see chapter 4 and Appendix J).

This prioritization scheme is related to the ecological need and objectives within the forested system of the LJCRP. Additional information such as location to wildland urban interface, highly valued resources (administrative sites, campgrounds, lookouts, etc.), grazing allotment management, sensitive animal or plant habitat, or Forest Plan management direction would need to be considered to maximize ecological and social benefit and efficiently utilize limited time and resources. These factors would be considered during preparation of burn plans prior to implementing prescribed fire.

In addition to fire disturbance, insects and diseases are also a natural disturbance with a characteristic frequency and severity in the project area. Under the Blue Mountains' normal moisture-limited conditions, densely-stocked stands of grand fir and Douglas-fir, while differing in some ecological traits, both become stressed. This increases their vulnerability to insect infestation, and in the case of Douglas-fir, mistletoe infestation. Similarly, on pine sites, multi-storied, densely stocked ponderosa pine stands are at risk of insect infestation under drought conditions. These densely stocked and moisture-stressed stands have become more abundant during the last half of the 20th century, and localized insect infestations have quickly blossomed into outbreaks covering thousands of acres (Gast et al. 1991). Table 10 summarizes susceptibility to insect and disease mortality for the LJCRP. Although insect outbreaks likely occurred prior to the time of the first Euro-American settlers, the frequency and size of outbreaks caused by western spruce budworm (*Choristoneura occidentalis*) and possibly other insects that attack Douglas-fir and grand fir appear to have increased as a result of the proliferation of fir-dominated forests (Swetnam et al. 1995). Similarly, the multi-storied ponderosa pine stands that replaced the single-storied stands on pine sites have also increased the potential for outbreaks of the western and mountain pine beetles (*Dendroctonus brevicomis*, and *D. ponderosae*, respectively) (Hessburg et al. 1994). During the past 50 years, tree mortality from insect disturbances in some stands has exceeded 80 percent of all overstory trees (Swetnam et al. 1995). Most tree diseases are increasing in occurrence and severity due to changes in tree species composition (increased grand fir within dry upland forest), stand structures (increases in multi-storied structure), and increased stocking levels (Scott and Schmitt 1996). The abundance of insect-killed trees has substantially increased the surface fuel loads across thousands of acres in the Blue Mountains. Conditions have become conducive for the occurrence of large, high-intensity wildfires. Twenty years ago, lightning-caused wildfires burned more than 445,000 acres in the Blue Mountains. Many of these fires were high severity, stand-replacing events that killed most of the trees across large areas. Within the project area, two notable wildfire events have occurred within the last 30 years. The 1986 Joseph Canyon/Starvation Ridge fire burned over 40,000 acres within the project area and the 1988 Tepee Butte burned almost 60,000 acres of which 1/3 was in the project area. A high percentage of these

fires were stand replacing and resulted in the stand initiation phase of forest succession. Since 2004, three wildfire events occurred within the project area, burning a total of approximately 23,750 acres (Table 3).

Table 10. Insect and disease susceptibility in the Lower Joseph Creek Restoration Project area

Potential Vegetation Group	Agent	Susceptibility Rating - % of Forested Area					
		Low		Moderate		High	
		Existing	RV Range	Existing	RV Range	Existing	RV Range
Dry upland forest (UF)	Defoliators	25%↓	40-85%	35%↑	15-30%	39%↑	5-15%
	Douglas-fir Beetle	15%↓	35-75%	39%↑	15-30%	45%↑	10-25%
	Fir Engraver	41%↓	45-90%	45%↑	10-25%	14%↑	5-10%
	Bark Beetles in P Pine	23%↑	5-10%	56%↑	15-30%	21%↓	40-90%
	Douglas-fir Dwarf Mistletoe	14%↓	25-55%	39%	15-40%	47%↑	20-35%
	Root Diseases	31%	30-60%	47%	25-50%	22%	5-25%
Moist upland forest (UF)	Defoliators	8%	5-10%	29%	20-30%	63%	35-90%
	Douglas-fir Beetle	5%↓	30-60%	23%	20-40%	71%↑	10-30%
	Fir Engraver	19%↓	30-70%	34%	20-35%	47%↑	10-20%
	Bark Beetles in P Pine	32%↓	40-70%	52%↑	15-35%	16%	5-25%
	Douglas-fir Dwarf Mistletoe	11%↓	30-65%	33%	20-45%	56%↑	10-20%
	Root Diseases	14%	5-15%	49%	20-50%	36%	35-75%

↓ less than RV; ↑ greater than RV

To restore insect- and disease-related disturbance regimes in the LJCRP area, and move toward desired conditions, forest densities and species composition must be strategically restored in appropriate locations. Tools available to reduce uncharacteristic insect and disease disturbance include thinning toward more natural forest structures, and the ecologically- and socially-appropriate use of planned and unplanned fire. For more detail on insects and diseases of the project area, see the Vegetation/Disturbance specialist's report.

Historically, disturbance from timber harvest has differed from natural disturbances in its frequency, severity, pattern, and in what remains on the landscape. Techniques to increase the similarity between human and natural disturbances have improved greatly over the past few decades (Diaz and Apostol 1992 , Franklin et al. 2013).

The severity, extent, and seasonality of planned and unplanned fire can range from being very similar to natural fire disturbance to being very different. Fire suppression is a human-caused disturbance that, in most cases, alters the natural fire process, except where it is used to mitigate uncharacteristic fire severity, which could result from over abundant fuel loads. To reduce departure between the effects of human and natural disturbance processes, human-caused and natural disturbance frequencies, patterns, and intensities need to be more aligned. Tools available to reduce this departure include the use of ecologically-informed tree harvest and fire prescriptions.

Vegetation Structure and Composition

Forest Structure and Composition

The basis for the forest structure classification system used in the Blue Mountains is the four stage system that was developed for conifer forests located west of the Cascade Mountains (Oliver and Larson 1996). This system was expanded to an eight class system to include a wider spectrum of structural variation that exists within the drier eastside forests of Oregon and Washington (O'Hara et al. 1996). Figure 3 illustrates and describes the forest structural stages for this analysis, which includes 6 structural stages.

Illustration of forest structural Stages	Description of forest structural Stages
	Stand Initiation (SI). Following a stand-replacing disturbance such as wildfire or tree harvest, growing space is occupied rapidly by vegetation that either survives the disturbance or colonizes the area. Survivors literally survive the disturbance above ground, or initiate new growth from their underground organs or from seeds on the site. Colonizers disperse seed into disturbed areas, it germinates, and then new seedlings establish and develop. A single canopy stratum of tree seedlings and saplings is present in this stage.
	Stem Exclusion (SE). In this structural stage, trees initially grow fast and quickly occupy all of their growing space, competing strongly for sunlight and moisture. Because trees are tall and reduce light, understory plants (including smaller trees) are shaded and grow more slowly. Species needing sunlight usually die; shrubs and herbs may go dormant. In this stage, establishment of new trees is precluded by a lack of sunlight (stem exclusion closed canopy) or by a lack of moisture (stem exclusion open canopy).
	Understory Reinitiation (UR). As the forest develops, a new age class of trees (cohort) eventually gets established after overstory trees begin to die or because they no longer fully occupy their growing space. Regrowth of understory seedlings and other vegetation then occurs, and trees begin to stratify into vertical layers. This stage consists of a low to moderate density overstory with small trees underneath.

Illustration of forest structural Stages	Description of forest structural Stages
Visualize the UR illustration with another tree crown layer between the overstory and understory layer.	**Young Forest Multi-Story (YFMS)**. As succession progresses, three or more tree layers have become established as a result of minor disturbances (including tree harvest) that cause progressive but partial mortality of overstory trees, thereby perpetuating a multi-layer, multi-cohort structure. This class consists of a broken overstory layer with a mix of sizes present (large trees are scarce); it provides high vertical and horizontal diversity
	Old Forest (OF). Many age classes and vegetation layers mark this structural stage containing large, old trees. Snags and decayed fallen trees may also be present, leaving a discontinuous overstory canopy. The drawing shows a single-layer stand of ponderosa pine reflecting the influence of frequent surface fire on dry-forest sites (old forest single stratum; OFSS). Surface fire is not as common on moist sites or common on cold sites, so these areas generally have multi-layer stands with large trees in the overstory stratum (old forest multi strata; OFMS).

Figure 3. Description of forest structural stages.

Sources: Based on O'Hara and others (1996), Oliver and Larson (1996), and Spies (1997).

Table 1 compares current and desired conditions for selected vegetation indicators. Tables 11-14 more completely compare current conditions and the RV for structural stage distribution, composition (cover type), forest density, and tree size class for the LJCRP. For more detail on these vegetation characteristics within the project area, see the Vegetation/Disturbance specialist's report. Existing and desired conditions of the project area's riparian vegetation is discussed below in the section "Watershed, Riparian and Aquatic Habitat" within the Physical Environment section.

Table 11. Distribution of forest structural stages in the Lower Joseph Creek Restoration Project area

Potential Vegetation Group	Structural Stage	Acres	Percentage of Potential Vegetation Group	Range of variation (%) (Powell 2010)
Dry upland forest (UF)	OFSS	190	<1%	40-60
Dry upland forest (UF)	OFMS	8,300	20%	5-15

Potential Vegetation Group	Structural Stage	Acres		Percentage of Potential Vegetation Group		Range of variation (%) (Powell 2010)
Dry upland forest (UF)	YFMS	3,400	19,100	8%	45%	5-10
Dry upland forest (UF)	UR	15,700		37%		
Dry upland forest (UF)	SE	7,500		18%		10-20
Dry upland forest (UF)	SI	7,000		17%		15-25
Dry upland forest (UF)	Unknown	180		0%		
Dry UF Total		42,300		100%		
Moist upland forest (UF)	OFSS	40		<1%		10-20
Moist upland forest (UF)	OFMS	3,900		30%		15-20
Moist upland forest (UF)	YFMS	2,000	4,700	15%	36%	10-20
Moist upland forest (UF)	UR	2,700		20%		
Moist upland forest (UF)	SE	2,300		18%		20-30
Moist upland forest (UF)	SI	2,000		16%		20-30
Moist upland forest (UF)	Unknown	20		<1%		
Moist UF Total		13,000		100%		
Grand Total		55,300				

Table 12. Current forest cover type distribution for the Lower Joseph Creek Restoration Project, and the natural range of variation in cover types for the Blue Mountains

Potential Vegetation Group	Cover Type	Acres	Percentage of Potential Vegetation Group	Range of variation (%) (Powell 2010)
Dry upland forest (UF)	Ponderosa pine	11,900	28%	50-80
Dry upland forest (UF)	Douglas-fir	21,800	51%	5-20
Dry upland forest (UF)	Western larch	580	1%	1-10
Dry upland forest (UF)	Lodgepole pine	220	1%	0
Dry upland forest (UF)	Grand fir	7,500	18%	1-10
Dry upland forest (UF)	Engelmann spruce	20	0%	0

Potential Vegetation Group	Cover Type	Acres	Percentage of Potential Vegetation Group	Range of variation (%) (Powell 2010)
Dry upland forest (UF)	Unknown	260	1%	
Dry UF Total		42,300	100%	
Moist upland forest (UF)	Ponderosa pine	1,400	11%	5-15
Moist upland forest (UF)	Douglas-fir	5,900	45%	15-30
Moist upland forest (UF)	Western larch	590	4%	10-30
Moist upland forest (UF)	Lodgepole pine	220	2%	25-45
Moist upland forest (UF)	Grand fir	4,700	36%	15-30
Moist upland forest (UF)	Engelmann spruce	130	1%	1-10
Moist upland forest (UF)	Unknown	40	<1%	
Moist UF Total		13,000	100%	
Grand Total		55,300		

Table 13. Distribution of tree density classes in the Lower Joseph Creek Restoration Project area

Potential Vegetation Group	Tree Density Class	Acres	Percentage of Potential Vegetation Group	Range of variation (%) (Powell 2010)
Dry upland forest (UF)	Dry High	14,200	33%	5-15
	Dry Mod	13,600	32%	15-30
	Dry Low	14,300	34%	40-85
	Unknown	180	<1%	
Dry UF Total		42,300	100%	
Moist upland forest (UF)	Moist High	5,800	45%	15-30
	Moist Mod	3,700	28%	25-60
	Moist Low	3,400	25%	20-40
	Unknown	50	2%	
Moist UF Total		13,000	100%	
Grand Total		55,300		

Table 14. Tree size class distribution in the Lower Joseph Creek Restoration Project area

Potential Vegetation Group	Tree Size Class (diameter range in inches)	Acres	Current percentage of Potential Vegetation Group
Dry upland forest (UF)	<5	7,000	17%
	5-10	800	2%

Potential Vegetation Group	Tree Size Class (diameter range in inches)	Acres	Current percentage of Potential Vegetation Group
	10-15	15,900	38%
	15-20	11,700	28%
	>20	6,700	16%
	Unknown	180	<1%
Dry UF Total		42,300	100%
Moist upland forest (UF)	<5	2,000	16%
	5-10	780	6%
	10-15	3,500	27%
	15-20	3,600	28%
	>20	3,000	23%
	Unknown	70	<1%
Moist UF Total		13,000	100%
Grand Total		55,300	

Understory Vegetation

Desired conditions for native plant diversity and understory productivity are based on Forest Plan and Hells Canyon National Recreation Area direction, policy guidance, and literature reviews. Goals and objectives common to all guidance are to protect and maintain appropriate habitats to ensure continued existence and viability of TES, native, and other desirable plants (FSM 2672.41, WWNF Forest Plan, HCNRA CMP, ESA).

Table 15 shows selected potential vegetation groups as habitats. The potential vegetation groups shown were selected because they contain habitat for TES plants. Within the selected habitats shown, the number of plant communities documented by the USFS Pacific Northwest (R6) ecology program in LJCRP is displayed. With the exception of rigid sage/Sandberg's bluegrass, shrublands are not shown in the table. Dry upland shrub lands in LJCRP have a total of two plant associations represented. Moist upland shrub lands have five plant associations represented. There are no suspected or known TES plants in shrub lands in LJCRP.

Table 15. Diversity by plant communities, species richness, percent native species and Shannon diversity index (Shannon 1948) for LJCRP

Selected Habitats	Number of Plant Associations Documented in Selected Habitats	Total Species Richness	Native Species Richness	Percent Relative Cover in Native Species	Shannon Diversity Index
Rigid sage/ Sandberg's bluegrass	1	60	54	90	3.6
Cold Moist Idaho fescue	7	140	123	89	4.2
Dry Upland Herbland	8	126	110	87	4.2
Moist Upland Forest	7	80	79	99	3.8

Selected Habitats	Number of Plant Associations Documented in Selected Habitats	Total Species Richness	Native Species Richness	Percent Relative Cover in Native Species	Shannon Diversity Index
Dry Upland Forest	7	139	124	89	4.1
All Habitats	37	318	294	92	2.4

Rangelands

Desired conditions for rangelands are to manage range vegetation and related resources in a manner insuring that the basic needs of the forage and browse plants and the soil resource are met, and to make available for harvest, forage production that is in excess to the basic needs of the plants and soil resource, for wildlife (within agreed upon management objectives) and domestic livestock (within Forest Plan utilization standards).

Forage production estimates by potential vegetation groups (PVG) based on Johnson and Simon (1987), Johnson and Clausnitzer (1992), and Johnson and Swanson (2005), were compiled for the Blue Mountains Forest Plan Revision and were used with the number of acres in allotments to give rough estimates of forage production in average pounds of forage per year. The production figures represent the current vegetation conditions, which in the case of the forested groups are heavily influenced by overstory canopy cover. In general, the higher the overstory canopy cover, the lower the understory production. For more details on the methodology used to estimate forage production, see the range specialist's report.

Vegetation conditions at a given site is determined by a complex set of interactions of past management, natural disturbances, soils, topography, climate, and seed sources. Countryman et al. (2012) found that conditions had improved in the dry shrubland potential vegetation group from 30 years earlier, but that this improvement has slowed. The dry herbland potential vegetation group has experienced invasion by nonnative plants resulting in conversion of some lands to exotic herblands (Hann 1997). The Wallowa County Natural Resources Advisory Committee conducted range condition surveys, re-reading 28 USFS Condition and Trend (C&T) monitoring plots, and reading 28 Natural Resources Conservation Service (NRCS) Interpreting Indicators of Rangeland Health plots on USFS land. Details on methodology and results can be found in the Lower Joseph Watershed Assessment (Wallowa County 2014). In general, C&T plots showed an upward trend, with better vegetative cover, although there was some ambiguity due to variations in how measurements have been recorded over the (~60 year) lifespan of the plots. Indicators of Rangeland Health plots showed generally positive trends for most of the allotment pastures. There were four pastures in LJCRP identified as having more bare soil than expected: Davis Creek allotment, Davis South pasture; Swamp Creek allotment, Miller pasture; Al-Cunningham allotment, Shoot Canyon pasture; and Cold Springs allotment, North Wildhorse Pasture. In all four pastures the soil loss was due to past management practices, not current management. All of the pastures identified as having greater than expected amounts of bare soil, except Miller pasture in the Swamp Creek allotment also had reduced cover in native perennials.

While livestock grazing was not identified as a key issue to be addressed in this project, existing and desired conditions of native and domestic grazing disturbance are tied to the condition of other disturbances, such as forest management and fire, which indirectly influences the distribution and seasonality of understory forage.

Noxious Weeds and other Non-native Invasive Plants

Desired conditions relative to non-native invasive plant species are to protect, restore, and sustain terrestrial and aquatic ecosystems, ecological functions and values; protect and improve biodiversity; improve and protect public recreational opportunities and wilderness integrity; prevent negative impacts to human health and the economy, and protect and restore fish and wildlife populations and habitats (USDA Forest Service 2005). Map 5 shows non-native plant species locations, and Appendix H summarizes non-native plant species found within the LJCRP area. Invasive grasses and noxious weeds could establish following an uncharacteristic large severe burn (resulting from increased fuel loading) in openings where native vegetation has been reduced. New and existing populations of meadow hawkweed (*Hieracium caespitosum*) is of particular concern in LJCRP. A large, scattered population exists in Swamp Creek meadow, including the area where restoration activities are planned. New populations of meadow knapweed were found during the 2014 plant surveys in HCNRA/Wildhorse IRA. These relatively small populations are near the 4600596 road system. Meadow hawkweed is a rhizomatous perennial with wind dispersed seed, and it can be spread both by seed and by root fragments.

Other Invasive Non-native Species

Non-native annual grasses alter grasslands by competing with native plants for limited resources and increasing fine fuels. They can form heavy thatch, which may interfere with biological soil crust (BSC) development and alter BSC species composition and the growth of native seedlings. Non-native annual grasses known to occur in the Lower Joseph Watershed are Japanese brome (*Bromus japonicus*), rattlesnake brome (*Bromus brizaeformis*), smooth brome (*Bromus mollis*), cheatgrass (*Bromus tectorum*), ventenata (*Ventenata dubia*), medusa-head (*Taeniatherum catput-medusae*), and annual fescue (*Vulpia myuros*). The extent of infestation by non-native annual grasses can only be speculated, as we have no maps and records are incomplete for these species. It is assumed that all grasslands within the project area have the potential to be infested, if not already infested.

Some non-native pasture grasses and sweetclover (*Melilotus officinalis*) were planted in the past, most notably after the 1986 Wildcat (Joseph-Starvation Ridge Complex) fire (Isley unpublished data). Species used in the post-fire aerial seeding that are still present today are: orchard grass (*Dactylis glomerata*), intermediate wheatgrass (*Thinopyrum intermedium*), sweetclover (*Melilotus officinalis*) and mountain brome (*Bromus carinatus* x cultivar). Timothy (*Phleum praetense*) is also present, but may have been introduced at a different time, perhaps as hay at campsites. These cultivars have persisted and thrived since planting, and now occupy roadsides, openings and disturbed and undisturbed open areas throughout the project area. These species are now known to be problematic when used for restoration purposes (USDA Forest Service 2014a). Inventory and the history of planting pasture grass are incomplete. Multiple introductions may have occurred before or after the 1986 post-fire seeding. Information regarding the 1986 post-fire seeding was lost in the 2009 fire that burned down the Wallowa Mountain Ranger District office.

Threatened, Endangered and USFS R6 Sensitive Plants

Threatened, endangered and sensitive (TES) plants and HCNRA biologically unique communities were grouped into broad habitat categories for analysis of effects: coniferous forest, grasslands, lithosol/shallow soils, cliffs, rock outcrops, and talus, springs and seeps, moist meadows, and wet meadows, riparian. Some of the species overlap into more than one habitat group. For species found in more than one habitat group, other habitat groups are noted in the botany specialist's report. The habitat groups of most concern are: coniferous forest, where there are no documented TES plants, but abundant habitat and biologically unique communities of concern; grasslands, where two sensitive

plants as well as habitat for federally listed Spalding's catchflyare documented; and lithosol/shallow soils, where three sensitive plants are documented in LJCRP.

There are two federally listed threatened plant species with potential habitat in the LJCRP area: MacFarlane's four-o'clock (*Mirabilis macfarlanei*), and Spalding's catchfly (*Silene spaldingii*). Upon review of field observations gathered during surveys conducted in 2003-4 and 2014, it was concluded that it was very unlikely that any MacFarlane's four-o-clock would be found in the area of Joseph Canyon that is administered by the Forest Service. Better potential habitat for this species exists further down canyon closer to the Snake River where Joseph Canyon is warmer and wider (Hustafa 2014).

Several populations of Spalding's catchfly are found in the Crow Creek and Romaine Gulch vicinities adjacent to the southeast portion of the LJCRP. In 2014, a total of approximately 24,000 acres were surveyed for TES plants (Map 6), focusing on Spalding's catchfly high priority habitat as well as sensitive species suspected or known from the LJCRP area. Within the 24,000 acres surveyed, 95% of the Spalding's catchfly high priority habitat was searched. High priority habitat was determined using a combination of the model results (Murray 2001) and professional judgment. Consultation on Spalding's catchfly has been concluded with USFWS with a letter of concurrence provided for the LJCRP (on file in the project record).

There are five R6 Regional Forester's listed sensitive plant species known to occur within the LJCRP area. These species are Wallowa needlegrass, (*Achnatherum wallowaensis*), green-band mariposa lily (*Calochortus macrocarpus v. maculosus*), rough rabbitweed (*Pyrrocoma scaberula*), Snake River daisy (*Erigeron disparipilus*), and Davis fleabane (*Erigeron davisii*). Wallowa needlegrass, Snake River daisy, and Davis fleabane are found in lithosol habitats. Rough rabbitweed and greenband mariposa lily are found in grasslands and open dry forest margins. Appendix F summarizes the sensitive plant species that are known or suspected to occur in the project area by habitat type. More information on TES, sensitive plants, and other plant species of interest can be found in the Botany specialist's report.

Biologically Unique and Rare Combinations of Outstanding and Diverse Ecosystems

The HCNRA CMP provides standards and guides to maintain biologically unique and rare combinations of outstanding and diverse ecosystems and parts associated therewith in an ecologically functioning sustainable condition. Specific communities are listed within the HCNRA CMP. The HCNRA portion of LJCRP contains the following biologically unique communities: *Ponderosa Pine/Idaho Fescue and Ponderosa Pine/Bluebunch Wheatgrass,* which is part of the coniferous forest habitat group; Mountain *Big Sagebrush/Idaho Fescue,* which is part of the grasslands habitat group; *and Douglas' Buckwheat-Sandberg's Bluegrass Plant Community Type,* which is a component of the grassland habitat group. *Quaking aspen* (*Populus tremuloides*) is another biologically unique community listed in the HCNRA CMP, but only documented from the project area outside the HCNRA. The *Grand Fir/Pacific yew/queen's cup beadlily* plant association is not listed as an HCNRA Rare Combinations of Outstanding and Diverse Ecosystems, but it is only occasionally found in the Wallowa Snake Province (Johnson and Simon 1987), where LJCRP lies. Locally, this habitat is of concern due to past silvicultural practices where yew was considered to have no value and was removed with the goal of converting ABGR/TABR/CLUN sites to more commercially valuable tree species.

Wildlife Habitat

The National Forest Management Act (NFMA) directs the Forest Service to provide habitat to maintain viable populations of existing native and desired non-native vertebrate species. Rather than

addressing all wildlife species, discussions in this FEIS focus on Forest Plan management indicator species (MIS), threatened, endangered and sensitive (TES) species, and landbirds.

Management Indicator Species - Wildlife

HRV estimates for habitat were derived for the Blue Mountains Plan Revision DEIS (USDA Forest Service 2014c). Dead wood reference condition (HRV) is derived from DecAID distribution histograms (Mellen-McLean et al. 2012). Scientists assume that species are more likely to persist under the conditions that remain most similar to those that existed in the past (Landres et al. 1999, Samson et al. 2003). It is assumed that maintaining habitat within HRV would provide adequate species population viability for the present suite of species. Individual species population viability is increasingly compromised as departure from HRV increases (see the Wildlife specialist's report for more information on the estimation of current and reference habitat conditions).

Primary changes to wildlife habitat in the last 150 years since European settlement have been the loss of old forest habitat (due to intensive timber harvesting, uncharacteristic wildfire, and density related tree mortality), and the degradation of habitats (e.g., ponderosa pine forest, riparian) from a number of factors including timber harvest, fire suppression, over-grazing, invasion of exotic vegetation, and human development. The loss and alteration of historic vegetation communities has impacted wildlife habitats and resulted in species range reductions, population declines, and some local and regional extirpations. In general, for moist forest types, the LJCRP area is low in the abundance of smaller trees, and is currently at the low end of large tree closed canopied habitat. Generally there is an abundance of medium and large-medium trees (10-20" dbh), and habitat >10" dbh with open canopies (<60% canopy closure) as compared to the reference range of variation. In dry forests, the LJCRP is below the range of variation in large tree, open canopied habitats, and above the range of variation in the medium and large-medium (10-20" dbh), closed canopied structural stages.

Management Indicator Species (MIS) were selected for emphasis in forest-level planning, and are assessed during Forest Plan implementation in order to determine the effects of management activities on their populations and the populations of other species with similar habitat needs. The amount and quality of habitat is used as a proxy for determining project effects on MIS.

Table 16 lists the terrestrial species selected as MIS in the Wallowa-Whitman Forest Plan, their habitat, and likelihood of habitat in the project area. All of these MIS have habitat, and likely occur in the project area, though habitat for the American marten is limited and presence of this species within the analysis area is unknown.

Table 16. Wildlife management indicator species identified in the Wallowa-Whitman Forest Plan.

Species	Representing	Habitat Description	Habitat Present in Analysis Area	Species Present in Analysis Area
Primary cavity excavators[1]	Dead & defective wood habitat	Snags and logs	Yes	Yes
Pileated woodpecker	Old growth and mature forests	Closed canopy, late-seral subalpine, montane and lower montane forests	Yes	Yes
American (pine) marten	Old growth and mature forests	Closed canopy, late-seral subalpine	Limited	Unknown

Species	Representing	Habitat Description	Habitat Present in Analysis Area	Species Present in Analysis Area
		and montane forests		
Northern Goshawk	Old growth and mature forests	Subalpine and montane forests, lodgepole pine, post-fire habitat	Yes	Yes
Rocky Mountain Elk	Species commonly hunted	Cover and forage	Yes	Yes

[1] Northern flicker; black-backed, downy, hairy, Lewis', three-toed, and white-headed woodpeckers; red-naped and Williamson's sapsuckers; black-capped, chestnut-backed, and mountain chickadees; and pygmy, red-breasted, and white-breasted nuthatches.

Primary Cavity Excavators

In general, populations of cavity nesting birds have declined across the Blue Mountains compared to historical conditions, primarily due to reductions in the numbers of large snags (Wisdom et al. 2000). However, of the cavity excavating MIS, Breeding Bird Surveys in Oregon have only detected a significant decrease in populations of the northern flicker between 1966 and 2010 (Sauer et al. 2011).

Snag habitat is currently adequate in the Ponderosa Pine/Douglas-fir Wildlife Habitat Type (PPDF WHT), and below reference conditions in the Eastside Mixed Conifer Wildlife Habitat Type (EMC WHT) ((Mellen-McLean et al. 2012)). In the EMC WHT, the landscape is deficit in snag density classes above 2 per acre for large (> 20" dbh) snags, as compared to reference conditions. Past management and fire wood cutting has likely had an influence on the current conditions of snag habitat. See the Wildlife specialist's report for the conservation status of cavity excavators, and more detailed information.

Old Forest Wildlife Habitats

Three species were selected in the Forest Plan to represent old growth habitats that have habitat in the LJCRP area: pileated woodpecker, American marten, and goshawk. Due to an increase in dense, multi-canopy stands due to fire suppression, habitat for these species is increasing across the Blue Mountains (Wisdom et al. 2000). However, densities of large-diameter snags (>21 inches dbh) needed by these species have declined from historical to current levels (Wisdom et al. 2000, Korol et al. 2002), and snag habitat is likely to be a limiting factor in the Eastside Mixed Conifer WHT (see the Wildlife specialist's report for more information).

Rocky Mountain Elk

Rocky Mountain elk are a management indicator species for the WWNF. Elk have been selected as an indicator of habitat diversity, interspersion of cover and forage areas, and security habitat provided by areas of low human disturbance. Elk management on the WWNF is a cooperative effort between the Forest Service and the Oregon Department of Fish and Wildlife (ODFW). The Forest Service manages habitat while ODFW manages populations by setting seasons, harvest limits, and goals for individual Wildlife Management Units (WMU).

In general, a mosaic of forage and cover areas in a given landscape, with minimal or no motorized access through forage areas, results in high to optimal elk use during any given season. This would be the desired condition for landscapes where elk use is promoted, as identified in coordination with

state wildlife agencies. For many winter ranges, this desired condition would emphasize the maintenance of existing cover areas, which often compose smaller portions of these landscapes, while also focusing on minimizing or eliminating motorized access and uses on winter ranges during the winter period. For many spring, summer, and fall ranges, this desired condition would emphasize the maintenance of adequate forage areas close to cover and far from roads and trails open to motorized uses. For landscapes where hunting occurs, the desired condition would emphasize motorized access restrictions on roads and trails during hunting seasons to a degree that elk can effectively use cover and topography as security. This approach at managing the desired condition would place more emphasis on motorized closures of roads and trails during hunting seasons for landscapes that are flat and open, and less emphasis on those that are steep and have more cover, as identified in coordination with state wildlife agencies.

The Forest Plan establishes standards for wildlife habitat, and more specifically elk habitat, on the Forest. Table 17 summarizes the habitat effectiveness index (HEI) and cover percentages for desired and existing conditions within the LJCRP area. The HEI model developed by Thomas et al. (1988) relies on open road density as an indicator of relative effects from roads on elk habitat. More recent research in northeastern Oregon found that road density is a poor indicator of habitat effectiveness (Rowland et al. 2000). By contrast, the study described a strong linear increase in elk use as distance from roads increased. Therefore, a method using a distance-banding approach, as described by Rowland et al. (2005), is utilized here as an alternate indicator of road effects on elk habitat in the Lower Joseph project area. HEI was calculated using both the habitat effectiveness with the original calculation using road density, and the newer calculation using distance banding. Currently the HEI for the area is above the Forest Plan standard, though especially in the Lower Joseph watershed in the summer range (primarily MA 1, see maps 11a and 11b), habitat effectiveness is relatively low. By comparing the HEI calculated using the distance band analysis (0.52), to the original calculation (0.63) this notable change in the score indicates that there is little area far from open roads. This area is mostly encompassed by the Peavine Creek, Rush Creek, and Broady Creek subwatersheds.

The LJCRP area provides year round habitat for big game. Winter range lies along the northern and western portion of the analysis area, transitional range is mid-slope and summer range lies along the central portion of the analysis area.

Table 17. HEI and Cover percentages for desired (Forest Plan) and existing conditions within the Lower Joseph project area.

	Forest Plan direction	Existing condition			
		Timber Emphasis (summer range)	Wildlife Emphasis (winter range)	Timber Emphasis (summer range)	Wildlife Emphasis (winter range)
		Lower Joseph Watershed		Upper Joseph Watershed	
Total Cover %	MA 1 ≥ 30% (summer range)	77%	23%	55%	30%
Cover:Forage		77:23	23:77	55:45	30:70
Marginal Cover %		35%	11%	26%	14%
Satisfactory Cover %		42%	13%	28%	16%
Forage %		23%	77%	45%	70%

	Forest Plan direction	Existing condition			
		Timber Emphasis (summer range)	Wildlife Emphasis (winter range)	Timber Emphasis (summer range)	Wildlife Emphasis (winter range)
		Lower Joseph Watershed		Upper Joseph Watershed	
Marginal Acres		4,634	4,078	4,408	4,134
Satisfactory acres		5,583	4,901	4,743	4,756
Forage acres		3,047	29,750	7,589	20,570
HEI	MA 1 ≥ 0.5 (summer range)	0.63	0.63	0.57	0.71
HEI using a distance band approach	MA 1 ≥ 0.5 (summer range)	0.52	0.56	0.58	0.64

Within the Lower Joseph project area there are parts of two WMUs: Chesnimnus and Sled Springs. Table 18 shows the recent trend in populations and the management objectives for the two management units. Currently the populations and bulls/100 cows ratios are exceeding the management objectives set by ODFW in both management units.

According to ODFW (Matthews 2014), the Chesnimnus unit is currently 40% over the population management objective with up to 70% of the population occurring on Zumwalt prairie private lands. The ODFW is currently trying to reduce elk numbers and return the elk population to management objective of 3,500 by harvesting antlerless elk on Zumwalt private lands. Elk numbers on the national forests are much below desired levels, so very little antlerless elk harvest occurs on the national forest portion of the Chesnimnus unit. Managing road density is important for security areas and bull escapement during hunting seasons.

Table 18. Population Trend data Rocky Mountain Elk (ODFW 2014)

Management Unit		Population	Bulls/100 cow
Chesnimnus	MO*	3,500	10
	2010	3,700	13
	2011	5,300	15
	2012	5,300	13
	2013	5,200	14
	2014	5,000	14
Sled Springs	MO*	2,750	10
	2010	2,500	4

Management Unit		Population	Bulls/100 cow
	2011	2,700	10
	2012	2,700	10
	2013	3,000	16
	2014	3,100	16

*MO = Management Objective (ODFW)

Research conducted at the Starkey Experimental Forest and Range and associated research sites is providing new insights regarding the importance of maintaining adequate nutritional resources for elk (Cook et al. 2013), and minimizing human disturbance effects through effective management of motorized access and cover (Rowland et al. 2000, Naylor et al. 2009). Higher nutritional resources are generally concentrated in elk forage areas, defined as areas with less than 40% overhead canopy cover. Highest nutritional resources are often particularly concentrated in areas with less than 20% overhead canopy cover, such as in grasslands, shrublands, and forests of the stand initiation structural stage, recognizing that nutritional resources in these areas will vary with season of elk use and forage phenology.

Elk use of forage areas often depends on their proximity to cover areas (to forest stands with overhead canopy cover 40% or higher) and the distance to roads and trails open to motorized uses. Forage areas within 100 yards of cover areas are most heavily used by elk, as are forage areas farther than 1,000 yards from roads or trails open to motorized uses. In addition, maintenance of adequate cover areas provides security for elk during hunting seasons and reduces elk vulnerability to harvest, such that harvest goals for elk can be met but not exceeded. Whether cover areas provide security for elk during hunting seasons, however, often requires motorized closures of large networks of roads and trails during hunting seasons. The need for motorized closures of many road and trail networks to provide effective security for elk during hunting seasons is higher on landscapes dominated by flat, open terrain, and lower in areas of steep, convex topography with more cover.

The Forest Plan direction for road densities by management areas (Maps 11a and 11b) calculated at a subwatershed is: MA1 $\leq$2.5 mi/mi2; MA3 $\leq$ 1.5 mi/mi2; and HCNRA $\leq$ 1.5 mi/mi2. The road density estimate does not take into account off-road vehicle use on OHV trails, cross-country travel and on closed roads. The current road densities by management area per subwatershed for the Lower Joseph project area are shown in Table 38. Currently, on seven out of 10 subwatersheds, open road densities are exceeding Forest Plan direction.

The sensitivity of elk to human disturbance and road management serve as an additional indicator for most other wildlife species. Gaines et al. (2003) reviewed 238 articles on the effects of recreation trails and roads on wildlife and found the most commonly reported interactions included displacement or avoidance where animals were reported as altering their use of habitats in response to roads or road networks (Cassirer and Groves 1990, Klein 1993, Hutto 1995, Mace et al. 1996, 1999, Johnson et al. 2000). Disturbance at a specific site was also commonly reported and included disruption of animal nesting, breeding, or wintering areas (Skagen et al. 1991, Linnell et al. 2000, Papouchis et al. 2001). Collisions between animals and vehicles were commonly reported and affected a diversity of wildlife species, from large mammals (Gibeau and Heuer 1996, Lehnert et al. 1996) to amphibians (Ashley and Robinson 1996). Finally, edge effects associated with roads or road networks constructed within

habitats, especially late-successional forests, were commonly identified (Hickman 1990, Miller et al. 1998).

Connectivity of Late Seral Closed Forest Habitats

Maintaining connectivity between habitats, particularly late and old structured habitat, is important for numerous wildlife species to allow free movement, interaction of adults, and dispersal of young. Management direction pertaining to maintaining connectivity between late and old structured (LOS) stands, in addition to designated old growth management areas (DOGMA), is provided by the Eastside Screens (see Chapter 3, Forest Plan Amendments, for more information on Eastside Screen direction).

Eastside Screen direction is to maintain or enhance the current level of connectivity between LOS (OFMS/OFSS) stands and between all Forest Plan DOGMAs (MA15) by maintaining stands between them. Harvesting is permitted in connectivity corridors if canopy closures are maintained within the top one-third of site potential. Based on an interpretation made by Forest staff, canopy closures are considered to be within the top one-third of site potential if canopy cover is maintained at or above 40% in the dry forest PVG, and 50% in the moist forest PVG.

The current level of connectivity between MA15 and LOS stands varies across the project area due to areas of non-forested vegetation, past timber harvest, and wildfires. Stands of more contiguous forest in the northern portion of the project area are currently well connected (Maps 6 and 7). Major riparian areas, such as Swamp Creek and Davis Creek provide connectivity in the southern part of the project area. Pileated woodpecker, American marten and their prey, goshawk and their prey, elk, and a variety of other vertebrates and invertebrates are affected by the level of connectivity between their source or preferred habitats. This project aims to maintain connectivity, to the extent possible, between all LOS and MA15 stands within and outside the project area according to Forest Plan direction.

Threatened and Endangered Wildlife Species

Appendix E lists all proposed, threatened, endangered, and sensitive species applicable to the LJCRP area identified in the 2015 Region 6 Regional Forester's special status species list obtained from the U.S. Fish and Wildlife Service. No proposed or federally-listed terrestrial wildlife species were described for Wallowa County, Oregon.

USFS Region 6 Sensitive Wildlife Species

Table 19 summarizes the 2011 Regional Forester's list of sensitive wildlife species with habitat suspected or known to be in the LJCRP area, and their existing habitat conditions. The following species do not have potential habitat in the project area, and are not discussed further: Black swift (*Cypseloides niger*), Harlequin duck (*Histrionicus histrionicus*), Black rosy finch (*Leucosticte tephrocotis wallowa*), Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*), Upland sandpiper (*Bartramia longicauda*), Greater sage grouse (*Centrocercus urophasianus phaios*), North American wolverine (*Gulo gulo luteus*), Silver-bordered fritillary (*Boloria selene*), Yuma skipper (*Ochlodes yuma*), and Fir pinwheel (*Radiodiscus albietum*).

Table 19. USDA Forest Service Region 6 Regional Forester's sensitive wildlife species with habitat suspected or known to be in the LJCRP area, and descriptions of desired conditions

Common and Latin name	Habitat within planning area[1]	Desired and current habitat conditions
AMPHIBIANS		
Rocky Mt tailed frog *Ascaphus montanus*	D	Rocky Mountain Tailed Frogs (*Ascaphus montanus)* are primarily nocturnal, and live in fast-flowing headwater streams in old-growth forests (Nielson et al. 2001). They occur in very cold, fast-flowing streams that contain large cobble or boulder substrates, little silt, and are often darkly shaded (Bull and Carter 1996). In the LJCRP area, tailed frogs were documented in Broady, West Fork Broady, East Fork Broady, and Cottonwood Creeks during Forest Service's stream surveys in the 1990s. Other streams that may provide habitat for tailed frogs are Peavine Creek, Rush Creek, Horse Creek, Deadhorse Creek and the Cottonwood tributary south of Deadhorse Creek. Tailed frogs are likely to occur in RHCA categories 1-3 due to the species' need for flowing water at all times. Tailed frogs are not likely to occur in Swamp Creek, as they are found in fast flowing, cold headwater streams.
Columbia spotted frog *Rana luteiventris*	S	Columbia spotted frogs are highly dependent on aquatic habitats and require permanent and semi-permanent wetlands that have aquatic vegetation and some deeper or flowing water for overwintering (Bull and Marx 2002, Pilliod et al. 2002). The spotted frog frequents waters and associated vegetated (grassy) shorelines of ponds, springs, marshes, and slow-flowing streams and appears to prefer waters with a bottom layer of dead and decaying vegetation (Bull 2005) are year-round residents of the Blue Mountains and occur in a number of locations across Northeast Oregon (Bull 2005, Reaser and Pilliod 2005). There have been no surveys specifically for spotted frogs within the LJCRP area but habitat is available and the species may exist along the perennial low gradient streams or ponds in the upper elevations.
BIRDS		
Northern bald eagle *Haliaeetus leucocephalus*	S	Bald eagles are highly dependent on riparian habitats. Nesting territories are normally associated with lakes, reservoirs, rivers, or large streams. In the Pacific Northwest recovery area the preferred nesting habitat for bald eagles is predominately uneven-aged, mature coniferous (ponderosa pine and Douglas-fir) stands or large black cottonwood trees along a riparian corridor (USDI 1986, NatureServe 2012). No known nest sites exist within the project area. Known nest sites are located more than 10 miles from the project area. The project area does contain potential foraging habitat and the potential for species occurrence.
American peregrine falcon *Falco peregrinus anatum*	D	Peregrines are found in many terrestrial biomes in the Americas; none seems to be preferred (although perhaps greater densities in tundras and coastally). The most commonly occupied habitats contain cliffs, for nesting and generally open landscapes for foraging (Hayes and Buchanan 2002, Hays and Milner 2004). A source of water, such as a river, lake, marsh or marine waters is typically in close proximity to the nest site and likely is associated with an adequate prey base of small to medium sized birds (Johnsgard 1990). There is no historical data for peregrines in the LJCRP area. Potential nest sites have been identified but suitable nest ledges are limited as are larger bodies of water for prey concentrations. Though no longer listed as endangered, their numbers are still low, and managing habitat toward recovery goals is warranted.
Lewis' woodpecker *Melanerpes lewis*	S	Three main habitats used by Lewis' woodpecker throughout its range are burned or logged areas, open ponderosa pine savanna at high elevations, and riparian woodland dominated by large cottonwoods at low elevations (Bock 1970, Tobalske 1997, Saab and Dudley 1998, Saab and Vierling 2001, Abele et al. 2004). Currently there is very little recent post-fire habitat in the LJCRP area.
White-headed woodpecker	S	The white-headed woodpecker is associated with open-canopied ponderosa pine forests (Bull et al. 1986, Frederick and Moore 1991, Garrett et al. 1996, Kozma 2011). White-headed woodpeckers forage predominantly on large-diameter live ponderosa pine trees (Dixon 1995) with pine seeds being the most important

Common and Latin name	Habitat within planning area[1]	Desired and current habitat conditions
Picoides albolarvatus		vegetable food item in Oregon (Bull et al. 1986, Dixon 1995). In addition, these woodpeckers may use areas which have undergone various silvicultural treatments, including post-fire areas, if large-diameter ponderosa pines (alive or dead) and other old-growth components remain (Raphael 1981, Raphael and White 1984, Raphael et al. 1987, Frenzel 2002, Wightman et al. 2010). Due to fire suppression in dry upland forest habitats, many areas that historically supported this species' habitat - open stands of large diameter ponderosa pine - now support closed canopied mixed species stands that no longer provide suitable habitat for the white-headed woodpecker.
MAMMALS		
Gray wolf *Canis lupus*	D	Habitat preference for the gray wolf appears to be more prey dependent than cover dependent. The wolf is a habitat generalist inhabiting a variety of plant communities, typically containing a mix of forested and open areas with a variety of topographic features (Mech et al. 1988, Witmer et al. 1998, Mladenoff et al. 1999). Based on data collected by the ODFW, the Imnaha pack (approximately 15 miles east of Joseph, Oregon) and Wenaha pack (centered approximately 20 miles west of Troy, Oregon) appear to be breeding, and in the summer of 2014 a new pack (Chesnimnus pack) was documented in the project area. Wolves prey primarily on large ungulates such as elk and deer (Boyd et al. 1994, Fritts et al. 1994, Kunkel et al. 1999). Alternate prey typically consists of smaller mammals and birds, such as, beaver, ground squirrels, rabbits, and grouse (Boyd et al. 1994; Witmer et al. 1998). Individuals may take livestock as secondary prey when ungulates are less vulnerable or available (Witmer et al. 1998).
Fringed myotis *Myotis thysanodes*	D	Fringed myotis occurs from sea level to 2,850 m but is most common at middle elevations 1200 to 2,100 m. Although the fringed myotis is found in a wide variety of habitats including desert scrub, mesic coniferous forest, grassland, and sage-grass steppe its distribution is patchy and it appears to be most common in drier woodlands (oak, pinyon-juniper, ponderosa pine). They roost in crevices in buildings, underground mines, rocks, cliff faces, and bridges. Roosting in decadent trees and snags, particularly large ones, is common throughout its range in western U. S. and Canada. The fringed myotis has been identified in the LJCRP (Anderson 1998). In general, the greatest threat to this species' habitat is human disturbance of roost sites through recreational caving and mine exploration, and disturbance of habitat (Weller 2005) (Keinath 2004).
Townsend's big-eared bat *Corynorhinus townsendii*	D	Townsend's big-eared bats have been reported from sea level to 3,300 meters in a wide variety of habitat types including coniferous forests, mixed meso-phytic forests, deserts, native prairies, riparian communities, active agricultural areas, and coastal habitat types (Kunz and Martin 1982, Piaggio and Sherwin 2005). Distribution is strongly correlated with the availability of caves and cave-like roosting habitat, including abandoned mines (Pierson et al. 1999, Sherwin et al. 2000, Gruver and Keinath 2006). A survey by Anderson (1998) located this bat within the Lower Joseph Watershed.
Spotted bat *Euderma maculatum*	S	The spotted bat has been found from below sea level to 2,700 m elevation and occurs from arid, low desert habitats to high elevation conifer forests (Chambers and Herder 2005). Prominent rock features appear to be a necessary feature for roosting. This species has been found in vegetation types that range from desert to sub-alpine meadows, including desert-scrub, pinyon-juniper woodland, ponderosa pine, mixed conifer forest, canyon bottoms, rims of cliffs, riparian areas, fields, and open pasture. Roost sites are cracks, crevices, and caves, usually high in fractured rock cliffs. As with most bat species, threats include habitat destruction or alteration, disturbance, sensitivity to pesticides and other pollutants, and overexploitation. No spotted bats have been recorded on the WWNF, however due to the lack of intensive bat sampling it is possible that the spotted bat occurs there.

Common and Latin name	Habitat within planning area[1]	Desired and current habitat conditions
INVERTEBRATES		
Johnson's hairstreak *Callophrys johnsoni*	S	These butterflies occur within coniferous forests which contain the mistletoes of the genus *Arceuthobium*, commonly referred to as dwarf mistletoe. These plants are highly specialized and are known to occur on a number of different conifers (Schmitt and Spiegel 2008). Old-growth and late successional second growth forests provide the best habitat for this butterfly, although younger forests where dwarf mistletoe is present also supports *C. johnsoni* populations (Larsen et al. 1995, LaBonte et al. 2001, Miller and Hammond 2007). Older coniferous forests, especially those with a heavy component of western hemlock (*Tsuga heterophylla*) that are infected by dwarf mistletoe (*Arceuthobium tsugense*) appear to be its key habitat (Andrews 2010, Miller and Hammond 2007, Larsen et al. 1995). In Washington, it is only know to occur west of the Cascade crest (Larsen et al. 1995). A disjunct population occurs at the Oregon/Idaho border in Baker and Union counties, Oregon and Adams County, Idaho. This disjunct population may be a relict population isolated by climate changes (Davis and Weever 2011).
Intermountain sulphur butterfly *Colia Christina pseudochristina*	S	This species inhabits open woodland from 3400 to 5000 feet, including meadows, roadsides, and open forest and is most often found on steep sunny slopes at the ecotone between forest and shrub steppe or grassland habitats (Foltz 2009). Hammond (*In* Foltz 2009) describes the subspecies habitat as sagebrush with scattered Ponderosa Pine, including both south- and east-facing slopes. The larvae of this subspecies feed on *Lathyrus* species, including *L. brachycalix, L. lanzwertii, L. puciflorus,* and. *L. nevadensis* (Foltz 2009). The Asotin County population in Washington was reported to feed on *L. puciflorus* (*reviewed in* Warren 2005). Adults of *C. christina* use a variety of plants as nectar sources, and males may occasionally be seen frequenting mud puddles (Warren 2005).
Western bumblebee *Bombus occidentalis*	S	Suitable habitat includes typically associated with sub-alpine meadows, coastlines, and high elevation valleys. It is known to feed on sweet clover, rabbit brush, thistle, buckwheat and clover (Koch et al. 2012).

1/ D = Documented in LJCRP area; S = Suspected to occur

Landbird and Migratory Bird Habitats

The loss and alteration of historic vegetation communities due to past intensive timber harvesting, fire suppression, over-grazing, invasion of exotic vegetation, and human development has impacted landbird habitats and resulted in some species range reductions, population declines, and some local and regional extirpations. In December 2008, the U.S. Fish and Wildlife Service released The Birds of Conservation Concern Report (BCC) which identifies species, subspecies, and populations of migratory and resident birds not already designated as federally threatened or endangered that represent the highest conservation priorities and are in need of additional conservation actions. Birds of Conservation Concern with habitat known or assumed to occur in the LJCRP area include:

Brown creeper
Cassin's Finch
Williamson's Sapsucker
Mountain chickadee
Ruffed Grouse
White-headed Woodpecker
Flammulated Owl
Calliope hummingbird
Townsend's solitaire
Dark-eyed junco
American kestrel
Olive-sided flycatcher
Lewis's Woodpecker
Peregrine Falcon
Ferruginous Hawk
Mourning dove
Black-billed magpie
Swainson's Hawk

Killdeer
Black Swift
Bald Eagle
Willow Flycatcher
Red-eyed vireo
Yellow warbler
Barn swallow
Common snipe

See the Wildlife specialist's report for a summary of birds of conservation concern, and the current condition of their habitat for those with habitat known or assumed to occur in the LJCRP area. In accordance with Executive Order 13186 ("Responsibilities of Federal Agencies to Protect Migratory Birds"), it is recommended that these lists be consulted during project planning to prevent or remove the need for additional ESA bird listings by implementing proactive management and conservation actions for these species.

Management actions needed to reduce departure between current and desired wildlife habitat for MIS, landbirds, and sensitive species include thinning of dense forest stands toward desired conditions to ensure their continued resistance to uncharacteristic stand replacement disturbances (wildfire; insect and disease outbreaks. Post-fire habitat created by characteristic intensity and extent is favored by some of these species), and protection of existing old forest habitat. Additional risk factors for these species include domestic livestock grazing, invasive plant species and road associated factors. Road-associated factors that negatively affect some species of migratory and resident birds include: snag and log reduction, habitat loss and fragmentation, negative edge effects, harassment or disturbance, collisions with motor vehicles, displacement or avoidance of certain areas, and chronic negative interactions with humans (Gaines et al. 2003).

Physical Environment

Climate

Climate across the project area and the greater Blue Mountains is changing, and these changes will influence local ecosystems and their role in human communities. Average annual temperatures in the Pacific Northwest have risen by 1.5 °F since 1900. Since 1950, temperatures have risen at twice the rate of increase that occurred before 1950 (Mote 2003). Temperatures are expected to increase by 0.2 to 1 °F per decade throughout the 21st century.

Based on average data for Blue Mountains (Oregon climate zone 8), average precipitation is lower since 1970 for every month except April, July, and August. Cool season (October through March) precipitation is lower by 14 percent; warm season precipitation (April through September) is lower by 2 percent; July and August precipitation is higher by 27 percent.

All but 2 of 34 climate measuring stations have recorded declines in April 1 snowpack since 1970, with an average decline of 24 percent and a range of 5 to minus 73 percent (Gecy 2010). Snowpack declines are expected to continue across the Blue Mountains as temperatures throughout the region increase. Continued warming is expected to result in more winter precipitation falling as rain rather than snow and less winter snow accumulation.

The projected increase in air temperatures and the resulting effect on snow pack and timing and magnitude of rainfall is predicted to have a considerable impact on natural resources and their management in the region and in the Blue Mountains. Climate-informed modeling completed for the Blue Mountains by the USFS PNW Research and Development program (Peterson et al. 2014) showed a strong conversion of forested lands to arid lands in the next 9 decades (Appendix C). In most cases (three of four climate models), the landscape becomes dominated by big sagebrush communities, often with exotic grasses. Modeling also showed, under the best case climate model, considerably less large tree dominated forests, decreasing forest resilience to changing climates.

Recent drought susceptibility modeling has developed maps highlighting the most at risk areas of drought that can help identify increased risk for disrupted disturbance processes with increased

severity. The current trends in climate change will lead to prolonging the late season drought, and increasing fire season length, and the size of annual area burned, leading to increased occurrence of fire potential (McKenzie et al. 2004, Westerling et al. 2006, Cansler and McKenzie 2014). This, coupled with fire suppression policies could lead to larger more severe and uncharacteristic fires, most obvious in the moisture-limited and dryer moist upland forest plant associations. Drought, along with other biophysical factors, also influences susceptibility and vulnerability to insect and disease disturbances (Lehmkuhl et al. 1994, Hessburg et al. 1999, Schmitt and Powell 2005).

Increasing air temperatures, decline in snowpack and changes in the magnitude and timing of rainfall are expected to reduce summer streamflow, increase cool season streamflow, and increase stream temperatures at least during the next century throughout the Pacific Northwest. These changes in streamflow and temperature have the potential to directly impact aquatic habitat and organisms. Climate change may affect water storage and seasonal water availability in climate change scenarios that reflect a warming climate (Mantua 2010). Snow pack will decrease in these scenarios, thus reducing the intensity of peak flows.

The Droughty Soils Index analysis, conducted by Oregon State University (2014), predicts the susceptibility of soils to drought within the LJCRP analysis area (Map 4). Their results indicate that soils within the proposed treatment area are particularly susceptible to a warming climate. Moving the landscape to a more resilient species composition and structure, described in the desired conditions for vegetation, above, would help forests be resilient to predicted climate change scenarios. Moving the vegetation toward the historic range of variation and creating a more fire resilient landscape would mitigate some of the effects of a seasonal reduction in water storage.

Ecosystems are affected not only by climate change but also through carbon sequestration (e.g., plant growth) and greenhouse gas emissions (e.g., fire, organic matter decomposition, and soil respiration). Ecosystem functions also directly influence the global carbon cycle.

Forest management can offset greenhouse gas emissions by increasing capacity for carbon uptake and storage in biomass, wood products, and soils. Forests of the Blue Mountains currently store substantial carbon stocks. Forest management activities and disturbances, such as wildland fire, can either increase or reduce carbon stocks over time, depending on their type, frequency, and severity. Management activities carried out in response to climate change, such as thinning of forests to reduce the risk of stand replacing wildland fire or insects disturbances, or to reduce moisture stress on the remaining trees, may reduce carbon stocks in the short term, but can have long-term benefits for carbon sequestration (Zhang et al. 2010). In general, current Forest Service management activities are unlikely to affect forest carbon stocks substantially in the Blue Mountains.

The most cost-effective climate change mitigation strategies (i.e., reducing carbon emissions) in forestry are sustainable forest management (i.e., reducing forest fires) and afforestation, reducing deforestation, and producing a sustained yield of timber, wood fiber, or energy (IPCC 2014). None of the alternatives analyzed in this EIS would cause deforestation. Uncharacteristic fire disturbance can result in carbon lost to the atmosphere in the short-term. If this disturbance interacts with climate changes that cause shifts in vegetation from forests to other vegetation types with less carbon sequestration potential, it can contribute to lower carbon sequestration over the longer-term. The strategic goals of the 2015-2020 USDA Strategic Plan (USDA Forest Service 2015a) include that national forests and private working lands are conserved, restored, and made more resilient to climate change, including mitigation considerations. Carbon density of forests on the WWNF are relatively moderate (180-240 Mg C/ha) compared to westside forests (over 300 Mg C/ha) (Heath et al. 2011).

Watershed, Riparian, and Aquatic Habitat

Watershed condition reflects a range of variability from naturally pristine (functioning properly) to degraded (severely altered state or impaired). Watersheds that are functioning properly have terrestrial, riparian, and aquatic ecosystems that capture, store, and release water, sediment, wood, and nutrients within their range of natural variability for these processes (USDA Forest Service 2011a). Specific desired conditions for watershed and aquatic systems are based on Forest Plan guidance, as amended by PACFISH, other policy guidance, state and federal standards, literature reviews, and Watershed Condition Framework definitions of properly functioning watersheds (USDA Forest Service 2011b).

Landscape-scale interim riparian management objectives (RMOs; PACFISH 1995) describing good habitat for anadromous fish at the watershed scale were developed using stream inventory data for pool frequency, large woody debris, bank stability, and width to depth ratio. State water quality standards were used to define favorable water temperatures. These RMOs are stream-specific for fish bearing streams and do not reflect vegetation RMOs for all RHCAs and the streams within them. RMOs are summarized in Table 20.

Table 20. Riparian Management Objectives for the LJCRP.

Pool Frequency: (varies by wetted width)								
Wetted width in feet:	10	20	25	50	75	100	125	150
Number of pools/mile:	96	56	47	26	23	18	14	12
Water Temperature:	Compliance with state water quality standards, or maximum <68F							
Large Woody debris:	> 20 pieces per mile; >12 inches diameter; 35 foot length							
Bank Stability:	>90 percent stable							
Width/Depth Ratio:	<10, mean wetted width divided by mean depth							

Table 21 shows the results of aquatic habitat surveys for those streams that have had habitat surveys completed within the project area. Aquatic habitat surveys are conducted on fish bearing streams only. This information was obtained from the Region 6 stream survey database and surveys are on file at the WWNF. Habitat survey results show the context of RMOs for fish bearing streams. Treatments of Category 4 RHCAs are related to the downstream RMOs (Table 20).

Table 21. Results of aquatic habitat surveys for streams within the Lower Joseph project area.

Stream/Year Surveyed	Survey Length (miles)	Pools (#/mile)	%Fine Sediment (<64mm)	Stable Banks (%)	Width/ Depth Ratio	Large Woody Debris (LWD) (pcs/mi)
Swamp Creek(2004)	15.44	8	79.5	78	22.1	6
Davis Creek (1995)	6.92	26	ND	95	9.9	67
Elk Creek (1990)	9.08	15	ND	ND	17.5	25
Little Elk Creek (1990)	2.07	11	ND	ND	8.2	29

Stream/Year Surveyed	Survey Length (miles)	Pools (#/mile)	%Fine Sediment (<64mm)	Stable Banks (%)	Width/ Depth Ratio	Large Woody Debris (LWD) (pcs/mi)
Joseph Creek(2005)	5.8	3	80	ND	16.8	<1
Broady Creek (1992)	6.55	23	ND	ND	15.7	101
EF Broady Creek(1997)	3.14	34	53.7	99	6.6	113
Cottonwood Creek (1994)	7.15	29	ND	95	16.3	76
Cougar Creek (2005)	2.86	55	80	95	19.6	2
Peavine Creek (1998)	1.74	24.7	68.8	ND	10.9	7

ND=No Data

Without treatment, there is a greater potential for future sediment inputs from high intensity wildlifres. See the Aquatics specialist's report for more detail about the affected environment in terms of RMOs, and sediment delivery to streams for the LJCRP.

In general, vegetative conditions in the RHCAs (management areas defined by a set distance from a stream bank or floodplain) reflect the general departure from HRV across the planning area (see vegetation section, above).

For Category 1 and 2 streams, the desired condition is for well stocked, closed canopy conditions. This desired condition allows for attainment of RMOs for stream temperature, large wood debris recruitment, which will maintain pool habitat values, and limit sediment delivery to stream channels. In some cases (e.g., Swamp Creek) the stream will not be in a forested vegetation type but in a meadow vegetation type that would be described as a grass forb community with little coniferous vegetation and limited woody vegetation.

For Category 4 streams the desired conditions is to provide for a generally similar forest structure and composition as the upland forest vegetation. Olson (2000) found fire occurrence in riparian zones to be only slightly less frequent than on adjacent uplands in similar forest types in the Blue Mountains in Oregon (Wright and Agee 2004). This desired condition for Category 4 streams allows for the attainment of RMOs for large woody debris recruitment, limiting sediment delivery to stream channels and storing sediment in the channel to delay delivery downstream to fish bearing streams.

Table 22 details water quality limited (303 (d) listed) stream reaches that may be affected by the LJCRP (Map 8). The desired conditions for streams within the planning area are to ensure their compliance with all applicable Water Quality Management Plans and maintain water quality for all beneficial uses.

Table 22. Water quality limited waters associated with the Lower Joseph Creek Restoration Project analysis area.

Waterbody	Pollutant	Season	Beneficial Uses Affect by Pollutant	Status (2010)
Davis Creek Mile 0-10.7	Flow Modification	Undefined	Resident fish and aquatic life. Salmonid fish rearing Salmonid fish spawning	Water quality limited not needing a TMDL

Waterbody	Pollutant	Season	Beneficial Uses Affect by Pollutant	Status (2010)
Swamp Creek Mile 0-26.6	Flow Modification	Undefined	Resident fish and aquatic life. Salmonid fish rearing Salmonid fish spawning	Water quality limited not needing a TMDL
Joseph Creek Mile 8.1-48.2	Flow Modification	Undefined	Resident fish and aquatic life. Salmonid fish rearing Salmonid fish spawning	Water quality limited not needing a TMDL
Joseph Creek Mile 8.1-48.2	Habitat Modification	Year-round	Salmon and trout rearing and migration: 18.0 degrees Celsius 7-day-average maximum	Category 4a: (delisted) TMDL approved - 2010.

Soils

The LJCRP area is dominated by soils with a mollic component (Map 9). These soils have organic rich surface layers associated with ponderosa pine and are indicators that widely spaced trees with significant grass and forb understory occupy, or once occupied these areas. Frequent fire was an important mechanism in the development of these organic rich soils which dually maintained an open understory (Abella et al. 2013). Due to the forage production potential and shallow slope gradients on plateaus, mollic soils also provide high quality range and wildlife habitat. Andisols make up the balance of the soils in the analysis area. These soils are formed in volcanic ash, are young and generally have a much higher water holding capacity, which makes them some of the most productive soils to support forested vegetation in the Pacific Northwest. Loess derived from the Palouse, Mazama and Glacier Peak ash deposits supplement the soil complexes in the project (Johnson and Simon 1987) (Table 23).

Table 23. Generalized vegetation by soil type for the LJCRP

Residual Soils	Ash/Andisols	Loess/Mollic intergrades
bluebunch wheatgrass	grand fir	Idaho fescue
xeric shrublands	subalpine fir	Douglas-fir
lithosols		ponderosa pine
ponderosa pine		

Soil productivity is closely related to ash and loess content of soils. Ash soils have high water holding capacity, high infiltration rates, high detachability, and a concentration of nutrients in the upper surface layers. Loess soils hold a large amount of nutrients (high in base saturation) and are high in nutrient reserve. Productivity of plant associations found on loess soils such as Idaho fescue-prairie junegrass associations have nearly three times the dry weight biomass of plant associations such as bluebunch wheatgrass-Sandberg's bluegrass, which grow on residual soils (Johnson and Simon 1987).

Soil water holding capacity has historically been extremely important in the Wallowa-Snake province, where summer precipitation is typically very low. Rock fragment content, depth of surface soil material, rooting depth, and presence of clay all influence soil water holding capacity and in turn contribute to vegetation composition (Johnson and Simon 1987).

Approximately 70% of the soils on NFS lands within the analysis area have an ash component, which indicates higher productivity but suggests that many of the soils would be susceptible to compaction. Soil compaction, or an increase in soil bulk density, can alter the hydrologic function of a site and

have adverse impacts on productivity. It decreases a soil's infiltration rate which leads to increased overland flow, increased surface erosion, and, potentially, increased sediment delivered to streamss.

Dry meadows and scablands occur on plateau tops and ridges and are scattered throughout the project area but are not usually included in harvest units. Dry meadows and scablands are defined as having shallow, rocky soils with drought tolerant plants (Johnson and Simon 1987). These soils have more rock and clay than soils influenced by loess or volcanic ash. When located on concave surfaces, shallow, rocky soils are often saturated until mid to late July. In undisturbed grasslands and scablands, biological soil crusts (BSC) form a protective layer over the soil. Biological soil crusts consist of bacteria (blue-green algae), algae, lichens, and bryophytes (mosses and liverworts), the sticky nature of the bacterial fibers combined with the bumpy, water absorbing qualities of the lichens and bryophytes functions to hold water and protect gaps between bunchgrasses from the impact of raindrops. Besides providing a roughened "skin" for the soil, BSCs fix nitrogen and act as a barrier to the germination of annual invasive grasses. Disturbance from the hooves of native and domestic ungulates can disrupt the biological soil crust resulting in exposed bare ground, loosened surface rock, and a decline in principle grass species. Loss of BSCs can take years or decades to re-establish. When you lose BSCs, increases in non-native annual grasses and other invasive non-native plant species can happen more easily.

Compaction, erosion and water quality related effects associated with livestock management across the LJCRP area have improved over the last couple decades. These improvements are results of restoration activities, and improved range management practices.

Detrimental Soil Conditions (DSC) directly impact soil productivity by displacement, compaction, loss of organic matter, rutting, erosion and loss of porosity. Land management activities, such as road construction and heavy equipment operation have the greatest potential to create detrimental soil conditions. As described in PDC Soils-7 and Soils-8 (Appendix J), there are existing DSCs from past activities. Each of these methods has an expected impact to the DSC (Bennett 1982, Archuleta 1997, Siskiyou National Forest 1997, Archuleta 1999, Reeves et al. 2011), which can influence sedimentation.

Social Environment

Socioeconomics

Agriculture, forestry, fishing and hunting; government; and retail trade sectors contain the largest shares of employment in Wallowa County. In addition, logging jobs make up two percent of total employment in Wallowa County (Minnesota IMPLAN Group 2014). Wallowa County holds about one percent of the jobs in the logging sector for the state of Oregon. Of the approximate 8,500 jobs in the logging sector in Oregon, 97 of those jobs are located in Wallowa County. Employment in the wood manufacturing sector only accounts for 16 jobs in Wallowa County, or 0.1 percent of the wood manufacturing jobs in the state. Although the logging sector makes up about two percent of total jobs in Wallowa County, this sector contains 6.5 percent of total labor income because the average wage per job in the logging sector was $62,000 in 2012.

The public meetings that were held in Enterprise, Oregon (see Public Involvement, Chapter 3), as well as submitted written comments, provided insight into the values, beliefs, and attitudes of the Lower Joseph Creek area residents and surrounding communities. The major concerns from the commenters were focused on economic, cultural and biological values, with specific beliefs regarding roads and access, vegetation treatments, cultural and tribal resources, and recreation, among others.

From the 1950s until 1992, the annual harvest from NFS land in Wallowa County averaged 50 to 100 million board feet year, the highest in 1962 of 129 million board feet. Since 2000, the saw timber volume harvested from NFS lands in Wallowa is between 0 and 10 million board feet per year with an average harvest of less than 5 million board feet per year (Wallowa County 2014). From 2004 to 2013, approximately 1,320 acres have been commercially harvested in the LJCRP area (Table 37).

Tribal Relations

The aboriginal territory of the Nez Perce Tribe, also known as Nimiipúu, or “the people”, includes large portions of the States of Idaho, Washington, Oregon, Montana and Wyoming (Figure 4). The Chief Joseph Band of Nez Perce had their winter home within Joseph Canyon. Through time and tradition, the Tribe has acquired and applied traditional ecological knowledge, as well as the latest science, to design and implement tribal stewardship objectives (Sondenaa and Kozusko 2003, Tribe 2013).

The Nez Perce way of life, now as in the past, depends on the inherent right of tribal members to fish, hunt, gather, pasture animals and rely on the land for subsistence as well as sanctuary. Article III of the Treaty of 1855 provides for: “The exclusive right of taking fish in all the streams where running through or bordering said reservation is further secured to said Indians; as also the right of taking fish at all usual and accustomed places in common with citizens of the Territory; and of erecting temporary buildings for curing, together with the privileges of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land” (Tribe 2013).

The exercise of treaty rights is dependent upon access to traditional hunting, fishing, and gathering sites and the resources associated with them. Sustainable populations of treaty resources such as fish, wildlife, and traditional plants, depend upon healthy habitats and resilient landscapes. Land management decisions may affect the ecosystems wherein valued tribal resources and natural settings are dependent. Refer to the plants, wildlife, aquatic habitat and watershed sections of this FEIS, and specialist reports for complete analyses for these resources.

The purpose and need for the LJCRP is not directly driven by Tribal interests. However, tribal comments conveyed substantive concern for the protection of treaty and heritage resources (see Appendices I, Response to Comments, and G, Nez Perce Tribe Consultation and Coordination Record).

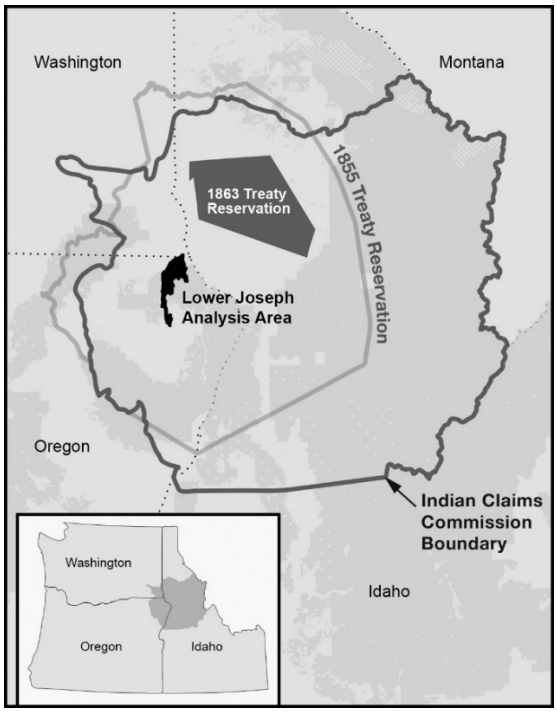


Figure 4. Nez Perce Indian Claims Commission Boundary and 1855 and 1863 Treaty Lands Cessions (adapted from Nez Perce 2013)

In the LJCRP, Nez Perce tribal members:

- Exercise Treaty rights to hunt, fish and gather subsistence resources including access to sites for camping and other traditional uses. In the LJCRP traditional plant habitats, including scab lands, meadows, riparian areas and seeps are being encroached upon by over stocked forests resulting from fire exclusion. The historically open fire dependent ecosystem that functioned to provide healthy habitat for subsistence resources is becoming less resilient to disturbance, insects, and disease.
- Are stewards in the management and recovery of steelhead and salmon populations in the Lower Joseph Creek watershed.
- Conduct neotropical bird studies adjacent to the LJCRP.
- Manage for wildlife values in their Precious Lands Management Area located adjacent to the LJCRP
- Travel to the LJCRP area to continue traditional practices. Information regarding the locations and activities associated with these practices are private and not readily shared. The Forest continues to work toward building relationships with the Tribe, tribal staff and members so that the potential effects to the settings and values associated with access and the use of traditional places may be understood and addressed.

Heritage Resources

Heritage resources, also known as cultural resources, archaeological, ethnographic and traditional sites or places, are highly valued by the public and Tribes as they are non-renewable vestiges of our Nation's heritage. The Forest Service is responsible for the management of heritage resources located on NFS lands.

The archaeological and historic sites located in the LJCRP area tell a robust story of early human uses, culture and lifeways associated with this landscape (Wallowa County 2014).

Cultural Resource Site Types in the LJCRP

Pre-contact to Euro American Settlement (up to 1870)

Tool stone quarries and lithic scatters originating from local granite and andesite outcrops are the most common archaeological site type in the LJCRP. Archaeological excavation of a quarry site located within the LJCRP area yielded evidence of aboriginal use and occupation dating from 8,000 years ago into the pre-contact era (18th century). In addition, sites associated with the Nez Perce seasonal subsistence ground include cambium peeled trees, upland plant processing camps and hunting camps. Rock features associated with ancient traditional practices have also been recorded.

Early Settlement to (1870-1940)

Cabins, barns, troughs, and fencing materials associated with trapping, homesteading and ranching are the most represented historic resources in the LJCRP area. Railroad logging camps, grade trusses and Civilian Conservation Corps Forest Service guard stations, lookouts, phone lines, and pack trails are also well represented.

Desired conditions as set forth in the WWNF Forest Plan states that the goal for heritage resources is to “provide for the identification, protection, preservation, enhancement and interpretation of prehistoric and historic sites, buildings, objects, and antiquities of local, regional or National significance so as to preserve their historical, cultural, and scientific values for the benefit of the public” (4-20). This goal and associated standards and guidelines are also found in the Hells Canyon NRA Comprehensive Management Plan HCNRA CMP; See Appendix B for relevant standards and guidelines).

Research Natural Areas

Research Natural Areas (RNA) are designated for research and educational opportunities, to maintain biological diversity on NFS lands, and are selected to complete a national network of ecological areas. Horse Pasture Ridge and Haystack Rock were originally proposed for RNA designation in 1988, and they still maintain all the qualities unique for RNA designation. The Horse Pasture Ridge proposed area would contribute to the national network of RNAs by providing an example of Idaho fescue-prairie junegrass and Idaho fescue –bluebunch wheatgrass plant associations in ridge top communities. The Haystack Rock proposed area would contribute to the national network of RNAs by providing an example of Idaho fescue-bluebunch wheatgrass-arrowleaf balsamroot and bluebunch wheatgrass-Sandberg’s bluegrass-narrow-leaved skullcap plant associations.

Recreation

The recreation activities within the LJCRP project area are predominately dispersed in nature; however, developed sites, trail use and special use permitted activities occur within the project area. There are five developed recreation sites including Coyote and Dougherty campgrounds, the Kirkland Cabin, the Joseph Canyon Viewpoint and the Frog Pond and Chico Trailheads (Figure 5). Other recreation activities are focused on day use activities such as OHV use, hunting, firewood gathering, mushroom picking, and viewing scenery. The highest use in this area occurs during the big game hunting seasons when hunters occupy many of the dispersed campsites within the area.

Because the construction of new recreation facilities or reconstruction of existing recreation facilities is not proposed for the LJCRP, this document focuses on the harvest activities and fuel treatments and

their effect on the recreation setting and visitor opportunities. Past timber harvest activities have influenced dispersed recreation activities by displacing some uses (i.e. big game hunters may go to areas with more denser canopy covering, berry pickers may go to areas where plants are more abundant), whereas it may have also encouraged other uses (i.e.open areas allow better viewing background scenery).

Scenery

Scenic character goals, desired conditions, and scenic conservation design features are provided in the WWNF Forest Plan (see Appendix B). The landscape character goal for the LJCRP area is to maintain a naturally appearing to slightly altered landscape character that expresses predominately natural processes in scenic viewsheds and travel routes.

Dominant scenic features of the LJCRP area include open ponderosa pine forests, large, open pine, and larch forests with fall color, grassy forest floors, canyon lands with timbered stringers and basalt rims, basalt and granite rock outcrops, deciduous riparian trees and shrubs, and rustic wooden “ruins” of old homesteads. The Scenery specialist’s report summarizes some of the valued landscape attributes, and special features specific to the LJCRP area. Ecologically sound landscapes can be aesthetically pleasing as well as sustainable, being reflective of the inherent natural disturbance regimes (including the natural role of fire, insects and pathogens). Landscape conditions that depart from natural ranges of variation can cause uncharacteristic disturbance severity, which can lead to a dramatic change to the existing scenery.

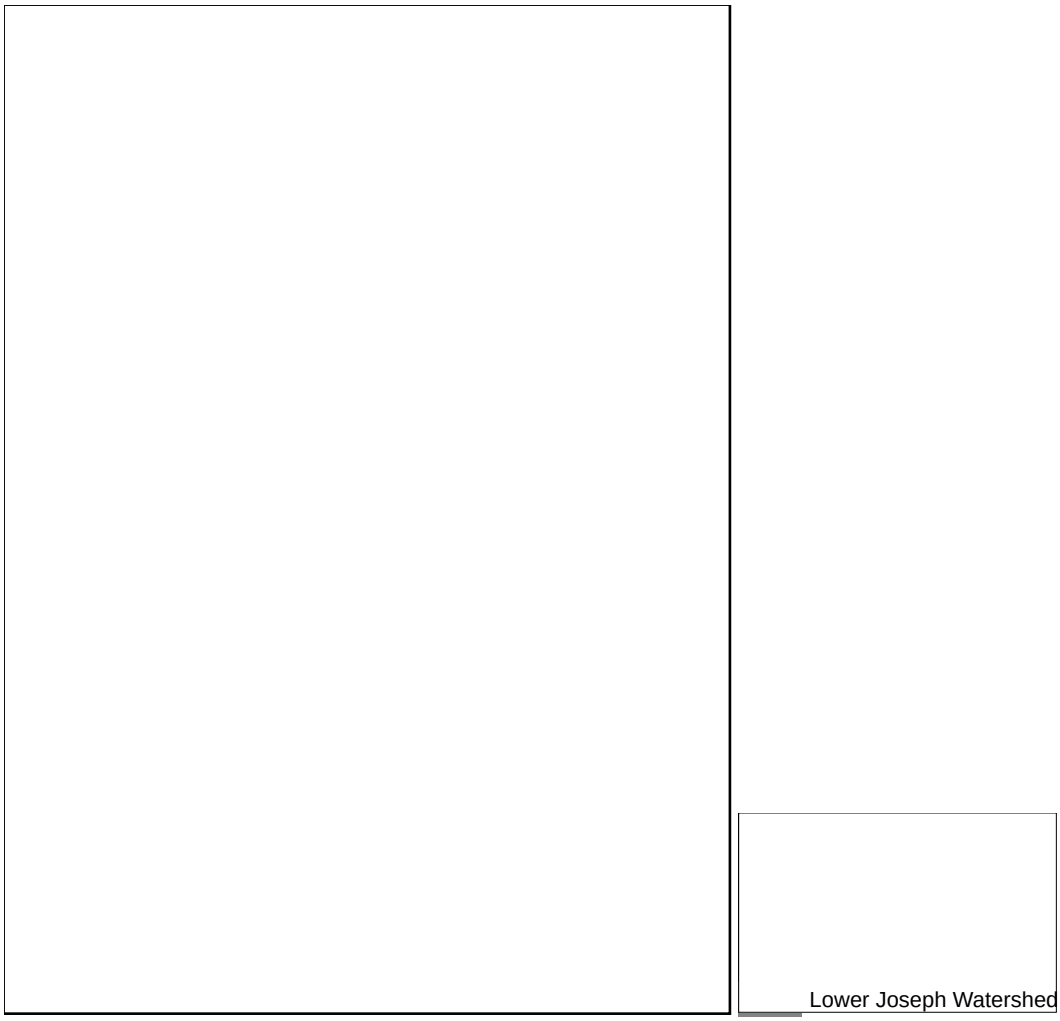


Figure 5. Developed recreation within the LJCRP area.

Scenery Landscape Analysis Areas

The LJCRP area has been divided into 4 separate landscape areas for assessing scenic effects, including:

Oregon State Highway 3, Joseph Canyon Overlook

Joseph Viewpoint located on State Highway 3, is designated as a Level 1 (critical) viewshed within the WWNF and over 76,000 visitors stop at the site annually.

Joseph Canyon Wild and Scenic River Corridor

Joseph Creek is classified as a Wild River from one mile downstream from Cougar Creek (Joseph Creek Ranch) to the WWNF boundary, for a total of 8.6 miles. Joseph Creek's outstandingly remarkable values include scenery, recreation, geology, fish, wildlife and history. The spectacular natural setting, ruggedness, inaccessibility and steep topography of Joseph Creek and the surrounding environs of Joseph Canyon create a lasting impression on those who view it. The river corridor provides a spectacular example of the steep, rimrock-exposed canyons found in northeast Oregon.

Access to Joseph Canyon and Joseph Creek is limited due to remoteness, steep and rugged terrain and climatic conditions. Hiking, horsepacking, birdwatching, wildlife viewing, fishing and big game hunting can be enjoyed in a solitary manner. The canyon contains examples of northeast Oregon geology, with Columbia River basalt canyons exposed by downcutting of rivers. The 2,000 foot deep canyon is virtually unmodified and its spectacular details, such as steep sideslopes, basalt layers and dikes, can be easily viewed from the canyon rim. Joseph Creek is an important wild steelhead and wild rainbow trout fishery. Wildlife includes bighorn sheep, deer, elk, bear, river otter and cougar. The area plays a vital role in Nez Perce Tribal history. Most important is the proximity of the river corridor to the winter gathering place for Chief Joseph and his band at the mouth of Joseph Creek.

Table Mountain

Table Mountain, accessed by Forest Service Road 4650, provides scenic viewpoints south and west across grassy hillsides and forested stringers into Joseph Canyon and the Joseph Creek Wild and Scenic River, and has been identified as an important place to view scenery by local residents.

Forest Road 46, Cold Spring Ridge/Forest Road 4680

Red Hill Lookout is located on Forest Road 46 and straddles the hydrologic divide between Upper and Lower Joseph Creek Watershed, and about 2,300 people visit the viewpoint each year. Cold Spring Ridge forms the northeastern boundary of the project area, within the Hells Canyon National recreation area (HCNRA) between the Cook Ridge and Wildhorse Inventoried Roadless areas.

Scenic Integrity

Scenic integrity is the amount of human caused deviation in form, line, color, and texture of a landscape. Scenic integrity serves as a frame of reference for measuring scenic integrity levels based on the valued attributes of the existing landscape character being viewed. The degrees of integrity vary from very high to very low. Scenic integrity is measured on the Wallowa-Whitman National Forest through Visual Quality Objective levels defined by the USFS Visual Management System's Chapter 1 USDA Handbook # 462. The current landscape character is predominately a naturally appearing to slightly altered forested environment viewed in the foreground, middleground and background of viewsheds. The existing scenic integrity of the LJCRP meets the visual quality objective of the Forest Plan and has a range of scenic integrity levels from very high to low. Within the project area there are evidences of past activities. Partial removal treatments can be seen in partial retention areas, and stumps are apparent. See the Scenery specialist's report for more detail.

Scenic Stability

The greatest hazard to scenery resources in this area are large stand replacement fires that would burn much more intensely due to the stocking levels, species compositions, ladder fuels and canopy closure that have developed over time, and large epidemics of insect or disease. Table 7 summarizes existing and desired fire severity probabilities for the dry and moist upland forest potential vegetation groups. Maintaining a landscape character consistent with the desired conditions for fire severity is also generally consistent with maintaining high scenic stability. See the Scenery specialist's report for more detail.

Landscape Visibility

Landscape visibility for scenic analyses is categorized into three classes: foreground, middleground, and background. Foreground is based on landscape visibility and is defined as views up to ½ mile distance zone, middleground is ½ mile to 4 miles distance zone and background is 4 miles to the horizon from the travelway and use areas. About 11% of the LJCRP area can be seen as foreground, 22% as middleground, and <1% as background. The vast majority (66%) is not generally visible from

major travelways or viewpoints. Additional information and descriptions regarding Visual Quality Objectives (VQO's) may be found in the Forest Service Scenery Management System (USDA Forest Service 1995) and the Visual Management System (USDA Forest Service 1974) National Forest Landscape Management Handbooks. See the Scenery specialist's report for more detail.

Inventoried Roadless Areas

The 2001 Roadless Area Conservation Rule (RACR) sets forth particular requirements that must be met for timber to be cut, sold, or removed within Inventoried Roadless Areas. Following are the requirements which apply to this project and will be used as indicators of compliance with the RACR. The descriptions of environmental effects to roadless area characteristics has also been used to analyze effects to Oregon Wild's "citizen's unroaded" areas (see the IRA/PWA report) that overlaps inventoried roadless areas.

- The purpose of any proposed treatment in IRAs is to maintain or restore the characteristics of ecosystem composition or structure, such as to reduce the risk of uncharacteristic wildfire effects, within the range of variability that would be expected to occur under natural disturbance regimes of the current climatic period. *36 CFR 294.13 (b)(1)(ii).* Criteria that only apply to the management within IRAs include:
  - The timber is generally small diameter. *36 CFR 294.13 (b)(1).*
  - Timber cutting, sale, and/or removal are needed to maintain or improve one or more of the roadless area characteristics. *36 CFR 294.13 (b)(1).*
  - The cutting, sale, or removal of timber is incidental to the implementation of a management activity not otherwise prohibited. *36 CFR 294.13 (b)(2).* This criterion would only be applied to cutting and removal of roadside danger trees.
  - The cutting and sale of timber is expected to be infrequent. *36 CFR 294.13 (b).*

Acres of forest treated within Inventoried Roadless Areas will be used to track the extent of the effects (Chapter 4).

Maintaining or Restoring the Characteristics of Ecosystem Structure

The specific purpose for any proposed treatment of IRAs in this project is: "To maintain or restore the characteristics of ecosystem composition or structure, such as to reduce the risk of uncharacteristic wildfire effects, within the range of variability that would be expected to occur under natural disturbance regimes of the current climatic period." The need for restoration described in Chapter 1 applies to the IRAs identified for treatment activities within the LJCRP area. Fire suppression outside and within the IRAs has resulted in increased density of younger fire intolerant species (such as grand fir) and an associated increase in fuel loading and in particular an increase in ladder fuels. Old fire resistant trees are likely to continue to decline in many of the dry and mixed conifer stands found in these IRAs due to increased competition especially during times of extended or early onset drought. These structure, density, composition, and disturbance regime changes increase the potential risk for uncharacteristic wildfire or insect/disease mortality with increased severity and effect on the integrity of the IRAs.

Maintaining or Improving Roadless Area Characteristics

Uncharacteristic disturbance due to changes in structure, density, composition, and pattern could adversely affect roadless area characteristics of the Joseph Canyon, Cook Ridge, Wildhorse, and Mountain Sheep IRAs.

Roadless area characteristics are resources or features that are often present in and characterize inventoried roadless areas (36 CFR 194.11), including;

1. High quality or undisturbed soil, water, and air;
2. Sources of public drinking water;
3. Diversity of plant and animal communities;
4. Habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land;
5. Primitive, semi-primitive non-motorized and semi-primitive motorized classes of dispersed recreation;
6. Reference landscapes;
7. Natural appearing landscapes with high scenic quality;
8. Traditional cultural properties and sacred sites; and
9. Other locally identified unique characteristics.

Generally Small Diameter

The RACR did not specifically define what constitutes "generally small diameter timber," "(b)ecause of the great variation in stand characteristics between vegetation types in different areas…" The Rule further states that project planning:

> [W]ill consider how the cutting or removal of various size classes of trees would affect the potential for future development of the stand, and the characteristics and interrelationships of plant and animal communities associated with the site and overall landscape. Site productivity, due to factors such as moisture and elevation gradients, site aspect, and soil types, will be considered, as well as how such cutting or removal of various size classes of standing or down timber would mimic the role and legacies of natural disturbance regimes in providing habitat patches, connectivity, and structural diversity critical to maintaining biological diversity. In all cases, the cutting, sale, or removal of small diameter timber will be consistent with maintaining or improving one or more of the roadless area characteristics (see Final Rule, Federal Register, Volume 66, No.9, 3257).

Cutting, Sale, or Removal of Danger Trees is Incidental

Cutting danger trees along roads can be necessary to remove trees that pose a danger to travelers. Danger trees are identified using the Field Guide for Danger Tree Identification (Toupin et al. 2008). The primary objective of this activity would be incidental to maintaining a road for safe travel. This criterion applies only to the activity that removes danger trees. Other criteria used for other prescriptions (e.g., generally small diameter) does not apply to danger tree mitigation.

Description of Joseph Canyon, Wildhorse, Cook Ridge, and Mountain Sheep IRA

During the current Forest Plan revision process each of the roadless areas (now represented as IRAs under RACR) in the LJCRP area were analyzed for meeting potential wilderness criteria and detailed descriptions were made for each concerning their existing resource conditions (Appendix C, Wallowa-Whitman Land and Resource Management Plan 1990). Further descriptions of these IRAs is detailed in the IRA/PWA report, and these documents are incorporated by reference and are included in the project record. Below is a brief summary of the contents as it pertains to the cutting, sale, or removal of timber and the project goal to maintain or restore ecological structure and natural disturbance for each of these IRAs.

Joseph Canyon IRA (24,300 acres)

The Joseph Canyon Roadless Area lies adjacent to State Highway 3 on the northern boundary of the Forest, 20 miles north of Enterprise, Oregon. In addition to evidence of timber harvest, there are scattered examples of human activity. These include abandoned fields and remains of buildings within the isolated private land parcels along Joseph Creek. Old railroad grades and skid trails in the lower reaches of Davis and Swamp Creeks were the result of logging activities from 1920s and ‘30s. About 50 livestock watering facilities, 30 miles of fence, and six miles of jeep road are found within the area. Recurring surface fires of low-to-moderate intensity and endemic insect and disease episodes controlled species composition, maintained sustainable stocking levels, and favored the retention of the intolerant conifers such as ponderosa pine. The absence of fire over the last 100 years (prior to 1986) resulted in the widespread development of dense forest dominated by sapling to small-sized, late seral Douglas-fir. The probability of a stand replacement event exceeding historic patterns, whether by fire, insects, or pathogens, was quite high due to the predominance of continuous layered, late seral structures. These expected consequences were realized during the Joseph Canyon Fire of 1986. Most of the timbered stringers (approximately 75 percent) were converted to the stem initiation stage of stand development. Salvaged stands were either seeded aerially or planted with conifer seedlings. Sites are marginally stocked with ponderosa pine and Douglas-fir seedlings and saplings.

Wildhorse IRA (20,300 acres)

The Wildhorse Roadless Area is bounded by the Cook Ridge Roadless area to the east and by the Wallowa Valley Ranger District to the west and south. The national forest boundary delineates the northern extent. The Dispersed Recreation/Timber Management Area portion of the roadless area was salvage-harvested following the Teepee Butte Fire of 1988. Substantial volume was removed via approximately 4 miles of permanent road which was constructed to facilitate harvest on the upper plateaus. Approximately 1,700 acres of the upper plateau were replanted with Douglas-fir, ponderosa pine, and western larch in 1992. Regenerated stands are currently stocked with conifers averaging 4-6 feet in height. The unplanted and non-harvested landbase capable of supporting conifers will require decades to re-stock with conifers given the loss of potential seed source and the relative harshness of the exposed sites. Previous high-intensity fires altered the landscape. Prior to the fire, logging had been limited to light salvage entries and restricted to ground-based equipment within the Dispersed Timber Recreation Management Area land allocation within the HCNRA. Following the Teepee Butte Fire, salvageable timber in excess of 12-inch DBH was removed from the upper flats of Cook Creek. About 4 miles of permanent road and 1 mile of temporary road was constructed to facilitate salvage harvest within Cook Ridge and Wildhorse Roadless Areas.

Cook Ridge IRA (19,600 acres)

The Cook Ridge Roadless Area is entirely within the Hells Canyon National Recreation Area. Much of the Hells Canyon National Recreation Area is in a roadless and undeveloped condition. The Cook Ridge Roadless Area is located primarily in Township 4 North, Range 48 East northwest of Buckhorn Springs. It abuts the Mountain Sheep Roadless Area to the north and east, Cold Springs Ridge to the west, and the Wallowa Valley Ranger District to the south. The area is dominated by Cook Creek which bisects the roadless area, south to north. The entire roadless area was impacted by the 1988 Teepee Butte Fire. The effects of the fire varied according to differences in fire intensity, duration, and pre-fire vegetative composition. Primarily, the intensely burned portions of the area occurred on the steep breaklands and within the dense thin-barked, grand fir-dominated stands on the upper plateau. Approximately 700 acres of the severely burned upper plateau was replanted with Douglas-fir, ponderosa pine, and western larch in 1992. Regenerated stands are currently fully stocked with conifers averaging four to six feet in height. The unplanted and non-harvested land base capable of supporting conifers will require decades to restock with conifers given the loss of potential seed

source and the relative harshness of the exposed sites. The IRA was also impacted by the Cache Creek fire of 2012, which burned 5,800 acres.

Mountain Sheep IRA (19,500 acres)

Much of the HCNRA is in a roadless and undeveloped condition. Congress recognized this in its establishment in 1975. The enabling legislation established Hells Canyon Wilderness Area and directed the Forest Service to specifically review additional areas for wilderness suitability. Mountain Sheep Roadless Area was, at that time designated as a Wilderness Study Area. The roadless area lies adjacent to the Snake River between Eureka Bar to the southeast and the Washington/Oregon state line to the northwest. The southwestern boundary follows portions of Cold Springs Creek turning southeast cross-country to a point south of the mouth of the Imnaha River. The river provides most of the access. The roads to the Cache Creek, Cherry Creek, and Jim Creek ranches provide additional access. The old wagon road from Spain Saddle to Eureka Bar provides trail access as does the Imnaha River Trail. This area has historically been grazed. The ranches at Cache, Cherry and Jim creeks have a long history of operation. Most of the area is unroaded, and the open roads within the area have been excluded from the IRA designation. Numerous structures are associated with the ranches. There are over 10 miles of fence. The bulk of the roadless area experienced a high-intensity, stand-replacement fire in 1988. The Teepee Butte Fire consumed the timbered stringers from Downey Saddle east to the Snake River and south to the extent of the roadless area. Prior to the fire, timbered stringers consisted of ponderosa pine old-growth over dense stands of pole to small diameter Douglas-fir and ponderosa pine. These structures only comprised 5 percent of the grassland dominated landbase within the roadless area. The fire converted the majority of the layered structures to the stem initiation stage of stand development. The majority of the vegetation represented within the area reflects grassland community types. Vegetation patterns on mid-slope benches and dissected basalt breaklands vary depending upon aspect. Bluebunch wheatgrass associated with sand dropseed dominate more xeric microsites (southern and western exposures, likely limited to the lowest elevations), whereas Idaho fescue associated with prairie junegrass occupy the more mesic northern and eastern exposures.

Potential Wilderness Areas

The scale of analysis is the LJCRP planning area, and additional area encompassing the Joseph Canyon, Wildhorse, Cook Ridge, and Mountain Sheep IRAs. The PWA analysis area (~276,000 acres) encompasses the entire project planning area (~98,000 acres) and additional lands sufficient to ensure a complete PWA inventory around the all IRAs that intersect the LJCRP. The descriptions of environmental effects to these indicators also apply to Oregon Wild's "citizan's unroaded" areas (see the IRA/PWA specialist's report) identified that overlap with potential wilderness areas. This was needed to put in context any reduction in PWA associated with the Joseph Canyon, Wildhorse, and Cook Ridge IRAs due to proposed activities.

While PWA inventories are a part of Forest Planning or Forest Plan revision, not project-level planning, an inventory of Potential Wilderness Areas was conducted for the Lower Joseph Creek Restoration Project to assess effects to the values of remoteness and solitude that these areas may represent, outside the Forest Planning process used for Wilderness recommendation. Appendix A of the IRA/PWA report describes the process and rationale used to conduct the inventory. The inventory is based on, and consistent with criteria found at Forest Service Handbook (FSH) 1909.12 Ch. 71 (amendment number 1909.12-2007-1 effective January 31, 2007). The inventory is conducted with the express purpose of identifying all lands that strictly meet the criteria for being evaluated for wilderness suitability so as to evaluate the range of project effects to these areas, and does not replace

or supercede the process used during Forest Planning or Plan revision to recommend Wilderness designation.

Each step of the inventory process is visually documented as a map in the IRA/PWA report and Map 10 of this document. The Forest Service used professional judgment, local knowledge, aerial photo interpretation, and ground based examination regarding unique, site-specific conditions of each area being considered for placement in the inventory of potential wilderness areas.

Potential wilderness areas are not a land designation decision, they do not imply or impart any particular level of management direction or protection, they are not an evaluation of potential wilderness (FSH 1909.12, Chapter 72), and they are not preliminary administrative recommendations for wilderness designation (FSH 1909.12, Chapter 73). The inventory of potential wilderness does not change the administrative boundary of any IRA or any Forest Plan management areas. PWAs overlap inventoried roadless areas only where those acres of land are consistent with the inventory criteria (FSH 1909.12 Chapter 71) and may extend beyond IRA and wilderness boundaries consistent with inventory criteria. The following three PWAs were identified following Chapter 71 criteria.

The Joseph PWA **(**6,500 acres) is comprised of a portion of Joseph Canyon IRA (6,100 acres) and PWAs contiguous with the IRA (400 acres).

The Wildhorse PWA (15,400 acres) is comprised of a portion of Wildhorse IRA (13,700 acres) and PWAs contiguous with the IRA (1,700 acres) that are located within the LJCRP planning area.

The Cook Mountain PWA (38,600 acres) is comprised of portions of Cook Ridge and Mountain Sheep IRAs (31,700 acres) and PWAs contiguous with the IRA (6,900 acres) that are located within and outside of the LJCRP planning area. A majority of both of these IRAs are located outside the project planning area. The inventory included an analysis of the entire boundary of these IRAs to be as inclusive as possible in identifying potential wilderness character.

Overall resource management covered by the Forest Plan is comprised of management goals, objectives, Forest-wide standards and guidelines, and management area allocations. The roadless area issue is primarily addressed in the Forest Plan through management area allocations. See the IRA/PWA specialist's report for management area allocation within PWAs.

Indicators for comparison purposes in the analysis of effects (Chapter 4) between alternatives are:

- *Roadless characteristics* (features that are often present in and characterize inventoried roadless areas) as identified in the 2001 Roadless Area Conservation Rule (36 CFR §294.11) previously listed.
- *Change in acres of inventoried PWAs.*

Other Undeveloped Lands

An outcome of the PWA inventory process found at FSH 1909.12, Chapter 71 was the identification of isolated polygons of other undeveloped lands (see IRA/PWA report). These polygons did not meet inventory criteria as potential wilderness areas and they are not inventoried roadless areas or a designated wilderness area. Each individual polygon of isolated land has no history of harvest activity and does not contain forest roads (see Other Undeveloped Areas specialist's report). They are stand-alone polygons of varying acreages all less than or equal to 4,999 acres within the project planning area.

There are no forest-wide or management area standards specific to other undeveloped lands in the Forest Plan. All lands, including undeveloped lands, are managed consistent with forest-wide standards and guidelines and by designated Forest Plan management area allocations (Map 11a and 11b; also see the IRA/PWA report for a table of management area allocations). The majority (51%) of other undeveloped lands fall into management area 3 – Wildlife/Timber emphasis (see IRA/PWA report for percent in other management area designations).

The scale of analysis is represented by the LJCRP planning area. Other undeveloped lands have intrinsic ecological and social values because they do not contain roads and evidence of past timber harvest (see Other Undeveloped Areas specialist's report). These values are used as indicators of comparison to display effects between alternatives. Other undeveloped lands are not inventoried roadless areas or potential wilderness areas and therefore are described using different indicators of comparison.

Indicators for comparison purposes in the analysis of effects (Chapter 4) between alternatives are:

- Intrinsic physical and biological resources (soils, water, wildlife, recreation, fisheries, etc.)
- Intrinsic social values (apparent naturalness, solitude, remoteness)
- Change in acres of other undeveloped lands

About 40,300 acres (41 percent of the project planning area) have been identified as isolated polygons of other undeveloped lands that are at least one acre in size. Approximately 25,300 acres (23 percent of the project planning area) have been identified as PWAs (Table 25), and the remaining acres (about 36 percent) are developed and managed (contain evidence of past harvest and forest roads). Individual polygons of other undeveloped lands less than an acre were eliminated from further study because no special or unique resource values were identified and the description of effects to individual pieces of land less than one acre are better disclosed as part of the other resource effects sections in this FEIS.

Table 24 displays the number, size class, and approximate acres of other undeveloped lands in the LJCRP area. Approximately 91 percent of the polygons are in the 1 to 99-acre size class and represent about 7% of the other undeveloped acres. The residual shape of each undeveloped polygon is the result of boundaries created by past harvest and road building. The largest polygon of other undeveloped lands is approximately 4,000 acres. This polygon is located in the northeast corner of the project planning area a few miles from the nearest harvest treatment unit.

Table 24. Size class and acres of other undeveloped lands in the LJCRP Area

Number of Polygons	Size Class	Approximate Acres
201	1 to 99 acres	2,700
9	100 to 499 acres	1,500
3	500 to 999 acres	2,200
4	1,000 to 4,999 acres	8,600
0	5,000+ acres	0
217	**Total**	**15,000***

*The total area of undeveloped land is approximately 40,300 acres. Approximately 25,300 acres of other undeveloped land was identified as PWA as a part of project effects analysis.

Areas Identified as Roadless by Oregon Wild (OW)

Oregon Wild submitted a map during the scoping period representing five areas that they identified as "citizen's roadless", named Joseph Canyon, Sumac Creek, Boner Gulch, Cottonwood Creek-Broady Creek, and Yew Wood Springs. These areas were defined with criteria different from those that define Inventoried Roadless Areas. Approximately 67,400 acres of these areas are within the LJCRP boundary. The descriptions of environmental effects to the 'intrinsic physical and social values' also apply to Oregon Wild's map (IRA/PWA report) identified in relation to other undeveloped lands.

There are no forest-wide or management area standards specific to OW areas in the Forest Plan. All lands, including these areas, are managed consistent with forest-wide standards and guidelines and by designated Forest Plan management area allocations. Portions of OW overlap with IRAs, PWAs, other undeveloped lands as well as areas with evidence of past harvest and evidence of development such as road construction and its influences. Table 25 shows the relationship between OW and other identified land characteristics.

Indicators of Comparison between Alternatives

The indicator of effects to OW areas, IRAs, PWAs, and other undeveloped lands is:

- Number of acres affected by proposed treatments

Table 25. Acres of Oregon Wild's roadless area that overlaps with other lands identified in LJCRP.

OW Area Names	Acres in LJCRP	Acres in FS IRA	Acres in FS PWA	Acres with evidence of past harvest	Acres with Forest Roads
Joseph Canyon	38,900	24,000	6,400	8,700	2,600
Sumac Creek	1,700	0	0	10	240
Boner Gulch	1,400	0	0	30	170
Cottonwood Creek-Broady Creek	24,000	20,100	15,400	4,000	2,900
Yew Wood Springs	1,400	0	0	130	250
Total	**67,400**	44,100	21,800	12,870	6,160

This page intentionally left blank

CHAPTER 3 Public Involvement, Issues, the Proposed Action and Alternatives

Summary

Public involvement helped the Forest Service identify three significant issues that were used to develop and compare alternatives. Significant issues encompassed the types and locations of forest treatments, and the extent of the road network, and are described in detail in the Significant Issues portion of this chapter.

These three significant issues were used to develop and compare alternatives. The alternatives were developed to address these issues while meeting the purpose and need for the project. Key differences between the alternatives include the amount, nature, and location of forest thinning and the extent of the open road network (Table 30).

The action alternatives use silvicultural prescriptions to restore characteristic function, and resilience to disturbance, using historical, current and climate change information to move toward natural forest structure, species composition, and pattern. Both action alternatives favor the retention of large, old, shade-intolerant tree species and emphasize the removal of younger, smaller, shade-tolerant trees.

Alternative 2 proposes about 15,770 acres of larger tree thinning (9” and larger in diameter at breast height) and 5,400 acres of smaller diameter tree thinning, with about 48,600 acres of high priority burning to develop the desired conditions across the 98,000 acre area. Alternative 3 scales this back by limiting larger tree thinning to areas outside riparian habitat conservation areas, inventoried roadless areas, potential wilderness areas, and designated old-growth preservation areas.

Alternative 2 includes the removal of some trees ≥21” in diameter trees in order to create desired stand structure and species composition – discriminating against shade-tolerant, younger trees in order to retain larger, older, shade-intolerant species. Alternative 3 does not.

Alternative 2 results in 69 miles of closed or decommissioned roads. Alternative 3 aims to maintain existing public access levels.

Proposed Forest Plan Amendments

A Forest Plan amendment (described in more detail in the section “Alternatives Considered in Detail”) would be required by these activities proposed in the action alternatives:

- Alternative 2: Removal of ≥21” diameter trees on up to 5,000 acres to increase resiliency to disturbance and climate changes, shifting toward more resilient, early successional species and toward reference conditions, while conserving all old trees. This part of the amendment would not be needed for Alternative 3.
- Alternative 2: Thinning and removal of trees from 25 acres of old forest, single story (OFSS) stands in order to restore and maintain the OFSS structure longer, and allow the effective reintroduction of fire.
- Alternative 3: Thinning and removal of trees from 20 acres of OFSS conditions.

All alternatives restore grassland and savanna areas by removing encroaching trees, and implement “individuals, clumps, and openings” stand level prescriptions to manage within-stand diversity, and

move species composition, distribution, and structure toward the range of variation through the use of thinning and burning.

Significant Issues

Public involvement helped the Forest Service identify planning issues. The Forest Service separated the issues into two groups: significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations explain this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…". A list of non-significant issues and reasons regarding their categorization as non-significant are described below. As for significant issues, the Forest Service identified the following issues during scoping, which were used to develop alternatives:

1. Fire suppression is the primary threat to forest resilience, and has been the cause of forest densification and uncharacteristic fire effects for over a century. Consequently, forest restoration may require the removal of relatively large trees that likely became established as a result of fire exclusion. Despite this, there are those who highly value large trees and are willing to accept their potential loss to uncharacteristically severe disturbances (i.e., fire, insects, disease) over their removal through active restoration.
2. Threats to forest resilience, such as fire suppression, act across the Lower Joseph Creek landscape regardless of Forest Plan management area. However, there are those who consider active management as presenting a greater risk than uncharacteristic disturbances to certain "reserved" management areas (dedicated old-growth, inventoried roadless areas, potential wilderness areas, and riparian habitat conservation areas).
3. The road network within the LJCRP area is highly valued by some segments of the public as their preferred form of access to dispersed recreation sites, firewood areas, special forest products, and other uses. However, the road network is considered by others to pose a high risk to water quality, and aquatic and wildlife habitats.

Non-Significant Issues

Wildlife Habitat

All action alternatives would aim to conserve or restore over the long term functional wildlife corridors for species dependent on large tree, closed canopy forest structure, within the context of the project purpose and need to move the landscape toward the range of natural variation in forested structural stages. In addition, all action alternatives would maintain viability of wildlife habitat for management indicator species (MIS), R6 Regional Forester's sensitive species, and other focal species.

Fire and Fuels Management

All action alternatives would aim to foster the re-introduction of planned and unplanned fire where it would be ecologically beneficial. In addition, this EIS analyzes the relative effects of the range of alternatives on fire behavior, values at risk of unwanted fire, departures in forest structure and composition between current and reference conditions, wildlife habitat, threatened and endangered

aquatic and terrestrial species, aquatic and riparian habitat, grassland extent, forage availability for domestic livestock, dead and down wood, snags, fuels, and wildlife habitat.

Economic and Social Actions

Almost all issues and considerations have an economic facet. Analysis of the relative economic effects between alternatives is part of this EIS, and the economic effects of the alternatives will in-turn inform the project decision. Scoping did not reveal economic conflicts or significant issues within the scope of the project purpose and need.

Livestock Grazing

This EIS analyzes the relative effects of the range of alternatives on forage availability and productivity, and grassland extent. Scoping did not reveal significant grazing issues within the scope of the project purpose and need.

Watershed Management and Aquatic Habitat

This EIS analyzes the relative effects of the range of alternatives on aquatic species (both listed and management indicator species), aquatic habitat conditions, RHCAs, and the degree of watershed restoration. As a part of alternative road networks analyzed under this EIS, the effects of aquatic organism passage restoration activities are analyzed as a common element of all action alternatives.

Climate Change Adaptation

All action alternatives include management actions that would improve the ability of National Forest resources to adapt to a changing climate. The alternatives vary in the types and amount of actions. Activities for addressing climate change include the following:

- Conserving species and habitats threatened directly or indirectly by climate change, enhancing landscape connectivity, and reducing barriers to species movement to facilitate the ability of species to move across the landscape with shifts in habitat distributions
- Reducing the risk of uncharacteristically severe fires and insects and disease disturbances through forest thinning
- Reducing the risk of increased nonnative species infestations through reductions in the extent of current nonnative species and prevention of future infestations
- Reducing potential increases in stream temperatures through riparian buffers, stream restoration, and development and maintenance of effective stream shade
- Reducing risk of water quality degradation while increasing aquatic connectivity by decreasing road density, reducing hydrological connectivity of the road system, replacing culverts, and road closure, realignment or decommissioning

Heritage Resources

All alternatives strive to meet desired conditions set forth in the WWNF Forest Plan and would comply with the National Historic Preservation Act Section 106. The goal for heritage resources is to “provide for the identification, protection, preservation, enhancement and interpretation of prehistoric and historic sites, buildings, objects, and antiquities of local, regional or National significance so as to preserve their historical, cultural, and scientific values for the benefit of the public” (4-20).

Background

The Wallowa County Natural Resource Advisory Committee, the Wallowa-Whitman Forest Collaborative, and the Wallowa Mountains Office staff of the WWNF have invested considerable time assessing ecological conditions of the Lower Joseph Creek landscape with the intent to support acceleration of Forest Service project planning in the area (NRAC 2014, Wallowa County 2014). The LJCRP was identified as an out-year project for the WWNF. In July 2013, the Eastern Oregon Coalition of Counties convened a meeting of a coalition of five collaborative groups in the Blue Mountains to discuss a suite of potential projects to be taken on by the ERS. The LJCRP had broad support as a potential test of new project planning processes, and a project of large enough landscape scale to advance accelerated restoration, yet small enough to be accomplished under an accelerated timeline by a dedicated planning team.

In August 2013, the ERS Board of Directors (BOD) reviewed input from the coalition of collaboratives and other sources, and selected the LJCRP as the first planning project for the Blue Mountains IDT. The LJCRP was selected by the ERS BOD primarily due to the active engagement of local and tribal governments and collaborators, the availability of Wallowa County's Lower Joseph Creek watershed assessment, and the presence of a local forest products industry. The ERS BOD determined that the LJCRP could test the value of a community-based watershed assessment to jump-start the NEPA planning process, and advance understanding of what it takes to achieve accelerated restoration planning in a collaborative environment.

The Wallowa County watershed assessment revealed mutual goals for landscape restoration, potential ecosystem restoration needs, and opportunities to contribute to local economies within the 98,600 acre LJCRP area. The Forest Service took that assessment, along with input from the public, tribes, collaborative groups, other government agencies, non-government organizations, and others to develop project objectives, the proposed action, and alternatives (see Public Involvement section, below).

Forest Plan Direction, Travel Management Planning, and other Key Planning Policies

The scope and process for NFS project planning is constrained by laws, regulations, government policies, and tribal trust responsibilities. This project is tiered to the WWNF Land and Resource Management Plan (Forest Plan) Record of Decision (ROD) and FEIS as amended (1990). The Forest Plan provides primary guidance for where and how each management activity can occur on the WWNF. It establishes goals, objectives, and desired future conditions, identifies management areas within the Forest, and provides standards and guidelines for implementation (USDA Forest Service 1990). Maps 11a and 11b illustrate Forest Plan management areas within the LJCRP boundaries (see the Forest Plan, Tables 6-7 for generally accepted management activities by management area). Table 26 displays the Forest Plan Management Areas within the LJCRP boundary and acres and percent of each management area within the project boundary.

The LJCRP was designed in response to Forest Plan goals for maintaining historic plant communities and maintaining ecosystem function (p. 4-30); minimizing insects and disease damage (p. 4-48); minimize the risk of fire damage (p. 4-48) and timber management consistent with various resource objectives, environmental requirements and economic efficiency (pp. 4-48 through 4-51). This project also tiers to the Hells Canyon National Recreation Area (HCNRA) Comprehensive Management Plan (CMP) ROD for the FEIS, where it overlaps the HCNRA (USDA Forest Service 2003). See Appendix B for more information.

Table 26. Forest Plan Management Areas within the LJCRP boundary.

Forest Plan Management Area	Acres	% of project area
1 - Timber Production Emphasis	28,100	28
3 - Wildlife/Timber	35,400	36
7 - Wild and Scenic Rivers	2,200	3
9 - HCNRA Dispersed Recreation/Native Vegetation	5,000	6
10 - HCNRA Forage Production	14,100	14
11 - HCNRA Dispersed Recreation/Timber Management	8,900	9
12 - Research Natural Areas	760	1
15 - Old Growth Preservation	3,100	3
Grand Total	**97,560**	

While the extent of the road network was raised as an issue, travel management planning was not considered a purpose and need of this project. A concurrent forest-level travel analysis process is underway that encompasses the entire Wallowa-Whitman National Forest, except the Hell's Canyon National Recreation Area (HCNRA), which is covered by the HCNRA Comprehensive Management Plan (CMP). The forest wide analysis (which consists of two separate analyses) is intended to achieve compliance with Subparts A and B of the 2005 Travel Management Rule. Subpart A of the Travel Management Rule (36 CFR Part 212.5(b)(1)), which requires each unit of the National Forest System to identify the minimum/sustainable road system needed for safe and efficient travel and for the protection, management, and use of NFS lands; and identify roads that are no longer needed to meet forest resource management objectives and which therefore should be scheduled for decommissioning or considered for other uses. Subpart A is not a process that results in a decision. It simply informs subsequent decisions that are subject to the NEPA process. Subpart B of the Travel Management Rule (36 CFR Part 212.51) is subject to the NEPA process, and designates roads, trails and areas for motorized use that are displayed on a motorized vehicle use map. Cross-country travel will be addressed under Subpart B.

Project-by-project decisions regarding the road network must comply with Forest Plan direction. A roads analysis (FSH 7709.55, Chapter 20) was conducted as part of the LJCRP to inform the decision related to the designation of roads for motor vehicle use in the LJCRP area. The LJCRP alternatives include proposed changes to the transportation system, but the responsible official may choose to defer any changes until the Subpart B travel analysis is complete.

For more information on how you can provide relevant and effective input on travel management planning on the Wallowa-Whitman National Forest can be found at: http://www.fs.usda.gov/detail/wallowa-whitman/landmanagement/projects/?cid=fsbdev7_008909.

The WWNF Forest Plan is currently under revision. Efforts were made within this analysis to align, wherever possible, desired conditions of the LJCRP with the current Forest Plan (as amended), and the DEIS for the Forest Plan revision. Amendments made to date to the WWNF Forest Plan, and other key guiding federal and state policies are listed and described in Appendix B.

Other Plans

The LJCRP is consistent with the Wallowa County Comprehensive Plan, including the goal "to conserve forest lands for forest uses" (Goal 4), and "to conserve open space and protect natural and scenic resources" (Goal 5), and related policies. The action alternatives are also consistent with Wallowa County's Community Wildfire Protection Plan (2006) goals to reduce fire risk and development of a fire-resilient landscape.

The National Cohesive Wildland Fire Management Strategy is a strategic plan to work collaboratively among all stakeholders and across all landscapes, and use the best science to make meaningful progress toward three goals: 1. resilient landscapes; 2. fire adapted communities; and 3. safe and effective wildfire response. The action alternatives are consistent with this national strategy through the development of a fire resilient landscape, which would also increase the safety and effectiveness of wildfire response.

Decision Framework

The proposed action and action alternatives are designed to achieve the project purpose and need, generally within the current objectives and constraints of accelerated restoration, policies, laws, regulations, and available resources. However, where necessary, the project decision could result in amendment of the WWNF Forest Plan.

The WWNF Supervisor is the Forest Service official responsible for deciding whether to select the actions as proposed (Alternative 2), the other action alternative, an alternative that combines attributes from the alternatives or another variation, or, no action (Alternative 1). The decision includes determining: (1) the location and treatment methods for restoration activities; (2) design criteria, and mitigation measures; (3) monitoring requirements and the components that would be included in the monitoring plan; (4) the components that would be included in the implementation checklist and plan; (5) the estimated products or timber volume to make available from the project; and (6) whether the Forest Plan would be amended.

The Pacific Northwest (Region 6) Regional Forester is the Forest Service official responsible for the decision to establish two RNAs, and thus amend the Forest Plan to change their allocation from "proposed" to "established". The PNW Research Station Director must concur with a decision to establish Research Natural Areas. Thus, the ROD for establishment of one or more RNAs would be developed separately from that of the rest of the LJCRP.

Public Involvement

This Final Environmental Impact Statement (FEIS) represents one intermediate step in a collaborative, public planning process to determine the best course of action for the LJCRP landscape over the next 10-15 years. The FEIS informs selection of the best course of action by considering current and desired conditions, and the best available science concerning ecosystem sustainability and socioeconomic vitality related to National Forest System (NFS) lands.

A coalition of five place-based collaboratives met in July 2013, in Baker City, Oregon, to help assess the strengths and weaknesses of potential projects to be undertaken by the ERS interdisciplinary team, including the LJCRP, and this input was considered by the Region during project selection.

The Notice of Intent (NOI) to develop an EIS for the LJCRP was published in the Federal Register on January 9, 2014, and a legal notice of the scoping comment period was published in the newspaper of record (Baker City Herald). The NOI asked for public comment on the proposal from January 9 - February 10, 2014. The Notice of Availability (NOA) of the DEIS for a 90 day comment period was

published in the Federal Register, and Baker City Herald on November 14, 2014. The DEIS comment period ended on February 12, 2015. In addition, as part of the public involvement process, the agency made presentations at collaborative and other public meetings, public workshops, and field trips. For more information, see the analysis of public scoping and DEIS comments in the project record at the Wallowa-Whitman National Forest Headquarters. About15 public meetings and field trips organized by the Wallowa-Whitman Forest Restoration Collaborative between August 2013 and August 2015 in-part focused on the LJCRP.

Twelve meetings and conference calls, in addition to the joint public meetings in January and December 2014, were held with the Wallowa County NRAC to discuss the proposed action, public comments, planning issues and alternatives, and effects analyses.

In February and May of 2014, meetings were held with livestock grazing permittees to discuss issues and suggestions for project development.

Two public open houses were held, one during scoping process, and one during the formal comment period for the DEIS.

A meeting was held in March 2015 with the Wallowa-Whitman Forest Collaborative Consensus Subcommittee concerning the analysis of potential wilderness areas to support their attainment of collaborative consensus during the formal comment period. On March 17, 2015, a follow up meeting was held with Hells Canyon Preservation Council to provide additional information on the PWA analysis process.

Tribal Consultation

More than 20 government-to-government meetings, staff-to-staff meetings, and conference calls were held with Nez Perce tribal members and staff throughout the development of the LJCRP. Five field trips were held for Nez Perce Tribal staff to discuss treatment locations and strategy (see FEIS, Appendix G, Tribal Consultation Record).

Using comments from the public, Wallowa County, other agencies, and the Nez Perce Tribe, the interdisciplinary team developed a list of issues to address (see Issues section).

Alternative Development Process

Alternatives for this project were developed to provide a range of possible actions to address the purpose and need outlined in Chapter 1, and the significant issues identified through scoping and described above in the “Significant Issues” section. This included vegetation and road treatment designs; Forest Plan amendments, project design features and mitigation measures where appropriate and necessary. Forest Plan goals and objectives, standards and guidelines, requirements under the Endangered Species Act and other Federal and state laws and regulations (Appendix B) also influenced the development of alternatives. In total, seven alternatives were considered. Four alternatives were eliminated and the remaining three were analyzed in detail. The responsible official approved two action alternatives and a no action alternative for detailed analysis.

LJCRP Alternative 2 is consistent with the 1990 WWNF Forest Plan, as currently amended, and with the inclusion of the non-significant amendments proposed as a part of this project. Alternative 3 is also consistent with the Forest Plan, as amended, except in the case of road density relative to road density standards for aquatic and wildlife habitat. The LJCRP planning process is also consistent with applicable Forest Service manuals and handbooks, the National Forest Management Act of 1976, and the Hells Canyon NRA Comprehensive Management Plan (USDA Forest Service 2003). More detail

about consistency with pertinent laws, regulations and policy can be found in the specialists reports, which are available in the project record. All proposed fuel treatments (prescribed fire and preparation and treatment of activity fuels) are consistent with Forest Plan standards as well as all applicable state and federal laws and regulations. See the Clean Air Act disclosure in Appendix B and air quality sections of the FEIS in terms of compliance with the State of Oregon requirements for smoke management. Appendix B contains Forest Plan direction and guidance, and other policies applicable to this project.

Monitoring and Learning

Interactive learning processes produce improved understanding and management over time, with an emphasis on uncertainty about resource responses to management actions and the value of reducing that uncertainty. The LJCRP can largely make use of existing monitoring programs, with a few exceptions (see “Stream Temperature and Sedimentation”, below), to improve understanding of effective management strategies over time.

Franklin et al. (2013) identify four key elements of monitoring, including:

Acknowledge uncertainty

Key LJCRP assumptions include:

- Silvicultural treatments would make treated stands more resilient to uncharacteristic insect, disease, and wildfire disturbances.
- Understory productivity would increase in stands that are thinned and burned.
- Silvicultural treatments would improve wildlife habitat for some species, and reduce habitat for others.
- Wildlife habitat would improve as a result of road closures.
- Water quality and fish habitat would improve as a result of silvicultural treatments and road closures
- Other LJCRP project uncertainties include:
    1. The social and ecological benefits and costs of removal of trees >21” under certain circumstances as part of a forest restoration strategy
    2. The social and ecological benefits and costs of restoration treatments in designated old growth (Management Area 15), Potential Wilderness Areas, or Inventoried Roadless Areas
    3. Projected increases in forest management related jobs and economic stability within Wallowa County as a result of project activities

Develop testable hypotheses about policy success

Gather information to test hypotheses

- Existing national, Forest, and place-based monitoring programs collect data on forest structure and composition, prescribed fire and wildland fire effects and effectiveness, soil and water quality and wildlife populations, among others, and would provide substantial information about how the LJCRP area would respond to the activities implemented by this decision. For example, monitoring implemented through various existing programs would help indicate whether over the long term, the LJCRP area would stay on a trajectory toward desired conditions. Some of these

monitoring programs also have indicators to prevent unanticipated environmental harm to water, soils, historical and cultural resources, and plant, wildlife, and aquatic habitats. The following categories outline existing and proposed monitoring programs that were used in the LJCRP analysis or proposed to address management uncertainties, and where appropriate would be referenced during implementation. Data gathered from LJCRP would, in turn, support these monitoring programs to help inform future management and science.

Forest, Fire and Understory Vegetation

- Forest Inventory and Analysis (FIA) is a National Forest System-wide program managed by the Research and Development branch that periodically collects detailed data on permanent plots at 3.4 mile intervals to track forest growth, development, and response to management actions. FIA data collected within the LJCRP area, in conjunction with data collected outside the project area in similar environments under similar management, was used in the vegetation modeling for this project, and can subsequently be used to inform general treatment effectiveness at the landscape scale over the long-term.
- FIA data is also used in the development of the USFS PNW Region's existing vegetation condition spatial data set (Gradient Nearest Neighbor, GNN) (Ohmann and Gregory 2002). This data uses plot data from FIA and other sources in conjunction with remote imagery to periodically map existing vegetation structure and composition. GNN data can be used to track change as a result of management, growth and natural disturbance, and indicate treatment effectiveness at a watershed or subwatershed scale.
- The Forest Service Activity Tracking System (FACTS), and Fuels Treatment Effectiveness Monitoring System include information on implementation of project decisions, and their effectiveness. Stands exams prior to and following treatment are generally conducted in areas representing various treatments, to determine diseases/extent, tree density, and mortality due to planned and unplanned fire, etc. The National Fire Plan Operations and Reporting System (NFPORS) tracks achievement nationally of resource goals through planned and unplanned fire.
- Areas proposed for harvest under selection cutting can be regenerated using standard reforestation techniques. The reforestation technique and range of desired stocking would be documented in a formal silvicultural prescription. These areas would be monitored by the implementation silviculturist to ensure the areas meet the prescribed post treatment stocking. If the areas do not meet desired stocking after 5 years, conditions that are inhibiting regeneration would be identified and remedial action may be prescribed to ensure regeneration.
- Ongoing allotment monitoring is being conducted to assess forage utilization and range condition through existing allotment management plans (and annual operating instructions, where current allotment management plans do not exist), and will provide insight into the understory-related effects of forest treatments. Understory productivity is generally measured before and after treatments, and noxious weed inventories are regularly conducted.
- Establishment of one or more RNAs in the LJCRPA would ensure the long-term maintenance of these areas as potential baseline study areas, or research sites with local relevance.

Wildlife

- ODFW tracks elk population levels, which would indicate effectiveness of forest thinning and road management actions taken in the LJCRP area to improve habitat.

Stream Temperature and Sedimentation

- The Forest Service National Best Management Practices (BMP) Program is the agency's non-point source pollution control program for achieving and documenting water resource protection. The ultimate goal is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters located within or near the national forests and grasslands. Stream sedimentation and temperature monitoring by subwatershed would be conducted as a required component of National Best Management Practices (BMPs). Appendix J lists BMPs that are relevant to this project.
- Approximately 10 percent of the RHCAs in the LJCRP area are proposed for treatment under Alternative 2, including 31 acres of Category 1 (Swamp Creek), and 1,822 acres of Category 4 RHCAs. If AAlternative 2 is selected, stream temperature monitoring above and below the 31 acre treatment in Swamp Creek would be conducted prior to implementation and for 5 years post implementation as a part of the project decision.
- Pre-project monitoring for the forest treatment portions of the LJCRP would include on the ground survey of the project area, and the proposed treatment units. Monitoring of the proposed treatment units would include survey of any stream channels, RHCAs, slope stability, and general riparian vegetation characteristics. Monitoring the project would ensure that all Standards and Guidelines in the Forest Plan are met through implementation of protection measures as identified by the interdisciplinary team (see Appendix J).
- Monitoring of the implementation of the project and the protection measures would take place throughout the life of the project by the timber sale administrator (TSA) and watershed specialist. For example, if an intense thunderstorm caused overland flow and subsequent excessive soil displacement or sediment production, harvest operations would cease until the soil moisture decreased or protection measures were complete. Potential effects from log haul on roads that parallel RHCAs would be monitored throughout the life of the project by the TSA and watershed specialist. Timber harvest operations would be halted if adverse impacts were observed at any point during the operation.
- Post-project monitoring would include implementation and effectiveness monitoring to determine if applicable BMPs and mitigation measures were effective in meeting soil and water resource protection.
- Monitoring of RHCAs treatments (both forest treatments and stand improvements) would be conducted by fish and watershed personnel in coordination with presale personnel, fire personnel and the TSA. Items monitored would include:
    - proper implementation of no activity stream buffers
    - proper implementation of Category 4 treatment variable width buffers,
    - burn pile size and placement,
    - fuel transects along stream buffers and through units to look for erosional features,
    - fire severity of piles burned.
- Nine stream monitoring sites are located within the LJCRP area to address stream temperature trend monitoring. Specific stream temperature monitoring in Swamp Creek would be placed prior to treatment activities and collect data for a total of five years after treatment to determine any change in stream water temperature that could be attributable to the treatment (for more information, see the Biological Assessment for the LJCRP, in the project record).
- The small proportion of proposed RHCA treatments allows for comparison of the effectiveness in attaining RMOs through forest treatments versus the effects of natural disturbance within RHCAs.

Cultural Resources

- The Oregon State Historic Preservation Office and Region 6 Forest Service Programmatic Agreement (Service 2013) guides monitoring for project effects to cultural resources (Section 111, Project Review; and Section V, Heritage Preservation Program).

Develop an institutional mechanism that ensures that the hypotheses will undergo periodic, fair minded review and management policies can change as a result.

Franklin et al. (2013) note that it is often difficult for people and organizations to admit that policies, in which they are invested, have not been successful in achieving their intended goals; and that people with investments in failed policy will seek favorable assessments, rather than changing a failed policy. Franklin et al. (2013) suggest involving collaborators in external reviews, revising monitoring hypotheses, and employing multi-party monitoring.

- Collaborators and the Forest Service are working together using the stated goals and objectives in this document, and the resulting decision, to develop specific monitoring questions and implement monitoring strategies. Key issues currently being considered for multi-party monitoring by the Wallowa-Whitman Forest Collaborative's monitoring subcommittee include effectiveness of treatments that include versus does not include the cutting of trees ≥ 21", and forest treatments in RHCAs, IRAs, PWAs, designated old growth preservation areas (MA 15), among others.

Alternatives Considered in Detail

A total of three alternatives were analyzed in detail: the No Action Alternative (Alternative 1), the Modified Proposed Action (Alternative 2), and Alternative 3. A quantitative comparison of alternative treatments is provided in Table 30. A list of actions common to all alternatives is also provided, below. Maps 12-17 show vegetation treatment locations and road networks by alternative, and the existing condition of the road network.

Alternative 1

No Action

Alternative 1 is the no action alternative and serves as a baseline for estimating the effects of the other alternatives. The LJCRP would not be implemented under Alternative 1. No management actions would be taken to influence the direction or rate of change for moving existing conditions toward desired condition. Current activities such as permitted grazing, dispersed recreation use, fire protection, and scheduled road maintenance would continue within the project area. The existing land and resource conditions would be otherwise unaffected, except through natural processes. It is assumed that any previous decisions not yet implemented would be implemented within the planning horizon. Maps 12-13 show the existing road network, and the road network under Alternative 1, assuming existing road network decisions that have not yet implemented would be implemented within the planning horizon (about 10 years).

Alternative 2 – The Modified Proposed Action

Alternative 2 is modified from the original Proposed Action developed by the Agency during the initial scoping process. This Modified Proposed Action (Alternative 2) is the preferred alternative.

Modifications to the proposed action occurred in the time between issuing the draft EIS and final EIS as a result of public comments or analyses that relate specifically to standards and guides found in the

respective Forest Plans for the WWNF or the HCNRA. See “Key changes between DEIS and FEIS” below. The Modified Proposed Action is analyzed in detail in this FEIS; and unless otherwise noted, is synonymous with the term “proposed action”. Table 32 shows how treatments changed between publication of the original proposed Action in the Federal Register and the Modified Proposed action analyzed in this FEIS.

Silviculture treatments would provide a diversity of forest structures that are more in line with desired conditions, and more resilient to anticipated future environmental conditions. Forest thinning prescriptions (silvicultural treatments) would follow a practical, science based approach intended to restore characteristic functionality, and resistance and resilience to disturbance. Known as “ICO” (individuals, clumps and openings), this approach uses historical information at the stand- and landscape-level to design restoration strategies and prescriptions for restoration (e.g., see (Franklin et al. 2013)). For example, the pattern of old trees, stumps and snags currently on the landscape provide indicators of natural tree clumping and spacing, and thus the degree of horizontal spatial heterogeneity. In places where legacies of historic forest patterns are absent (e.g., young, post-fire forests), information is used from similar habitats.

Thinning, and mechanical fuel treatments across approximately 15,700 acres would encourage the development of large tree structural characteristics, understory plant diversity, forage productivity, and resilience to disturbances such as wildfire. Thinning of largely younger trees across an additional 5,400 acres, which are in the process of recovery after stand replacement disturbance, would encourage the development of spatial heterogeneity and increase the proportion of early seral tree species. Silvicultural treatments would generally retain and protect large trees of early seral species and trees with old growth physical characteristics consistent with historical reference conditions.

Silvicultural treatments in category 4 RHCAs (intermittent, non-fish bearing streams) would be applied where they support attainment of RMOs, and would generally parallel adjacent upland treatments. Category 4 RHCAs identified for treatment would include the establishment of a minimum 25 foot variable width no treatment buffer where there would be no harvest or equipment allowed. Relative to non-mechanized stand improvement (hand thinning) and prescribed fire treatments, RHCAs would be treated in accordance with the Blue Mountains Project Design Criteria (PDC) (Table 46).

No treatments would occur in categories 1, 2 or 3 RHCAs, with the exception of Swamp Creek (Category 1 RHCA, which is a fish-bearing stream). No treatments would occur in any RHCAs that are currently in an old forest structural condition. Treatment in Swamp Creek includes thinning of encroaching trees to restore meadow features, hydrologic function, and aquatic habitat conditions. Removal of woody vegetation encroachment resulting from fire exclusion in some riparian areas would protect and restore watershed function. Riparian and flood plain restoration may also include road closure or modification.

No trees $\geq$21” in diameter would be harvested in MA 15.

Prescribed burning using planned and unplanned ignitions, where ecologically appropriate, on up to 90,000 acres, including 48,200 acres of high priority, would reduce fuel loads, increase understory productivity and diversity, allow fire to perform its natural ecological role, and reduce uncharacteristic disturbance from wildfire, insects, and disease.

The transportation system would be managed through road reconstruction, use of temporary roads, and seasonal or permanent closures, as needed to support public access, proposed forest management activities, wildlife habitat quality, and aquatic habitat connectivity. The majority of road-related

activities would make use of the existing system road network. A roads analysis was conducted to assess the transportation system and the appropriate actions needed to meet project and administrative needs, public access, Forest Plan standards and guidelines, future needs, and consultation guidance for federally listed fish (see Project Record for more information). Approximately 86 miles of system road would be reconstructed or maintained; and 12.6 miles of temporary roads would be constructed to access treatment stands, where necessary and ecologically suitable. These temporary roads would be decommissioned following use for this project. 17 miles would be closed or decommissioned, as determined in the roads analysis and an evaluation of each segment's status, future need, and impact on other resources. Roads proposed for any type of closure focus on restoring water quality, fish habitat and wildlife habitat.

In the interest of landscape learning and streamlining NEPA, two Research Natural Areas, which have been proposed for establishment in the WWNF Forest Plan (Horse Pasture Ridge (338 acres) and Haystack Rock (425 acres)) would be established and serve as untreated baseline study areas. The establishment of the two RNAs would require a Forest Plan amendment, as described below.

The proposed action would include maintenance and enhancement of culturally significant resources, settings, viewsheds, and sensitive plant and animal species habitat, including those of interest to the Tribes.

Connected actions included in the analysis include reforestation (planting), noxious weed treatments, bare ground revegetation, rock pit development, water source development, fireline construction, understory vegetation treatment (e.g. whip felling) to facilitate prescribed fire, erosion control features, culvert replacement to support system haul, road maintenance, and hazard tree cutting or removal. Fuels associated with silvicultural treatments (activity fuels) would be treated with a suite of available tools including, but not limited to, felling by hand of non-commercial material, mastication, removal, grapple or hand piling and burning, burning of existing fuel concentrations ("jackpot burns"), cutting and scattering limbs, and broadcast burning.

Project design elements and site specific mitigation measures are described in Appendix J. Implementation of the LJCRP would follow these to reduce or eliminate unwanted effects from treatment activity. Mitigation measures may include seasonal operating restrictions, snag and downed wood creation, and/or soil amendments (e.g., adding biochar) on compacted or detrimental soils.

Table 27 shows acres of harvest and stand improvement allocation by Forest Plan management area for the modified proposed action (Alternative 2). See Table 31 for descriptions of treatment types.

Table 27. Acres of harvest and stand improvement by Forest Plan management area for Alternative 2.

Forest Plan Management Area	Group Selection	Inter-mediate Treatment	Single Tree Selection	Savan-na	Meadow	Stand Improve-ment
1 - Timber Production Emphasis	710	140	7,900	200	31	2,200
3 - Wildlife/Timber	120	30	2,600	50	0	600
7 - Wild and Scenic Rivers	0	0	0	0	0	0
9 - HCNRA Dispersed Recreation/Native Vegetation	0	0	0	0	0	0

Forest Plan Management Area	Group Selection	Inter-mediate Treatment	Single Tree Selection	Savan-na	Meadow	Stand Improve-ment
10 - HCNRA Forage Production	370	90	520	80	0	510
11 - HCNRA Dispersed Recreation/Timber Management	1,200	80	780	190	0	2,100
12 - Research Natural Areas	0	0	0	0	0	0
15 - Old Growth Preservation	3	0	620	1	0	8

Forest Plan Amendments – Alternative 2 (Modified Proposed Action)

The Forest Service proposes amending the WWNF Forest Plan under the 1982 planning regulations following Forest Service Handbook (FSH 1909.12 section 21.3) and Manual direction (FSM 1926.51). The significance of the amendment was evaluated in accordance with FSH 1926.51 and FSH 1926.52, and is considered to be non-significant according to this policy. The amendment follows Forest Service Handbook (FSH 1909.12 section 25.4) and Manual direction (FSM 1926.51) direction. Opportunities for public participation and notification was provided as required in § 219.4 and § 219.16.The following Forest Plan amendment would be needed to implement the Modified Proposed Action (Alternative 2) and achieve the project's desired conditions within the context of existing conditions of the LJCRP landscape.

The Wildlife Standard - Eastside Screens (Regional Forester's Amendment # 2 for the Wallowa-Whitman Land and Resource Management Plan (Forest Plan))

The Eastside Screens were adopted as interim direction in 1993, amending the WWNF Forest Plan in 1994 (Regional Forester's Amendment #1) and with minor changes in 1995. In 2003, after nine years of implementation, the Regional Forester for the Pacific Northwest Region examined whether the Eastside Screens were functioning as intended (Goodman 2003). It was found that interpretation of screens direction, including 21-inch diameter limitations, no harvest in stands below HRV, and prescriptive connectivity corridors, at times limits the ability to meet policy objectives of providing late, old forest structure (LOS), particularly in dry single-story ponderosa pine or western larch stands. Restoring species composition toward HRV can at times require removing larger, but younger (<150 year) shade-tolerant species to favor shade-intolerant species, such as ponderosa pine and western larch.

With every year that goes by without the benefits of characteristic fire or other disturbances, trees that established after the mid-1800s on the LJCRP area have been getting larger in diameter. Hard diameter limits, such as a 21-inch dbh limit, in conjunction with fire suppression, make it difficult to achieve desired composition in at least dry and possibly also mixed conifer forests, and compromise their future resilience (Franklin et al. 2013, Stine et al. 2014). A site-specific Forest Plan amendment would create more opportunity to meet objectives of moving landscapes toward HRV, and provide for the habitat needs of associated wildlife species.

Under Alternative 2, the Forest Plan would need to be amended on 5,000 acres (Map 14) within the LJCRP area to allow for the removal of trees greater than 21" in diameter at breast height (dbh). The design of prescriptions for cutting of any trees ≥21" would be based on the desire to restore forest

structure and composition toward reference conditions (HRV), particularly to increase the abundance of shade-intolerant tree species (ponderosa pine and western larch), reduce the risk of uncharacteristically severe fire and insect and disease outbreaks, and increase resiliency to natural disturbance and climate change. With the intent to conserve all old trees, the project would adopt scientifically-derived guidelines (similar to those described in Van Pelt (2008)) to assess tree age regardless of the diameter of individual trees. On the 5,000 acres where this amendment would apply, based on inventory plots within the project area, approximately 8,000 trees > 21" dbh would be removed. The volume of these trees would be approximately 275,000-550,000 cubic feet (adapted from Zhou and Hemstrom (2010), with Blue Mountains-specific data provided by Zhou). Overall, after treatment under Alternative 2, the amount of large tree dominated forest across the project area would increase by nine percent.

Scenario A of the Eastside Screens wildlife standard allows timber harvest activity in LOS under two circumstances:

1. To transform some portion of an LOS component that is within or above HRV into an LOS component that is deficient (e.g., transforming old forest multi-story stands into old forest single story).
2. To maintain or enhance existing conditions in LOS stands within or above HRV.

In addition to the 5,000 acres where trees >21" dbh could be cut, Alternative 2 includes 25 acres of thinning in old forest single story (OFSS) conditions to maintain or enhance existing conditions (Map 14). According to the Eastside Screens Scenario A, this objective is not permissible for old forest single story conditions because abundance of this structure is below HRV. Therefore, a Forest Plan amendment is needed to accomplish this objective. This treatment would not change the overall LOS structural conditions (i.e., the condition would be LOS before and after treatment), but would serve to reduce the risk of its loss to uncharacteristic disturbance. Therefore, this proposed treatment meets the intent of Scenario A because there would be no net loss of LOS as a result of proposed treatments. The understory thinning treatments proposed for these stands are designed to address species composition, stand density, insect susceptibility, climate change adaptation, and fire risk considerations. The section below describes the rationale for the proposed amendment to cut trees >21" dbh, and for treatments on 25 acres that are currently in an OFSS condition, but are currently trending toward a multi-story condition.

Alternative 2 includes the following specific proposed changes to Eastside Screens language:

a) Scenario A objectives for non-LOS stands states: "Maintain all remnant late and old seral and/or structural live trees ≥21" dbh that currently exist within stands proposed for harvest activities" (USDA Forest Service 1995). The amendment language would replace "structural live trees ≥ 21" dbh" with "live trees older than 150 years." This language is consistent with current science (Franklin et al. 2013) and would allow removal of some of the large Douglas-fir and grand fir trees that are ≥ 21 inches dbh, but less than 150 years in age (at breast height) from any of the structural stages being treated (Map 14), except for units classified as the old forest single stratum structural stage (OFSS; this stage is called "single stratum with large trees" in the Screens). The amount of OFSS is currently below RV, so a stand that is currently classified as OFSS would not have a need to remove large trees. Identification of the large but young Douglas-fir and grand fir trees to be removed would be based on the need to restore the HRV in stand pattern and characteristic fire regime dynamics (more information on this rationale is below). Table 42 summarizes proposed treatments by stand density class.

b) The HRV analysis for LJCRP area showed that old forest multi-strata (OFMS) is within HRV and old forest single-strata is below HRV. Where the LOS component is below HRV, timber harvest is prohibited by the Eastside Screens. The amendment would change the Eastside Screen language where it "allows timber harvest activity in LOS to maintain or enhance existing conditions in LOS stands within or above HRV" to "allow timber harvest activity in LOS to maintain or enhance existing conditions in LOS stands within or above HRV, and allow timber harvest within 25 acres of old forest single stratum, which is below HRV, but where treatments would only remove trees < 21 inches dbh, and there would be no net loss of late-old structure following the treatment (e.g., the units classified as OFSS structure before treatment, would also be classified as OFSS structure after treatment)".

Site-Specific Needs for Amendments to the Eastside Screens

See Map 14 for the location of stands where the proposed Eastside Screen amendment would apply in relation to the other Alternative 2 treatment areas. Identification of these areas considered the unique, site specific diversity and pattern of the project landscape.

The LJCRP landscape is a mosaic of forests and grasslands shaped largely by the behavior of natural disturbance regimes, in particular, fire. Disturbance regimes dominated by low intensity, high frequency fire has created a landscape in the LJCRP area of stringers and large patches of forest surrounded by grasslands (Figure 1). This interweaving of vegetation exposes a relatively high proportion of the forested landscape to fire occurrence, which historically shaped the distribution of predominantly open forest and savanna structural stages and fire-tolerant species composition. The landforms of the LJCRP are characterized by steep washboard canyons in the lower elevations, capped by stable and highly productive incised plateaus in the east and angulate plateaus in the southernmost extent (Map 18). The landforms and topography of the LJCRP is the template upon which its forests, grasslands and shrublands establish and grow, and help shape the productivity, structure, size class distribution, composition pattern and fire regimes of the landscape.

The forested landscape is dominated by dry forest (about 43 percent of the forested area; Table 2), where the current fire regime displays a higher proportion of mixed severity fire than characteristic of the vegetation type. Historically, about 64-82 percent of the fires in dry forests characteristic of the LJCRP were of low severity (largely only supportable by open conditions), and 13-21 percent were of mixed severity. Today, low and mixed severity fires make up about 49 and 46 percent of the fires, respectively (Table 8). The effects of this departure between current and historical fire regimes is evidenced by the very low abundance of single story old forests, which historically made up about 40-60 percent of the dry forest area, whereas today, they make up less than 1% (Table 11).

Moist forests make up about 13 percent of the forested LJCRP area (Table 2). Fire return intervals in moist forests have been missed, but not at the same magnitude as in dry forests; however, fuel accumulation rates far exceed those of dry forests due to higher productivity soils and higher moisture availability. This means it takes fewer missed return intervals to create an uncharacteristic fuel loading and fire behavior in moist than dry forests.

In addition to changes in the extent of forest structure, density, fuel loading , and composition, departure between current and reference conditions on the LJCRP landscape has also caused a reduction in forest patch sizes, which, according to estimates specific to the local forest types and ecological context, historically ranged up to about 160 acres for open forest conditions (Hessburg et al. 1999). Additionally, site-specific state-and-transition modeling showed that patch sizes for the current condition are much smaller than those in the reference scenario. In both canyonlands and incised plateaus, all current patches are less than 32 acres in size (Appendix C). Based on this local

model, patches were considerably larger for the reference condition; more than 50 percent of modeled incised plateau patches exceeded 256 acres in size while those in canyonlands exceeded 128 acres (Appendix C). This decrease in patch sizes through time is due to a combination of past harvesting that generated relatively small patches, and somewhat smaller wildfires under the current fire suppression regime than the pre-fire suppression reference period.

State-and-transition modeling for the project area and the WWNF as a whole also showed that, given no action, more large trees (>20”) would be lost to fire over a 30-year modeling scenario than would be cut or lost to fire under the action alternatives (Appendix C).

The areas identified for treatments that would require an amendment to the WWNF Forest Plan/Eastside Screens (Map 14) are those that currently have the forest structure and composition required to move overall landscape patterns (i.e., larger patch sizes of open stands dominated by ponderosa pine and western larch) toward conditions more characteristic of this specific landscape. Their treatment, in combination with adjacent forest conditions, would move the landscape toward patterns (i.e., larger patches of large tree-dominated, open dry forests) more consistent with the underlying dynamic range of species, structure, vegetation patterns, and patch size distributions that emerge under the constraints of the climate, geology, disturbance regimes, and biota of the local area. These treatment stands requiring the Forest Plan amendment are located due to their juxtaposition to neighboring forest cover types, structural stages and density classes. Of the 5,000 acres that would be subject to the portion of the amendment to allow the cutting of trees ≥21” dbh, 96 percent is classified within the dry PVG and four percent is in the moist PVG. Table 28 summarizes the existing and projected post-treatment condition in terms of forest cover types, forest structural stages and tree density classes for the 5,000 acres affected by the proposed amendment.

Table 28. Percent of amendment area (percent of 5,000 acres) by existing and projected post-treatment conditions.

Forest Cover Type	Percent of Amendment Area	
	Existing Condition	Post-treatment Condition
Ponderosa Pine	0%	30%
Douglas-fir	60%	35%
Western Larch	2%	3%
Lodgepole Pine	0%	0%
Grand Fir	38%	31%
Engelmann Spruce	<1%	<1%
Forest Structural Stage	**Existing Condition**	**Post Treatment Condition**
Stem Exclusion (SE)	44%	0%
Understory Reinitiation (UR)	33%	52%
Young Forest Multi-Story (YFMS)	6%	1%
Old Forest Multi-Strata (OFMS)	17%	21%
Old Forest Single Stratum (OFSS)	0%	26%

Forest Cover Type	Percent of Amendment Area	
	Existing Condition	Post-treatment Condition
Tree Density Class	**Existing Condition**	**Post Treatment Condition**
Low	0%	100%
Moderate	6%	0%
High	94%	0%

The area that would be subject to an amendment also represents a sizable opportunity to increase the resilience of existing large and old ponderosa pine and western larch trees, which are threatened by forest densities outside the RV (Table 13). Forest densities above the RV increase the risk of tree mortality to uncharacteristic fire and insect/disease disturbances. The amendment would also support the successful regeneration of ponderosa and western larch, which are below the RV in abundance (Table 12). Desired outcomes of treatments are to move forest conditions toward the RV, including: reduced presence of shade tolerant species (Douglas-fir and grand fir); increased presence of shade intolerant species (ponderosa pine and western larch); increased abundance of OFSS; and reduced forest stand densities.

Rationale for Removing Trees Greater than 21-inches in Diameter

The option to remove some of the young grand fir and Douglas-fir trees that are over 21″ in diameter and interacting with a desirable tree refers to young but large grand fir and Douglas-fir trees (e.g., those grand fir and Douglas-fir trees < 150 years of age and ≥ 21 inches dbh) and generally competing with a desirable tree. A desirable tree is defined as one whose retention would contribute to the purpose and need for the LJCRP to increase the long-term abundance and conservation of large trees, and shade-intolerant tree species. Specifically, desirable trees occur in the following species preference (from most to least desirable): any live tree ≥ 21 inches dbh and > 150 years of age, ponderosa pine, western larch, Douglas-fir, [Engelmann spruce], grand fir, [lodgepole pine], and western juniper; on dry-forest sites, the tree species in brackets are uncommon and typically associated only with seeps and other moist microsites. A desirable tree also possesses a vigor level, and a lack of insect or disease activity, suggesting it could survive for at least 10 more years.

Occasionally, a desirable tree is > 150 years of age but < 21″ dbh. For some of these situations, young but large grand fir and Douglas-fir trees (e.g., those grand fir and Douglas-fir trees < 150 years of age and ≥ 21 inches dbh) would be cut and removed when competing or otherwise threatening a desirable tree greater than 150 years of age, but less than 21 inches in diameter.

Because this portion of the proposed plan amendment would not result in all of the young but large grand fir and Douglas-fir trees being removed, a decision about which of the young but large grand fir or Douglas-fir trees to remove would incorporate wildlife considerations, and these considerations would be incorporated in the marking guides being used by crews preparing the LJCRP.

Franklin et al. (2013) provides practical guidance on restoration of dry forest structure and composition, including where larger, but younger shade-tolerant species abundance is contributing to departure from HRV. Estimates from 144 local stand exams show that less than 15 percent of all trees ≥21” in diameter at breast height (dbh) in treatment units would be cut.

Rationale for Proposing Thinning Treatments in the OFSS Structural Stage

The proposal to thin 25 acres in old forest single story (OFSS) conditions under Alternative 2 (Map 14) is designed to:

- Improve tree vigor, and resistance to western pine beetle attack and future wildfire risk, thereby ensuring maintenance and persistence of the large-tree component into the future. Reestablishing a large-tree component would also increase resiliency to climate change, and the safety and effectiveness of prescribed fire applications.
- Contribute to species composition objectives for the LJCRP. Of the 25 acres of proposed treatments in OFSS condition in the proposed action, about 19 acres occurs in stands with a ponderosa pine (PP) cover type (PP is below HRV); the remaining 6 acres occurs in stands with a Douglas-fir (DF) cover type (DF is above HRV) (Table 12). The ponderosa pine treatments are designed to maintain ponderosa pine as the dominant cover type, whereas the Douglas-fir treatments are designed to convert Douglas-fir to a ponderosa pine cover type, thereby moving the landscape toward HRV.
- Contribute to stand density objectives for the LJCRP. The entire 25 acres of proposed treatment in OFSS are designed to reduce density to low stand density. Low stand density is substantially below HRV (Table 13). In areas with wildlife habitat connectivity objectives, treatments would ensure maintenance of these cover objectives.

Research Natural Areas

The WWNF Forest Plan included analysis of, and recommendations for, the establishment of the proposed RNAs evaluated in this FEIS. As part of the establishment records (FSM 4063), a Forest Plan amendment would need to be prepared to change designation of the Horse Pasture Ridge and Haystack Rock “proposed” research natural areas (RNA) to “established” RNAs.

Key changes between the DEIS and the FEIS

Key changes between publication of the LJCRP DEIS and FEIS include:

- Removed portions of forest treatment units that were inadvertently within Management Area 9 (HCNRA Dispersed Recreation/Native Vegetation), private land inholdings, and portions of the Swamp Creek RHCA.
- Changed treatment type designation for five units that are outside of Management Area 15 from single tree selection/old growth (STS_OG) to single tree selection (STS).
- Updated treatment units that are adjacent to IRA and PWA boundaries to accurately reflect units and acres that would and would not be treated under Alternative 3.
- Removed treatment units that are within goshawk nest stands and that are classified as LOS within goshawk post fledgling areas (PFAs)
- Simplified Appendix B (Forest Plan direction, and other policies, laws, regulations, and agreements) to reduce redundancy.
- Added modeling results to appendices C (Landscape Modeling), and D (Burn Probability Modeling)

Inventoried Roadless Areas

Stand exam data was collected and analyzed between publication of the DEIS and the FEIS to demonstrate that treatment under Alternative 2 within IRAs would meet the "generally small diameter" provision for timber harvest in the Roadless Area Conservation Rule (RACR). Figure 9 was added with additional narrative describing how the LJCRP is compliant with this provision.

Alternative 3

Alternative 3 was also developed in response to significant issues (see the Significant issues section in Chapter 3) and would be similar to Alternative 2 in the forest treatment types, except commercial thinning is not proposed for RHCAs, IRAs, and MA15. No trees greater than or equal to 21" dbh would be harvested, except for safety or administrative reasons. In IRAs, there would also be no non-commercial treatments. PACFISH RHCAs would be followed where category 4 RHCAs are present within commercial units. Non-commercial thinning could occur in category 4 RHCAs outside old forest multi-story and old forest single story structures (OFMS and OFSS) in accordance with the Blue Mountains PDCs. The road network aims to maintain current public access levels. Relative to existing conditions, post implementation road density condition would be static for aquatic habitat and wildlife objectives. Total road density to meet consultation guidance for Snake River steelhead would be met in Lower Joseph Creek watershed but not met in Upper Joseph Creek watershed. The two RNAs would be established. Table 29 shows acres of harvest and stand improvement allocation by Forest Plan management area for Alternative 3.

Table 29. Acres of harvest and stand improvement by Forest Plan management area for Alternative 3.

Forest Plan Management Area	Group Selection	Inter-mediate Treatment	Single Tree Selection	Savanna	Stand Improvement
1 - Timber Production Emphasis	650	130	6,900	200	2,100
3 - Wildlife/Timber	110	20	1,700	30	520
7 - Wild and Scenic Rivers	0	0	0	0	0
9 - HCNRA Dispersed Recreation/Native Vegetation	0	0	0	0	0
10 - HCNRA Forage Production	0	0	3	0	1
11 - HCNRA Dispersed Recreation/Timber Management	120	50	190	60	410
12 - Research Natural Areas	0	0	0	0	0
15 - Old Growth Preservation	2	0	5	1	2

Forest Plan Amendments – Alternative 3

The Wildlife Standard - Eastside Screens (Regional Forester's Amendment # 2 for the Wallowa-Whitman Land and Resource Management Plan (Forest Plan))

See the section "Forest Plan Amendments - Alternative 2" above for a general policy discussion, including relevant Forest Service manual and handbook direction related to amending the Eastside Screens. Selection of Alternative 3 would require a Forest Plan amendment to implement forest harvests in OFSS (LOS) structure. However, Alternative 3 would comply with Screens direction regarding harvest of ≥ 21" dbh trees.

The HRV analysis for LJCRP area showed that old forest multi-strata (OFMS) is within HRV and old forest single-strata is below HRV. Where the LOS component is below HRV, timber harvest is prohibited by the Eastside Screens. The amendment would change the Eastside Screen language where it "allows timber harvest activity in LOS to maintain or enhance existing conditions in LOS stands within or above HRV" to "allows timber harvest activity in LOS to maintain or enhance existing conditions in LOS stands within or above HRV, and allow timber harvest within 20 acres of old forest single stratum, which is below HRV, but where treatments would only remove trees < 21 inches dbh, and there would be no net loss of late-old structure following the treatment (e.g., the units classified as OFSS structure before treatment, would also be classified as OFSS structure after treatment)".

Rationale for Proposing Thinning Treatments in the OFSS Structural Stage

The "Site-specific Needs for Amendments to the Eastside Screens" described under Alternative 2, above, also apply to the proposed Eastside Screen amendment for Alternative 3. Alternative 3 does not include the cutting of trees ≥21" dbh, but it includes 20 acres of thinning in old forest single story conditions to maintain or enhance existing conditions (Map 16). This treatment would not change the overall LOS structural conditions. Therefore, this proposed treatment meets the intent of Scenario A because there would be no net loss of LOS as a result of proposed treatments. The understory thinning treatments proposed for these stands are designed to address species composition, stand density, insect susceptibility, climate change adaptation, and fire risk considerations. Specifically, they are designed to:

- Improve tree vigor, and resistance to western pine beetle attack and future wildfire risk thereby ensuring maintenance and persistence of the large-tree component into the future. Reestablishing a large-tree component would also increase resiliency to climate change, and the safety and effectiveness of prescribed fire applications.

- Contribute to species composition objectives for the LJCRP. Of the 20 acres of proposed treatments in OFSS condition in Alternative 3, about 14 acres occur in stands with a ponderosa pine (PP) cover type (PP is below HRV); the remaining 6 acres occur in stands with a Douglas-fir (DF) cover type (DF is above HRV). The ponderosa pine treatments are designed to maintain ponderosa pine as the dominant cover type, whereas the Douglas-fir treatments are designed to convert Douglas-fir to a ponderosa pine cover type, thereby moving the landscape toward HRV.

- Contribute to stand density objectives for the LJCRP. The entire 20 acres of proposed treatment in OFSS are designed to reduce density to low stand density. Low stand density within the LJCRP area is substantially below HRV (Table 13). In areas with wildlife habitat connectivity objectives, treatments would ensure maintenance of those cover objectives.

Research Natural Areas

Similar to Alternative 2, a Forest Plan amendment would need to be prepared to change designation of the Horse Pasture Ridge and Haystack Rock "proposed" RNAs to "established" RNAs.

Summary of Key Thematic Differences between the Alternatives

Table 30 summarizes the key thematic differences between alternatives relative to the significant issues identified during scoping.

Table 30. Descriptions of alternatives for the Lower Joseph Creek Restoration Project

Alternative	Restoration Treatments	Management Areas	Road Network
Alt 1 (No Action)	No management actions would be taken to influence the direction or rate of change for moving existing conditions toward desired condition. Current activities such as permitted grazing, dispersed recreation use, fire protection, and scheduled road maintenance would continue within the project area.	No management actions would be taken to influence the direction or rate of change for moving existing conditions toward desired condition. Current activities such as permitted grazing, dispersed recreation use, fire protection, and scheduled road maintenance would continue within the project area.	Road actions approved under existing decisions would continue to be implemented. No other management actions would be taken to influence the direction or rate of change for moving existing conditions toward desired condition. Current activities such as permitted grazing, dispersed recreation use, fire protection, and scheduled road maintenance would continue within the project area.
Alt 2 (Proposed Action)	Trees greater than 21" could be harvested, within the context of restoring forest resilience, safety or administration. Treatment extent generally based on priority treatment needs to move the landscape toward HRV.	Mechanical treatments would occur in some designated old growth (MA 15), inventoried roadless areas (IRAs), potential wilderness areas (PWAs) and category 4[4] riparian habitat conservation areas (RHCAs) that bisect restoration treatment units not currently in old forest structure (OFSS/OFMS). No treatments in large, closed canopied moist forests. RHCA treatments based on attaining riparian management objectives. Category 4 stream treatments would follow upslope treatment prescriptions and have variable width (25 foot minimum) no-treatment, no equipment stream buffers. No treatments would occur in Category 1 and 2	Road actions approved under existing decisions would continue to be implemented. Additional roads identified through roads analysis that could be closed or decommissioned to move wildlife habitat closer to Forest Plan road density standards would be treated and reduce the total road density to meet consultation guidance for Snake River steelhead.

[4] Category 4 RHCAs are intermittent, non-fish bearing

Alternative	Restoration Treatments	Management Areas	Road Network
		streams, except for 58 acres of treatment specific to Swamp Creek. Small diameter thinning could occur in category 1, 2 and 4 RHCAs as per Blue Mountains Project Design Criteria[5]. Two RNAs would be established.	
Alt 3	Similar to Alternative 2, except no trees greater than 21" would be harvested, except for safety or administration.	No treatments in MA15, IRAs, and PWAs. Small diameter thinning could occur in category 1, 2 and 4 RHCAs as per Blue Mountains Project Design Criteria. No treatments in large, closed canopied moist forests. No other vegetation treatments would occur in Category 1, 2 and 4 streams. Two RNAs would be established.	The road network maintains current access levels for recreation, firewood cutting, permittees, private inholdings, tribal resources, and administration.

Activities Common to All Action Alternatives

All action alternatives would use the same suite of forest vegetation treatment types (Table 31, Figures 6 and 7). The design of forest vegetation management prescriptions would use the "individuals, clumps and openings" (ICO) approach (Franklin et al. 2013) to achieve trends in forest stand-level spatial heterogeneity toward HRV.

Table 31. Description of forest vegetation treatment types

Treatment Types	Treatment Description
Savanna	Reestablishment of grassland/forest edges and historic grasslands that have conifer encroachment.
Single Tree Selection (STS)	ICO variable density thinning within all age classes present
Group Selection (GS)	ICO variable density thinning within all age classes present; ½ to 4 acre group selection to initiate new cohort of seral species (PP/WL).
Intermediate Treatment (IT)	ICO variable density thinning within all age classes present with emphasis on isolating mistletoe infections and creating conditions that reduce intensification of infection.
Stand Improvement (SI)	ICO variable density thinning within young, post disturbance stands.

[5] National Marine Fisheries Service letter of concurrence for implementation of the Blue Mountains Province Expedited Process Instrument for Programmatic Informal Consultation with Project Design Criteria on the Malheur, Wallowa-Whitman and Umatilla National Forests, and Bureau of Land Management Vale and Prineville Districts, dated November 1, 2013. NMFS No. NWR-2013-10339, Portland, OR.

Figure 6. Example of single tree selection and prescribed fire post-treatment in dry forest.
Note the regeneration “skip” in the middle of the picture**.**

Figure 7. Example of a group selection about 10 years post-treatment.

Note the ponderosa pine regeneration and residual old ponderosa pine trees as part of the “group”

The following activities and guidelines would be common to all action alternatives:

- During tree harvest, favor leaving early seral tree species.
- Achieve trend in patch size distribution toward HRV.
- Planned ignition priority areas are identified for the action alternatives using the same criteria (Table 9), although acres of high, medium and low priority differ between the alternatives. Maps 20 and 21 show the locations for prioritization of prescribed fire by alternative. High priority areas in both action alternatives represent the acres that are treated with either harvest or stand improvement (SI), or are in the dry upland forest potential vegetation group.
- Treat fuels associated with silvicultural treatments (activity fuels) using mastication, removal, pile and burn, cutting and scattering limbs, prescribed fire, or other means.
- Retain and protect large trees of early seral species and trees with old growth physical characteristics consistent with historical reference conditions.
- Project design criteria for forest treatments in wildlife corridors in moist upland forest would retain at least 50 percent residual canopy closure, where available.
- Project design criteria for forest treatments in wildlife corridors in dry upland forest would retain at least 40% residual canopy closure, where available.
- For stands identified as moist, large tree, closed canopy, maintain an overall stand minimum canopy cover of 60 percent, and do not harvest any trees $\geq$21” dbh.
- In MA15, trees $\geq$ 21” dbh would not be harvested.
- In goshawk post fledgling areas (PFAs), trees $\geq$ 21” dbh would not be harvested.
- Heritage sites that are eligible, or potentially eligible, to be added to the National Register of Historic Places, would be protected by mitigation measures designed to avoid and protect cultural values.
- The majority of road-related activities would make use of the existing system road network.
- Roads proposed for any type of closure would focus on improving resource and habitat conditions (see Appendix K).
- Establish two RNAs (Horse Pasture Ridge (338 acres); Haystack Rock (425 acres)).
- Maintain and enhance culturally significant resources, settings, viewsheds, and sensitive plant and animal species habitat.
- Provide project design criteria, standards, guidelines, and/or tactics to reduce the spread of invasive species.
- Provide project design criteria, standards and/or guidelines for tree planting and conservation of advanced regeneration of early seral tree species currently existing on the landscape.
- Outline a monitoring strategy to support learning through time.
- Continue road maintenance and hazard tree cutting or removal.
- Provide for aquatic organism passage at six sites in the LJCRP area.

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the Proposed Action provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives were outside the scope of this project, duplicative of the alternatives considered in detail, or determined to be components that would cause unnecessary environmental harm. Therefore, a number of alternatives were considered, but dismissed from detailed consideration for reasons summarized below.

Do not Establish the RNAs

Concerns about the establishment of RNAs in the project area do not represent a significant issue. The rationale provided for amending the Forest Plan to remove these RNAs as proposed are unsupported by data, existing conditions, or science. The Forest Plan requires that these areas are managed as RNAs until establishment.

Remove Diameter/Age Limit for All Species

A proposal was considered to remove diameter and age limitations from silvicultural prescriptions, and cut trees of all age and size classes. Due to the disruption of the disturbance regime, some climax species, such as grand fir and in some instances Douglas-fir occupy sites that would be dominated by more fire adapted species. In these instances, there is a recognized need to thin these climax species, regardless of size, but cognizant of the need to conserve old trees (>150 years) in order to move the landscape toward the desired condition. However, there is no science available to support the ecological need for wide-spread removal of large and/or old trees to hasten the transition back to a more fire adapted ecosystem. Additionally, the project landscape has less single story old ponderosa pine forest than the range of variation, and the purpose and need for the project includes increasing the amount of this structure and composition. Harvesting old trees, or large ponderosa pine trees that are not competing with other large trees, would not support attainment of the purpose and need.

Consider Less Prescribed Fire

During scoping, some commenters expressed concerns that prescribed fire could adversely impact grazing, merchantable timber and special forest products. As part of the project design features and the project's implementation plan, a set of protocols were designed that must be followed prior to, during and after implementation to coordinate with grazing permittees, so the disruption to their operations are minimal. Additionally, prescriptions and implementation timing are designed so that impacts to merchantable timber and special forest products would be minimized or avoided all together. The purpose and need for the project includes to increase fire-tolerant ponderosa pine coverage; reduce the amount of fire-intolerant Douglas-fir and grand fir in mixed stands; increase the amount of fire-resilient single-story, old forest stands; reduce the mid-story and understory of multi-story old forest stands (reducing uncharacteristic fuel loads); and improve opportunities to manage fire at characteristic frequencies and severities. As such, prescribed fire, in conjunction with forest thinning, will indirectly support the long term maintenance of merchantable timber and other forest products. Therefore, these concerns are addressed in Alternatives 2 and 3, and an additional stand-alone alternative that considers less prescribed fire is not warranted.

Adjust Treatments in the Proposed Action for Resource Concerns

Some comments suggested that the Proposed Action was focused on forest vegetation management, and did not consider resource concerns such as wildlife habitat, old forest connectivity, and aquatic

habitat. Evaluation of this potential alternative showed that these resource concerns were already covered under Forest Plan direction (e.g. RHCA RMOs, connectivity, and road density). The resource concerns envisioned under this alternative are incorporated into Alternative 2 (Proposed Action) and Project Design Criteria (Appendix J).

Summary of Alternatives

Table 32 provides a summary of the actions proposed in each alternative. The Modified Proposed Action was the result of adjusting Alternative 2 based on comments on the DEIS, or corrections to data or analyses.

Table 32. Comparison of restoration actions and effects by alternative

Criteria	Metric	Alternative 1 (No Action)	Proposed Action[1] (PA)	Alternative 2 (Modified PA)	Alternative 3
Group selection	*Acres*	0	3,000	2,400	880
Intermediate treatment	*Acres*	0	400	330	190
Meadow/Savanna	*Acres*	0	800	560	290
Stand improvement	*Acres*	0	5,000	5,400	3,000
Single tree selection	*Acres*	0	13,800	11,800	8,900
Single Tree selection - old forest	*Acres*	0	2,000	660	0
Total mechanical forest treatments	*Acres*	0	25,000	21,200	13,300
High priority area for prescribed burning	*Acres*	0	<90,000	48,600	46,500
RHCA treatment	*Acres*	0	3,000	2,600	750
Cat 1 RHCA treatments	*Acres*	0	31	31	0
Cat 4 RHCA treatments	*Acres*	0	1,800	1,800	0
SI RHCA treatments	*Acres*	0	750	750	750
Forest treatments in IRAs	*Acres*	0	5,600	5,600	0
Aquatic organism passage improvements	# culverts	0	6	6	6
Road construction	*Miles*	0	1.5	0	0
Road reconstruction/maint.	*Miles*	0	24	82.6	82.6
Temporary road construction	*Miles*	0	26	12.6	12.6
Road closure/ and decommissioning	*Miles*	0	Called for roads analysis to determine	17	0[2]
Total Open Roads	*Miles*	187		170	230
Total Closed Roads	*Miles*	132		124	93

Criteria	Metric	Alternative 1 (No Action)	Proposed Action[1] (PA)	Alternative 2 (Modified PA)	Alternative 3
Total Decommissioned Roads	*Miles*	14	Called for roads analysis to determine	39	10

1- The proposed action published in the federal register and used in scoping is provided here for comparison to the modified proposed action, which was analyzed in detail in this FEIS.
2- Alternative 3 opens some roads closed under Alternative 1.

CHAPTER 4 Environmental Consequences

Summary

While Chapter 3 differentiates between the management strategies of the three alternatives, Chapter 4 clearly explains the consequences of applying those different strategies. The consequences are organized first by alternative, and then according to the impact the alternative actions would have on the physical, biological and cultural environment. Consequences common to all of the alternatives are summarized, as are the "cumulative effects" of each. A summary of the effects of applying the management strategies contained in each alternative is presented in Table 33, "Comparison of the relative effects of the alternatives".

Alternative 1 (the No Action Alternative), would leave current conditions (including existing but not yet implemented management decisions) in place. This Alternative, as well as existing conditions are used as baselines for comparing the effects of implementing Alternative 2 or 3.

Major differences in environmental impact between implementing Alternative 2 or Alternative 3 are summarized as follows:

Biological Environment

- Forest management treatments under Alternative 2 would increase the amount of the ponderosa pine cover type by 8 percent, and large tree dominated forests by 7 percent, compared to 6 percent and 5 percent respectively under alterantive 3.
- Fire management and forest treatments are allowed in the following areas in Alternative 2, preparing the acreage for the safe and effective reintroduction of fire:
    - Inventoried Roadless Areas
    - Potential Wilderness Areas
    - Designated Old Growth Preservation Areas
    - Riparian Habitat Conservation Areas
- Alternative 3 restricts harvesting in the above areas, and as a consequence also restricts the use of prescribed fire in these areas, at least where current conditions are not amenable to its use.
- Alternative 2 would bring the LJCRP area closer to reference conditions in vegetation and disturbance regimes in comparison to the No Action and Alternative 3, creating a more resilient and sustainable condition through time.
- Ground disturbance and short-term effects on habitat quality for some wildlife species would be expected to be less under Alternative 3 than under Alternative 2.
- There would be an increase in forage production on 8-12 percent of the acreage as a result of forest thinning in Alternative 2 compared to 5-8 percent in Alternative 3.
- 38 percent of the forest treated would see an improvement in vegetative pattern in Alternative 2 compared to 24% in Alternative 3.
- Alternative 3 would prohibit harvesting trees greater than or equal to 21 inches in diameter.

- Alternative 3 would have fewer acres of activity fuels prescribed burned as a result of fewer stands treated, but potentially more area could burn when a high intensity fire occurs (15-25 percent of the landscape could burn in an extreme year, versus 5-10 percent under Alternative 2).
- The impact of roads to threatened, endangered, and sensitive species under Alternative 3 would be greater than Alternatives 1 and 2, but no greater than it is under the existing condition.
- Both Alternatives 2 and 3 would protect populations of sensitive plants from ground disturbing activities and prescribed fire using project design criteria.
- Riparian management objectives would be met to a greater degree under Alternative 2 than Alternative 3.

Social Environment

- Approximately 10.6 million cubic feet of timber volume would be removed as a result of forest treatments in Alternative 2; Alternative 3 would remove about 6.6 million cubic feet.
- 55 jobs would be created under Alternative 2; 34 jobs created in Alternative 3.
- 5,100 acres potentially containing heritage sites could be at risk in Alternative 2 compared to 2,600 acres in Alternative 3.
- The road network under Alternative 3 would maintain existing public access levels, meaning more roads would be left open for passenger vehicle than under Alternative 2.
- Under both Alternative 2 and Alternative 3, all roads considered for closure would remain open to off-road vehicle use. There would be slightly fewer miles of roads used for haul routes under Alternative 3 (about 1.5 percent less miles) and the length of temporary roads would be the same for both Alternatives 2 and 3.

Physical Environment

- The location of road construction and timber harvest in Alternative 2 would have potentially greater adverse impacts on soils, runoff and sedimentation compared to Alternative 3.
- The total number of miles of open roads and road density is greater in Alternative 3 than Alternative 2; but timber harvest activity (and therefore the intensity of road use and its related effects on the physical environment) is less in Alternative 3 than Alternative 2.

Direct, Indirect, and Cumulative Effects by Alternative

Spatial and Temporal Context for Project Level Effects Analyses

For the vegetation/disturbance regime effects analyses, the spatial context being considered is the 98,000 acres of NFS lands (project area). The baseline year used for this analysis is the year 2014 as the existing condition. In the effects discussion, post treatment refers to the time the final activity is accomplished (assumed to be the year 2024), “short-term” effects refers to effects over the 10-year period from the time the final activity was accomplished (year 2034). Beyond 20-years effects will be considered as “long-term” (year 2054).

Cumulative effects are discussed in terms of changes in the existing condition due to present and foreseeable activities, including the effects of the alternative being discussed. The spatial context being considered for cumulative effects differs by resource area, as explained in the cumulative effects sections. The time frame considered for cumulative effects is approximately 10 years into the

future at which time the majority of the actions proposed would have been completed and the responses to these actions has occurred.

Past, Present, and Reasonably Foreseeable Actions

The temporal and spatial scale of analysis is variable depending on the resource concerns being evaluated, particularly when considering the effects of past, present, and reasonably foreseeable actions. During the interdisciplinary process, the team followed guidance presented in CEQ's letter dated June 24, 2005. Using this guidance, the following summary was developed showing past, present and reasonably foreseeable actions within and adjacent to the LJCRP planning area. These projects were considered, where relevant, when addressing cumulative effects for various resources.

Past Actions

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects. Table 3 lists approximate acres of the various vegetation management, fuels treatment and prescribed burning activities as well as wildfires that have occurred within the project area from 2004 to 2013.

This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. There are several reasons for not taking this approach. First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Current conditions have been impacted by innumerable actions over the last century (and beyond), and trying to isolate the individual actions that continue to have residual impacts would be nearly impossible. Second, providing the details of the effects of past actions on an individual basis would not be useful to predict the cumulative effects of the proposed action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because there is limited information on the environmental impacts of individual past actions, and one cannot reasonably identify each and every action over the last century that has contributed to current conditions. Additionally, focusing on the impacts of past human actions can lead to ignoring the important residual effects of past natural events, which may contribute to cumulative effects just as much as human actions. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. Finally, the Council on Environmental Quality (CEQ) issued an interpretive memorandum on June 24, 2005, regarding analysis of past actions, which states, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions."

The cumulative effects analysis in this EA is also consistent with Forest Service National Environmental Policy Act (NEPA) Regulations (36 CFR 220.4(f)), which state, in part:

> "CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions. Once the agency has identified those present effects of past actions that warrant consideration, the agency assesses the extent that the effects of the proposal for agency action or its alternatives would add to, modify, or mitigate those effects. The final analysis documents an agency assessment of the cumulative effects of the actions considered (including past, present, and reasonable foreseeable future actions) on the affected environment. With respect to past actions, during the scoping process and subsequent preparation of the analysis, the agency must determine what information regarding past actions is useful and relevant to the required analysis of cumulative effects. Cataloging

> past actions and specific information about the direct and indirect effects of their design and implementation could in some contexts be useful to predict the cumulative effects of the proposal. The CEQ regulations, however, do not require agencies to catalogue or exhaustively list and analyze all individual past actions. Simply because information about past actions may be available or obtained with reasonable effort does not mean that it is relevant and necessary to inform decision making. (40 CFR 1508.7)"

For these reasons, the analysis of past actions in this section is based on current environmental conditions, and is presented in the existing condition discussions for each resource area.

Present Actions

There are no vegetation management activities presently operating within the LJCRP area. Table 4 summarizes ongoing non-vegetation management activities in the LJCRP area. The cumulative effects of these activities along with proposed LJCRP activities are discussed in the cumulative effects sections of this chapter.

Reasonably Foreseeable Actions

The Blue Mountains Forest Resiliency Project (FRP) is a proposed large landscape project on NFS lands that adjoins the LJCRP and has the potential to contribute to cumulative effects. The FRP public scoping period ended on April 5, 2016. The FRP proposed action proposes dry forest thinning and prescribed burning to reduce the departure between existing and desired forest density, cover, composition, structure, and pattern, and fire regimes in similar ways to the LJCRP. The FRP also proposes strategic fuel treatments, which could occur in all forest types in areas accessible by existing roads to facilitate the safe and effective management of planned and unplanned fire at the landscape scale. The FRP proposed action summarized 610,000 acres of thinning and prescribed burning at the watershed level across three National Forests, and did not specify treatments at the stand level. Hence, cumulative effects of the FRP in combination with the LJCRP can only be generally described at this time. Cumulative effects of this reasonably foreseeable project are discussed in the cumulative effects sections of this chapter.

Comparison of Effects of the Alternatives

Table 33 compares the effects of the alternatives. See Table 32 for a summary of the activities proposed by each alternative.

Table 33. Comparison of selected effects of the alternatives

Criteria	Metric	Alternative 1 (No Action)	Alternative 2 (Modified PA)	Alternative 3
Increase in ponderosa pine cover type	*% increase from current*	0	8	6
Increase in old forest multistory and old forest single story		0	7	5
Decrease in high density stands		0	19	11
Increase in trees >20' dbh		0	9	5
Total treatment area with the potential for cutting trees ≥21" dbh	*Acres*	0	5,000	0
Treatment area with the potential for cutting trees ≥21" dbh in IRAs	*Acres*	0	1,600	0

Criteria	Metric	Alternative 1 (No Action)	Alternative 2 (Modified PA)	Alternative 3
Treatment area with the potential for cutting trees ≥21" dbh in PWAs outside IRAs	*Acres*	0	170	0
Stand improvement treatments in PWA	*Acres*	0	350	0
High priority prescribed fire in PWA	*Acres*	0	6,630	6,370
Stand improvement treatments in IRA	*Acres*	0	2,370	0
High priority prescribed fire in IRA	*Acres*	0	18,900	17,500
Cat 1 RHCA treatments	*Acres*	0	31	0
Cat 4 RHCA treatments	*Acres*	0	1,800	0
SI RHCA treatments	*Acres*	0	750	750
Forest treatments in IRAs	*Acres*	0	5,500	0
Roads in RHCAs - Lower Joseph	*Miles*	59.5	57.0	58.1
Roads in RHCAs - Upper Joseph	*Miles*	39	56.7	62.0
Riparian Management Objectives	*Qualitative category*	Outside the acceptable range	Meet RMOs over long-term	Between Alts 1 and 2
Total open USFS roads	*Miles*	187	170	230
Total stream crossings Lower Joseph	*Miles*	192	192	201
Total stream crossings Upper Joseph	*Miles*	277	215	277
Total road density Lower Joseph	*Miles/Sq Mile*	1.78	1.76	1.84
Total road density Upper Joseph	*Miles/Sq Mile*	2.43	2.10	2.42
Spalding's catchfly (TES plant)	*Viability*	No effect	May affect, not likely to adversely affect	
Snake River Steelhead (TES fish)	*Viability*	No effect	Likely to adversely effect	
Open road density[6] – Davis Creek (MA1)	*Miles/Sq Mile*	4.0	2.9	4.4
Open road density – Cougar Creek (MA1)	*Miles/Sq Mile*	3.7	3.3	4.1
Open road density – Lower Swamp Creek (MA1)	*Miles/Sq Mile*	2.6	2.6	3.0
Open road density – Rush Creek (MA1)	*Miles/sq Mile*	3.1	3.1	3.9
Open road density – Sumac Creek (MA1)	*Miles/Sq Mile*	3.5	2.9	4.1
Increase in forage production as a result of forest thinning, where cover would be <40%	% of treated acres in allotments	0	8-12	5-8
Vegetation pattern (% of forest treated with ICO)	*%*	0	38	24
Landscape Resiliency – fire frequency and extent (HRV = *6-15% burned/year)*	*% of project area*	<2% of landscape	4-6% of landscape	4-6% of landscape

[6] The subwatersheds not listed here do not differ in open road density between alternatives.

Criteria	Metric	Alternative 1 (No Action)	Alternative 2 (Modified PA)	Alternative 3
		burns/year (unplanned ignitions); 15-20% burns at once in high fire years	burns/year (planned + unplanned); 5-10% burns at once in high fire yrs	burns/year (planned + unplanned); 15-25% burns at once in high fire yrs
Native plant diversity (Based on the chance of encountering the same plant species in consecutive samples)	*Shannon-Wiener index*	3.9 to 4.4 depending on habitat	Greater than Alt 1	Greater than Alt 1
Jobs	#	0	55	34
Timber volume removed	*million cubic feet*	0	10.4	6.6
Heritage (Relative risk to conservation of heritage sites as measured by the area of mechanical treatments in high to moderate-low probability heritage site areas)	*Acres*	0	5,100	2,603
Risk of invasive plant species spread	*Qualitative ranking*	High	Moderate	Moderate

Alternative 1: Direct, Indirect, and Cumulative Effects

Alternative 1 is the no action alternative as required by 40 CFR 1502.14(c). Alternative 1 and the existing condition are the points of reference for estimating effects of Alternatives 2 and 3.

The Physical Environment

Soil and Water

There would be no direct effects to soil productivity or water quality in the analysis area with Alternative 1. In the absence of active timber management, soil productivity in former timber sale units would continue to improve over the course of 20-50 years (Xiao Tana 2005). Compaction and displacement would be improved over time through natural restoration processes such as freeze/thaw, tree root expansion, ground cover root mass expansion, and organic matter, leaf, and litter layer development.

Under Alternative 1, no additional roads would be decommissioned. Therefore no direct deleterious effects of active road decommissioning would occur. However, these roads would remain on the landscape and continue to fragment habitat, interrupt aquatic connectivity, lengthen streams, persist as a source of sediment and contribute to detrimental soils conditions.

Fuel loads would continue to increase and subsequently increase the risk of uncharacteristic wildfire intensity under Alternative 1. Potential wildfire effects on physical environment would depend upon the intensity, duration and extent of the fire. Soil recovery depends on post-fire organic content and erodibility, slope, and the speed with which groundcover is re-established. A stand replacing wildfire with high temperatures, long flame lengths, and long residence times could consume litter and duff and reduce effective groundcover. A loss of groundcover could lead to indirect effects such as reduced site productivity (nutrient loss through erosion), increased sediment production (sheet and rill erosion), and reduced water quality (Landsburg 2000).

In the absence of fuels management, fuel loads would be high and would raise the risk of uncharacteristic wildfire intensity. The potential for epidemic insect and disease damage would also be greater than if the forest were thinned, which also raises the risk of wildfire intensity. A high intensity wildfire in the area could lead to indirect effects such as elevated stream temperatures and increased stream sediment for approximately 5 to 10 years (Dunham et al. 2007, Charles C. Rhoades 2011)

Air Quality

There would be no direct effects to air quality under Alternative 1.

In the absence of forest management, SI, and prescribed fire, forest vegetation and fuel loading would continue to depart from reference conditions and associated disturbance would continue to operate outside characteristic severity levels. Seasonal wildfire would continue to occur with the potential to become larger and more severe. Large fires have the potential to produce more smoke than prescribed fire in a shorter time period. The presence of smoke has the potential to impact air quality, visibility, communities, and human health. The duration of smoke impacts from wildfire could last from days to months depending on the fuels affected and duration of active fire and would likely be have greater effect than from prescribed burning.

The Biological Environment

Vegetation and Disturbance Regimes

In the short term, the distribution of forest cover type, forest structural stages and tree density class under Alternative 1 would be expected to be similar to existing conditions (Tables 11-14). The following is a narrative discussion of change over time based on the current trajectory that would occur under Alternative 1.

Forest Cover Type

In the short term, western larch in the dry PVG and ponderosa pine in the moist PVG would remain within the desired range. All other cover types in the dry and moist PVGs would be outside RV percentages. Conditions would continue to favor Douglas-fir and grand fir. Seral species (ponderosa pine and western larch) would continue to stagnate and decline moving farther outside RV.

Forest Structural Stages

The dry PVG stand initiation and stem exclusion structural stages would remain within RV percentages. All other dry PVG and all moist PVG structural stages would be outside the desired range. Successional pathways from stand initiation to old forest would continue. Tree growth would slow in areas of high stocking. Forest structure would continue to be outside of RV and favor multi-storied conditions.

Tree Density Class

Within the moist PVG, the moderate and low density classes would remain within the desired range in the short term. The percent of the landscape in the moist high and all density classes in the dry PVG would be outside of the RV. Overstocked conditions would continue. Tree growth would continue to slow and density related mortality would increase. Moderate and high density classes would increase as the low density classes transition to moderate, and moderate shift to high, further moving away from the desired RV percentages.

Pattern

In the absence of forest restoration and stand improvement treatments, pattern would continue to favor continuous tree crowns with small canopy gaps associated with insect and disease pockets. Forest canopy would continue to increase, shading out understory herbaceous vegetation and further reducing forage production and species diversity. Historic grasslands, savannas and forest openings would continue to become smaller.

Size Class Distribution

The forested landscape would remain dominated by trees in the 10 to 20 inch size classes. Trees would continue to grow toward the next higher size class. Individual tree growth would slow and where overstocked conditions occur, movement from one class to the next would be inhibited.

Disturbance and Fire Regimes

There would be no direct effects to disturbance regimes or fire severity under Alternative 1.

Fire suppression has been and would continue to be implemented in the LJCRP area under Alternative 1. Given current and expected fire suppression activities less than 2 percent of the LJCRP landscape is affected by fire on average per year. On modeled high fire years approximately 15 – 20 percent of the LJCRP area burns at once. The historical range of acres affected by fire in any given year is approximately 6 – 15 percent (modeling results and methodology are described in Appendix C and D).

Under Alternative 1, without forest restoration treatment or utilization of prescribed fire, the conditions described in the affected environment would continue to depart from desired conditions. The landscape would continue to become less resilient to disturbance (including changing climate). Disturbance regimes would continue to shift from relatively frequent low/mixed severity disturbance toward relatively infrequent moderate/high severity. The landscape would continue to homogenize in density and structure creating a more continuous fuel environment that has the potential to support larger more intense disturbance effects. The shift from fire tolerant to intolerant species and continued fire suppression could create conditions that select against regeneration of early seral fire tolerant species.

Alternative 1 does not meet the purpose and need of the project because there would be no restoration of structure, density, composition or pattern, thus no restoration of disturbance processes at the landscape scale. Disturbances would continue to increase in severity and potentially size depending on conditions (fire weather) under which they occur. This disturbance has the potential to affect many ecosystem components including existing early seral old trees and wildlife habitat features.

Fire Management Decision Space

Alternative 1 would not allow for proposed restoration actions that would reduce the risk of utilizing unplanned ignitions to meet landscape restoration goals. The fire management decision space would remain constrained by this risk.

Insects and Disease

Insects and diseases that thrive in overstocked stem exclusion or understory reinitiation structural stages and with host species of Douglas-fir and grand fir would increase. Susceptibility of ponderosa pine and western larch would increase as conditions favoring these species deteriorate and they become more stressed.

Dwarf mistletoe and degree of mistletoe infestation - Without the removal of infected trees, reduction of host trees, or creation of conditions that minimizes potential for spread to uninfected trees, it is expected that existing dwarf mistletoe infections would intensify and spread.

Timber Resource

There would be no harvest treatment (0 acres treated that remove timber volume) and there would no timber volume (0 cubic feet) removed as a result of restoration treatments.

Rangelands and Understory Vegetation

Alternative 1 would have no known direct, indirect or cumulative effects on range resources. Trends would be toward a gradual loss of forage as trees continue to encroach in stringer meadows in pine savannah and fill forest openings. Loss of forage by gradual ingrowth of trees could lead to more concentrated use of the remaining forage. Fire suppression and the resulting accumulation of fuels could contribute to more intense wildfire, a subsequent loss of forage, potentially leading to reduced or suspended livestock grazing. Rangeland condition, livestock distribution, and improvements would remain unchanged and consistent with existing management. Changes in livestock distribution through enhancement of transitory range would not occur.

Non-native Invasive Plants

Currently, invasive plants increase and spread through ongoing land management activities and permitted actions, recreational users, and wildlife use. Known invasive plant sites within the planning area are currently managed under an integrated management system. Documented sites would continue to be treated based upon their current priority and status. Project planning frequently includes road closures to help affected watersheds meet or move toward Forest Plan standards for road densities. In reality, roads closed and decommissioned under existing decisions are treated as funding becomes available. Alternative 1 would close and decommission roads identified through past projects, resulting in a 52 mile reduction in open roads. Risk of spreading noxious weeds along roads would be higher than under Alternative 2, which would result in a 69 mile reduction in open roads that would be done as funding is available. In the event of wildfire, invasive annual grasses and noxious weeds could be spread through fire created openings and through suppression activities such as fire line construction. The overall effects of Alternative 1 in regard to invasive plant increase and spread are essentially the same as the current baseline situation. The no action alternative has the lowest risk of spreading invasive plants by thinning and prescribed fire. However the no action alternative has a higher risk than either action alternative for spreading invasive plants through wildfire suppression activities and in the case of moderate to mixed severity wildfire (Table 8).

Threatened, Endangered and USFS Region 6 Sensitive Plants

Under Alternative 1, no management except fire suppression and implementation of pre-existing decisions would occur. Both known sites and possible undetected occurrences of threatened, endangered or sensitive plants would not be impacted by project activities.

Sensitive species growing in partial shade in forest could lose habitat as openings fill with trees in the absence of natural fire cycles. Increases in ladder fuels resulting from fire suppression could increase the risk of larger, more severe wildfires. Lack of fire and increased canopy cover would benefit some understory species requiring cool moist habitat with low light and large coarse woody debris. Meadows and grasslands would be at risk for increased ingrowth of conifers and shrubs. Most of the TES species included are adapted to wildfire within the range of variability. In the absence of natural fire return intervals, fires may burn more intensely over larger areas and understory plant species may be at risk in forested settings. Grassland plants are at risk in areas where fire burns hot enough to kill

native vegetation, creating openings where invasive grasses such as ventenata, cheatgrass and medusahead can thrive. In the absence of fire, forest openings with grass and shrubs used by ungulates become less abundant, trees encroach into meadows, and grasslands fill with shrubs, concentrating grazing and browsing on smaller portions of the landscape, such as areas with shallow soils/ lithosols, riparian areas, and wet meadows where many sensitive plant species are found.

Aquatic Habitat

Fine sediment levels are generally above the 20 percent RMO for fish bearing streams in the analysis area (Table 21).

Under Alternative 1, livestock grazing and roads are the current management activities in the analysis area that are likely to be contributing to elevated fine sediment levels.

The majority of the forested stands in the project area would be represented by a fuel model that is likely to exhibit moderate fire severities in the case of a wildfire. Wildfires typically result in increases in fine sediment for three to five years, depending on the wildfire severity (Neary et al. 2005). Where fine sediment levels increase and exceed the 20 percent threshold, spawning success for Snake River steelhead and redband trout would decrease, and a decrease in survival of juvenile salmonids may occur. A wildfire in the area could also elevate water temperatures for up to 10 years, depending on the wildfire severity (Dunham et al. 2007). If water temperatures exceeded 64ºF for an extended period of time as a result of wildfire, survival of salmonids would likely be reduced.

Threatened and Endangered Aquatic Species

Alternative 1 would not affect Snake River steelhead or its designated critical habitat (no effect).

Management Indicator Species – Aquatic Species

Alternative 1 may impact individual redband trout and their habitat, but would not likely contribute toward federal listing or loss of viability to the population or species (MIIH).

Alternative 1 may impact individual Snake River steelhead and their habitat, but would not likely contribute toward loss of viability to the population or species (MIIH).

Watershed and aquatic habitat conditions would likely remain in their current condition for the next 5 years. Current levels of fine sediment in the majority of streams in the analysis area are above the 20 percent threshold used to indicate adverse impacts to salmonids.

USFS Region 6 Sensitive Aquatic Species

Alternative 1 would have no impact on individual western ridge mussels and their Habitat (NI). Watershed and aquatic habitat conditions would likely remain in their current condition for the next 5 years. Current aquatic habitat conditions in the analysis area are not likely limiting for western ridge mussels.

Over the longer term, western ridge mussels would be vulnerable to impacts from large-scale wildfires that result in large increases in fine sediment and changes in peak flows. Western ridge mussels are adapted to habitats with fine sediment; however, large influxes of fine sediment could result in the burying of mussel beds and the death of individuals. Western ridge mussels require stable streambeds for mussel beds to develop. Increases in peak flows that scour streambed substrates destroy existing mussel beds.

Wildlife

Primary Cavity Excavators

Alternative 1 would not have a direct effect on snag habitat. Snags would not be reduced for operational reasons or consumed during prescribed burning as in either Alternative 2 or 3. Stress in overstocked stands may lead to increased snag abundance but may also increase fuel loadings, increasing the likelihood of uncharacteristic stand replacement fires. Stand replacing fires would reduce snag habitat for those PCE's associated with live closed canopied forests (e.g. pileated woodpecker), while increasing habitat for those PCE's associated with post-fire conditions (e.g. Lewis's woodpecker). Currently the abundance of post-fire habitat is below the HRV within the project area.

Alternative 1 includes the closure and decommissioning of 52 miles of road, approved under existing decision, but not yet implemented within the watershed. Road closures and decommissioning would reduce disturbance and limit access for firewood cutting and snag loss relative to the existing condition. Since there would be no change to PCE habitat from management activities, and there is a reduction in open roads from existing condition, PCE habitat would remain viable at the forest and at the project levels.

Pileated Woodpecker and Northern Goshawk

Quantity of source habitat for pileated woodpeckers and norther goshawks would not change. Source habitat abundance would remain within the HRV. No harvesting would occurs within source habitat leaving habitat quality unchanged. Ongoing tree growth would continue to increase canopy closure and density of large trees and snags, thus increasing source habitat for pileated woodpeckers and goshawks.

Risk to loss of live trees due to insects and/or disease would continue to increase, which may increase snag habitat, though also depending the scale of the disturbance may change the suitability of existing habitat due to loss of live trees. Risk to large scale fire would continue to increase. Large-scale stand replacing fires would reduce source habitat for pileated woodpecker and goshawks.

The abundance of open roads across the planning area would be reduced from existing conditions in Alternative 1 through the implementation of existing conditions. Removal of snags for firewood and safety would be reduced as effective road closures are implemented across the planning area. Approximately 52 miles of roads that are currently open would be closed or decommissioned under existing decisions under Alternative 1, potentially leading to an increase in habitat quality through snag retention along roads and decreased human disturbance.

Tables 34 and 35 compare conditions of pileated woodpecker and northern goshawk source habitat by alternative, respectively. Alternative 1 would maintain source habitat within HRV, but would have higher habitat quality in the short-term compared to the action alternatives, where restoration treatments reduce canopy cover or large tree structure abundance.

Since no change to pileated woodpecker or goshawk habitat would occur from management activities, and there is a reduction in open roads from existing condition, habitats would remain viable at the forest and at the project scale.

American Marten

Under Alternative 1, there would be no direct effects on marten source habitat in the short term. The amount of source habitat in the project area, currently at the low end of the RV, would likely increase

through time as trees continue to grow, canopy closure would increase and the abundance of large trees and snags would increase (Table 36).

Due to the high abundance of adjacent, primarily dry forests with uncharacteristic closed-canopied forest conditions, there is an increased risk of insect infestation and mortality as well as increased susceptibility to disease and fire. Both standing and down fuels would continue to increase over time as trees die due to competition or insects. This would increase snags and down wood, which are beneficial to marten, but could increase the severity of a wildfire, should one occur. Effects from a stand replacing fire could convert marten habitat to an unsuitable condition for marten.

The abundance of open roads across the planning area would be reduced from existing conditions in Alternative 1 as a result of the implementation of existing decisions. Removal of snags for firewood and safety would be reduced as effective road closures are implemented across the planning area. Approximately 52 miles of roads that are currently open would be closed under existing decisions under Alternative 1, potentially leading to an increase in habitat quality through snag retention along roads and decreased human disturbance.

As no change to marten habitat would occur from management activities, and there is a reduction in open roads from existing condition, habitats would remain viable at the forest and at the project scale.

Table 34. Pileated woodpecker source habitat conditions by alternative

Pileated Woodpecker	Alternative 1	Alternative 2	Alternative 3	Comment
Source Habitat (acres)	7,500	7,000	6,600	
% HRV	16%	15%	14%	The current condition as well as the outcome of all alternatives, maintain source habitat within the HRV. The HRV for this species is about 1-39%.
Acres source habitat with harvest	0	1,900	1,100	Acres of pileated woodpecker habitat that have been harvested are likely lower quality.
% source habitat with harvest	0	27%	16%	Acres of pileated woodpecker habitat that have been harvested are likely lower quality. It is expected that within 10-30 years the habitats that were harvested and are of lesser quality would transition to higher quality source habitat
Acres of source habitat not commercially treated	7,400	5,100	5,600	Pileated woodpecker habitat that is not harvested and is likely higher quality habitat.
% HRV of source habitat not treated	16%	11%	12%	Untreated pileated woodpecker habitat is within the HRV (1-39%). It is expected that within 10-30 years the habitats that were harvested and are of lesser quality would transition to higher quality source habitat.
Acres of large (≥21” trees) potentially harvested	0	700	0	Loss of large trees would adversely affect the quantity and quality of current and future habitat for pileated woodpeckers.

Pileated Woodpecker	Alternative 1	Alternative 2	Alternative 3	Comment
Miles of road closed and/or decommissioned (from Existing Condition)	52	69	9	The greater the reduction in open roads, the greater the benefit to pileated woodpeckers. Removal of snags (an important habitat feature) is greater along open roads.

Table 35. Northern goshawk source habitat conditions by alternative

Northern Goshawk	Alternative 1 (and current)	Alternative 2	Alternative 3	Comment
Source Habitat (acres)	18,900	14,900	15,800	
% HRV	34%	27%	29%	The current condition as well as the outcome of all alternatives, maintain source habitat within the HRV (1-46%)
Acres source habitat with commercial harvest	0	3,800	2,100	Acres of Northern goshawk habitat that have been commercially harvested are likely lower quality.
% source habitat with commercial treatment	0	20%	11%	Northern goshawk habitat that has been commercially harvested, are likely lower quality.
Acres of source habitat without commercial treatment	18,900	11,200	13,700	Northern goshawk habitat that has not been commercially harvested, are likely higher quality habitat.
% HRV of source habitat not treated	34%	20%	25%	Northern goshawk habitat that has not been commercially treated is within the HRV. It is expected that within 10-30 years the habitats that were treated and are of lesser quality would transition (through growth) to higher quality source habitat.
Acres of source habitat with potential for trees >21" dbh removed	0	2,300	0	Large trees provide an important habitat component for goshawks.

Table 36. Source habitat for American marten by alternative

American marten	Alternative 1	Alternative 2	Alternative 3	Comment
Source Habitat (acres)	2,180	2,180	2,180	
% HRV	17	17	17	The current condition as well as the outcome of all alternatives, maintain source habitat within the HRV. The HRV for this species is about 19-29% of the potential vegetation.
Acres source habitat with harvest	0	820	730	Acres of marten habitat that has been harvested are likely lower quality.
% source habitat with harvest	0	38	33	Acres of marten habitat that has been harvested are likely lower quality. It is expected that within 10-30 years the habitats that were harvested and are of lesser quality would transition to higher quality source habitat.
Acres of source habitat not commercially treated	2,200	1,360	1,500	Marten habitat that is not harvested, are likely higher quality habitat.
Acres of large (≥21" trees) potentially harvested	0	220	0	Loss of large trees would adversely affect the quantity and quality of current and future habitat for marten.
Miles of road closed and/or decommissioned (from Existing Condition)	52	69	9	The greater the reduction in open roads, the greater the benefit to marten. Removal of snags (an important habitat feature) is greater along open roads.

Rocky Mountain Elk

Table 37 summarizes the habitat effectiveness index and cover percentages by alternative within the LJCRP area. HEI was calculated using both the original technique for roads as well as using the distance band technique. Without management activities, elk cover and forage habitat would not be altered through active management, and short-term disturbances (associated with treatment activities) to elk habitat would not occur. The overall area providing cover remains higher than either of the two action alternatives. Although, open road densities are lower than the existing condition, road densities in MA 1 would remain high (>3.0 miles/square mile) and above Forest Plan standards of 2.5 miles/square mile in Cougar, Davis, Rush and Sumac Creeks (Table 38). A reduction in open road

densities from current conditions (through implementation of existing decisions) would benefit elk habitat quality.

Table 37. Habitat effectiveness index and cover percentages for the alternatives within the LJCRP area.

		Timber Emphasis (summer range)			Wildlife Emphasis (winter range)			Timber Emphasis (summer range)			Wildlife Emphasis (winter range)		
		Lower Josesph Watershed			Lower Josesph Watershed			Upper Joseph Watershed			Upper Joseph Watershed		
	FP direction or assumption	Alt 1	Alt 2	Alt 3	Alt 1	Alt 2	Alt 3	Alt 1	Alt 2	Alt 3	Alt 1	Alt 2	Alt 3
Total Cover %	MA 1 >=30%	77 %	63 %	64 %	23 %	18 %	23 %	55 %	40 %	42 %	30 %	25 %	26 %
HEI	MA 1* >= 0.5 (direction)	0.6	0.63	0.59	0.64	0.62	0.64	0.6	0.58	0.57	0.73	0.71	0.7
HEI _Distance Band	MA 1* >= 0.5 (direction)	0.54	0.57	0.55	0.58	0.56	0.57	0.59	0.57	0.56	0.66	0.63	0.63
*MA1 - generally is the area in Timber emphasis - primarily in the Upper Joseph watershed.													

Table 38. Road densities by management area and subwatershed currently and by alternative for the Lower Joseph project area.

Subwatershed Name	MA[1]	Areas (Acres, USFS Land Only)	Forest Plan Standard	Existing Open Rd Density (mi/mi2)	Alt. 1 Open Rd Density (mi/mi2)	Alt. 2 Open Rd Density (mi/mi2)	Alt. 3 Open Rd Density (mi/mi2)
Broady Creek	1	5,300	2.5	2.8	1.6	1.6	2.8
	3	1,700	1.5	1.2	-	-	0.3
	10	3,200	1.35	1.4	1.1	1.1	1.1
Cougar Creek-Joseph Creek	1	2,800	2.5	4.3	3.7	3.3	4.1
	3	10,200	1.5	0.9	0.7	0.5	0.9
Davis Creek	1	4,000	2.5	44	4.0	2.9	4.4
	3	4,000	1.5	0.2	0.2	0.2	0.2

Subwatershed Name	MA[1]	Areas (Acres, USFS Land Only)	Forest Plan Standard	Existing Open Rd Density (mi/mi2)	Alt. 1 Open Rd Density (mi/mi2)	Alt. 2 Open Rd Density (mi/mi2)	Alt. 3 Open Rd Density (mi/mi2)
Horse Creek	10	5,800	1.35	1.7	1.7	1.5	1.7
Lower Cottonwood Creek	10	6,700	1.35	0.6	0.6	0.6	0.6
Lower Swamp Creek	1	6,200	2.5	3.1	2.6	2.6	3.0
	3	8,600	1.5	0.3	0.1	0.1	0.3
Peavine Creek-Joseph Creek	1	5,900	2.5	2.1	1.1	1.1	2.1
	3	5,300	1.5	0.2	0.1	0.1	0.2
Rush Creek-Joseph Creek	1	2,000	2.5	4.0	3.1	3.1	3.9
	3	3,700	1.5	0.9	0.5	0.5	.7
Sumac Creek-Joseph Creek	1	3,600	2.5	4.2	3.5	2.9	4.1
	3	6,000	1.5	1.6	1.3	1.3	1.4
Upper Cottonwood Creek	1	70	2.5	16.1	14.8	14.8	16.1
	10	12,200	1.35	0.7	0.6	0.6	0.7

1 – MA= Management Area. See Table 27 for MA names, and Maps 11a and 11b for MA locations.

Old Growth Management Areas, Late-old Forest Habitat, and Connectivity corridors

No mechanical vegetation treatments would occur under Alternative 1, and fires would be suppressed.

There would be no direct impacts to MA15, LOS habitat, or connectivity corridors under Alternative 1. Indirectly, this alternative would forgo the opportunity to reduce the likelihood of a high intensity and/or stand-replacing fire through treatments. The current level of connectedness would persist, and would improve in quality for species associated with closed canopied forests in the absence of large scale disturbances. Although connectivity for some species would be enhanced over time, susceptibility to insects, diseases, and wildfire would increase.

LOS habitat for species associated with open-canopied habitats is below HRV and would likely continue to decline without management activity. Risk to uncharacteristic disturbance would continue

to increase. Depending the severity and scale of disturbances, habitats for LOS species associated with live trees would decline.

Landbird and Migratory Bird Habitat

In the absence of large scale disturbances, Alternative 1 would provide long-term habitat for migratory birds at the same level that exists today (See Wildlife specialist's report). Forest fuels would continue to accumulate as fuel reduction treatments are deferred. Alternative 1 would contribute further to increased fuel accumulations, increasing the risks to overstory trees when wildfires occur. Depending on the species and the scale and intensity of wildfires, some species habitats may be improved (e.g. white-headed woodpecker), while other species habitats may be reduced (e.g. Williamson's sapsucker).

With the implementation of existing decisions, miles of open roads would be reduced in Alternative 1 as compared to existing conditions. This would likely benefit all of these migratory birds. Road-associated factors that adversely affect some species of migratory and resident birds include: snag and log reduction, habitat loss and fragmentation, negative edge effects, harassment or disturbance, collisions, displacement or avoidance, and chronic negative interactions with humans (Gaines et al. 2003).

Threatened, Endangered, and USFS R6 Sensitive Wildlife Species

Table 39 summarizes the comparative effects of each alternative on federally-listed and USFS R6 sensitive wildlife species with habitat in the LJCRP area. Alternative 1 would have No Effect (NE) to the Canada lynx because it is not considered present on the WWNF (U.S. Department of Agriculture and U.S. Department of Interior 2006).

Alternative 1 would also have No Impact on the tailed frog, spotted frog, bald eagle, peregrine falcon, grey wolf, fringed myotis, Townsend's big-eared bat, potted bat, Johnson's hairstreak, Intermountain sulpur butterfly or the Western bumblebee.

White-headed Woodpecker and Lewis' Woodpecker

Under Alternative 1, the risk of uncharacteristic wildfire or disease/insect outbreaks would continue to increase naturally over time. Post-disturbance habitat (wildfire or insects/disease) may provide suitable habitat for some species and unsuitable for others. Wildfire would likely produce snags, and white-headed woodpeckers and Lewis' woodpeckers are known to occur in recent post-fire habitat that has large pine snags (Wightman et al. 2010). The impact to habitat would depend on the size and severity of the disturbance. For these reason, there is No Impact (NI) to the white-headed woodpecker or the Lewis' woodpecker or their habitat under Alternative 1.

Table 39. TES wildlife species effects by alternative.

Species	Habitat within planning area[1]	Alt 1[2]	Alt 2	Alt 3	Rationale
AMPHIBIANS					
Rocky Mt tailed frog *Ascaphus montanus*	D	NI	NI	NI	Habitat protected by RHCAs
Columbia spotted frog *Rana luteiventris*	S	NI	MIIH	NI	Habitat protected by RHCAs
BIRDS					
Northern bald eagle *Haliaeetus leucocephalus*	S	NI	NI	NI	Habitat requirements not affected.
American peregrine falcon *Falco peregrinus anatum*	D	NI	NI	NI	Habitat requirements not affected.
Lewis' woodpecker *Melanerpes lewis*	S	NI	BI	BI	Trend toward restoring habitat under Alternatives 2,3
White-headed woodpecker *Picoides albolarvatus*	S	NI	BI	BI	Trend toward restoring habitat under Alternatives 2,3
MAMMALS					
Canada lynx *Felix lynx canadensis*	N	NE	NE	NE	Highly unlikely to occur in this area
Gray wolf *Canis lupus*	D	NI	NI	NI	No known den sites within area
Fringed myotis *Myotis thysanodes*	D	NI	MIIH	MIIH	Roost tree abundance potentially affected

Species	Habitat within planning area[1]	Alt 1[2]	Alt 2	Alt 3	Rationale
Townsend's big-eared bat	D				Habitat requirements not affected.
Corynorhinus townsendii		NI	NI	NI	
Spotted bat	S	NI	NI	NI	Habitat requirements not affected.
Euderma maculatum					
INVERTEBRATES					
Johnson's hairstreak	S	NI	MIIH	MIIH	Removal of mistletoe may impact habitat
Callophrys johnsoni					
Intermountain sulphur					Prescribed fire may impact habitat
Colia Christina pseudochristina	S	NI	MIIH	MIIH	
Western bumblebee	S	NI	MIIH	MIIH	Prescribed fire may impact habitat
Bombus occidentalis					

[1] D = Documented ; N = Not known to occur ; S = Suspected [2]NI = No Impact; MIIH = May impact individuals and habitat; BI = Beneficial impact; NE = No effect

The Social Environment

Socioeconomics

Financial Efficiency and Economic Impacts

No direct effects on the local economy would occur under Alternative 1. Within the analysis area, economic conditions and trends (employment, labor income, unemployment, etc.) would not change relative to the LJCRP since no action would be taken. In addition, any potential revenue from the sale of timber would not be realized under Alternative 1. Indirect effects on local economic conditions could occur as a result of Alternative 1; however, estimates of these changes are not available. The lack of measurable direct and indirect effects translates to a lack of measurable cumulative effects to economic conditions under Alternative 1.

Compared to the action alternatives, greater wildfire related costs could result if fuels are left untreated under Alternative 1. Potential threats and costs to human life, property and fire-fighter safety under Alternative 1 would be greater than Alternatives 2 or 3. Fire suppression costs and risk to life and property should be less when wildland fires occur where hazardous fuels have been treated compared to areas where fuels have not been treated. This is commonly accepted since fires in non-

treated areas generally burn hotter, flame length is higher, and fires in tree canopies are more likely. However, while we generally understand expected wildfire frequency and intensity, due to lack of knowledge about where these fires may occur, and how large each fire would be, it is not possible to accurately predict the costs of non-prescribed wildland fire under Alternative 1.

Social Impacts

Under Alternative 1, social impacts to livelihood, cultural values, and biological values would not change from the current condition. However, with a greater risk of wildfire and unchanged conditions for forest health under Alternative 1, the possibility of long-term effects to recreation may be greater under this alternative as a result of potential displacement during fire suppression activities or adverse effects to scenic and recreation values.

Timber Market and Forest Products

Alternative 1 would not provide new timber for harvest and therefore is not anticipated to affect the timber market relative to the current condition. However, if the incidence of wildfire increases as a result of not implementing restoration treatments, large fires could damage existing forest stocks and increase the amount of salvaged wood on the market, leading to decreases in delivered log prices.

Non-Market Values

Under Alternative 1, the impacts to ecosystem services may be more severe. For example, water quality enhancement in the long term may be minimal compared to the other alternatives. Without restoration treatments, forest health could continue to decline along with the ecosystem services it provides (such as air quality, water quality, and biodiversity). Although these services are difficult to quantify, they should be considered.

Environmental Justice

As indicated in the Affected Environment section above, minority and low-income populations exist in the analysis area. While Alternative 1 is not expected to have a disproportionately high and adverse human health or environmental effects on these communities, increased susceptibility to wildfire could result. Consequently, additional unmeasurable indirect economic effects associated with increases in wildfire related costs are possible, which could result in impacts to local communities. However, there is no reason to suspect that any impacts would disproportionately affect minority and low income populations.

Heritage

No direct or cumulative effects to heritage resources would result from Alternative 1. No treatment activities would occur, and the current biological and physical processes would be allowed to continue along their present paths with associated risks and benefits. All cultural sites and properties would not need to be protected from the risk of ground based mechanical treatment operations.

However, indirect effects include a high probability that existing fuels in and around archaeological and historic sites would continue to accumulate due to a lack of the use of the proposed unplanned ignitions and prescribed fire treatments. Ecological conditions would trend increasingly vulnerable to more frequent and intense wildfires. As a result, archaeological integrity and research potential may be lost due to post fire erosion of soils that may harbor buried archaeological deposits (Christensen et al. 1992).

Fire suppression and post fire rehabilitation actions pose high risk to cultural resource sites and values. Bulldozer impacts to archaeological sites can be the most severe (Traylor et al. 1990). In

addition, sites become more visible after wildland fire, as the added ground visibility makes sites more vulnerable to vandalism and looting.

Tribal

For all alternatives, the Tribal Relations analysis uses a qualitative approach by comparing relative effects for each alternative with a focus on the Nez Perce Tribe's values associated with their "Traditional Economy". This is an economy that is guided by tradition, beliefs and practices associated with a subsistence lifeway dependent upon fishing, hunting and gathering of treaty resources.

Values associated with the traditional, cultural and contemporary beliefs and practices surrounding land stewardship are of utmost importance to the Tribe (see Nez Perce Tribe Executive Committee (NPTEC) Scoping and DEIS Comments; Government to Government consultation; and staff to staff coordination meeting notes in the project record). The Tribal Coordination and Consultation Record can be found in Appendix G.

The Tribal Relations effects analysis considers risks to the conservation of the Nez Perce traditional economy by taking into account rights, values, beliefs, and attitudes as derived from tribal input referenced above. Not all of the values, beliefs and attitudes are addressed in this analysis. However, the information shared through comments, consultation and staff to staff coordination provides the best information available. According to Allen et al. (2009) values are "relatively general, yet enduring, conceptions of what is good or bad, right or wrong, desirable or undesirable." Beliefs are "judgments about what is true or false and may be linked to effects." Attitudes are "tendencies to react favorably or unfavorably to a situation, individual, object or concept" (LJCRP Socioeconomics Report, Loughery November, 2014).

Some tribal comments, concerns, values and beliefs required interpretation by the author in an effort to more fully describe and disclose effects to Tribal values by alternative. In all cases the author studied the tribe's public comment responses, as well as issues shared at government to government consultation, or staff to staff, coordination meetings.

Nez Perce issues to be analyzed for effects are summarized in Table 40. The Tribal Relations column includes issues oriented to traditional cultural values. The "natural resources" column summarizes issues that are tied to tribal concerns regarding management of treaty resource habitats and ecological conditions relative to wildlife, hydrology, aquatics, silviculture, road management, old growth, and botany values. Tribal issues specific to heritage or cultural resource management are addressed in the Heritage Resource section of this chapter.

Table 40. Nez Perce Concerns Considered for Analysis

TRIBAL RELATIONS	NATURAL RESOURCE
Impacts on hunting, fishing and gathering	Harm to treaty resource habitat
Need to address the true value of the landscape beyond economics	No treatments in riparian area unless demonstrate beneficial effects (see aquatics and hydrology effects sections)
Concern for water developments impacts*	Abandoned roads, run off erosion, sediment delivery, road decommissioning needed (see hydrology and soils effects sections)

TRIBAL RELATIONS	NATURAL RESOURCE
Maintain old growth legacy trees	Properly functioning watersheds (see hydrology effects sections)
Federal compliance of trust responsibilities *	Want upward trend in fish habitat, water, riparian conditions (see aquatics, hydrology, botany sections)
Resource risks of accelerated planning and restoration	Road density/road placement and relative to treaty resource values (see all effects sections)
Maintenance of administrative access and wildlife connectivity to the adjacent Precious Lands Wildlife Management Area *	Concern for ESA wildlife and native plant resource condition (see wildlife and botany effects sections)
Impacts to traditional plant resources, including the "traditional economy" of the Nez Perce Tribe (NPTEC meeting 07-08-14). See Tribal Relations Specialist Report Table 2: Traditional Plants Known to be of Interest to the Nez Perce Tribe	Impacts to fish strongholds, particularly from roads and disturbance in RHCAs (see aquatics, roads, botany effects sections)
Conservation of inventoried road less areas	Achievement of riparian management objectives (see aquatics effects section)
Likely Traditional Cultural Properties, sacred sites and traditional use areas in project area. Need traditional use studies	Adequate heritage inventory to ensure protection during project implementation (See heritage effects section)

* Issues or concerns not analyzed for effects as they may be addressed outside environment analysis through ongoing consultation, partnerships or policy direction.

No direct effects to tribal values would result from Alternative 1. However, indirect effects are summarized below.

Impacts on Hunting, Fishing and Gathering

Alternative 1 presents a high risk to the access and availability of hunting, fishing and gathering resources. There could be detrimental effects to what remains of the historically open fire dependent ecosystem needed to support healthy, and accessible, treaty resources and their habitats. Loss of fire dependent ecosystems means stands would be less resilient to disturbance, insects, and disease. Many traditional food plants that also provide browse and forage for wildlife are reliant on low intensity fire regimes for healthy reproduction (see Tribal Relations specialist's report in the project record).

Tribal input suggests that Alternative 1 may best address tribal uncertainty about scope, scale and pace of LJCRP restoration. Some tribal members may prefer to trust in "Mother Nature" (NPTEC, July 8, 2014) to do the restoration work in lieu of taking a risk on accelerated, broad scale treatments and timelines.

The True Value of the Landscape over Economics

The LJCRP purpose and need considers both natural resource values and the contribution of the LJCRP to social and economic values. In the action alternatives, timber harvest would primarily be used as a tool to treat unhealthy stands to move landscapes toward desired, resilient conditions over time, while resulting merchantable timber may be sold through timber sales. Alternative 1 would result in a lost or delayed opportunity to restore and enhance LJCRP landscape conditions.

Tribal comments state that conservation of forest landscapes should be valued over economic benefits. The Tribe's position is that past National Forest management created the current unhealthy landscape conditions through even age management practices (i.e. "clear cutting") designed to

maximize timber volume (NPTEC July 8, 2014). Therefore, for some tribal members who equate forest management with economic motivations, the effects of Alternative 1 would be preferred.

Maintain Old Growth Legacy Trees and Conserve Inventoried Roadless Areas

Old growth stands and roadless areas are valued by the Tribe for their natural, ancient settings that provide sanctuary for people and wildlife. In the short term, the effects of Alternative 1 on old growth and inventoried roadless areas (IRA), barring high intensity fires or other major disturbance, would cause little change relative to their abundance or character. However, over the long term, old growth stands would continue to be encroached upon by smaller diameter trees (particularly in dry forest) that would out-compete the big trees resulting in changed biological and structural diversity. Fuel loads would build, and create high risk of disease and stand replacement fire. Landscape conditions and settings associated with traditional uses, treaty resource habitat, and other values associated with old growth stands and IRAs would decline over the long-term.

Alternative 1 foregoes opportunities for proposed maintenance of legacy trees. Without active management, maintenance of old growth stands and conservation of IRA values may be lost to uncharacteristic disturbances.

Resource Risks of Accelerated Planning and Restoration

Conflicts exist between the risks of conventional forest management timelines verses the risks of “doing things differently” by increasing the pace and scale of treatments (i.e., acceleration restoration). Tribal members support “trying things differently as long as you don’t throw out the tried and true” management options (NPTEC July 8, 2014), but are skeptical about accelerated restoration.

Alternative 1 would not risk any unintended adverse effects of “doing things differently”, but would also not move the landscape toward shared desired conditions (i.e., a trend toward a more natural range of variation), or take advantage of the opportunity to learn the lessons of accelerated restoration. Learning through monitoring could involve the tribe in a joint effort to increase understanding of the conflicts, risks and benefits to the traditional economy conservation outlined in the action alternatives.

Impacts to traditional plant resources

In the LJCRP area, traditional plant habitats (including scab lands, savanna, meadows, riparian areas, seeps, dry and moist forests) are being encroached by particularly shade-tolerant conifers, primarily as a result of fire exclusion (refer to the Tribal Relations specialist’s report for plant species, habitat, response to soil/ground disturbance and fire response). Alternative 1 poses high risk to traditional plant species and habitats, especially those that are shade intolerant or that respond well to low intensity fire. The majority of the plants listed in Table 48 of the Tribal Relations specialist’s report need forest openings and sun to thrive. Historically the Nez Perce tribe used fire to maintain camas, “cous” and huckleberry habitats (Marshall 1999).

Continued increased canopy cover and litter accumulation would further reduce habitat suitability for many of the species listed in the Tribal Relations specialist’s report. Potential soil damage from a severe wildfire could reduce potential suitable habitat and, in the case of high intensity fire, kill plants outright.

Alternative 1 would represent a lost or delayed opportunity to benefit LJCRP traditional plants through landscape level low intensity prescribed fire treatments, thinning of meadow and riparian encroachment, natural fire use, and creation of individual clumps and openings (Franklin et al. 2013).

Traditional cultural properties, sacred sites, and other traditional use areas

Locations and specific information and concerns associated with traditional cultural properties, sacred sites and other traditional use areas would not need to be addressed at this time if there is No Action. No Action poses unknown effects to these currently unidentified resources. However, it is assumed that the values associated with these types of cultural places, such as private settings, traditional use resources, or spiritual practices, would be potentially at risk from high intensity wildfire and other unplanned disturbance. However, in the short term, these values would not be affected under Alternative 1.

Recreation

There would be no direct or indirect effects due to vegetation management under Alternative 1. Vegetation densities or characteristics would not be modified and the forest would continue to be influenced by natural processes and limited management actions, such as fire suppression. The miles of open roads would be reduced from the existing condition by about 52 miles. More area would be available for non-motorized recreation (e.g. horseback riding, hiking). Under Alternative 1, no overall change is anticipated in the number of visitors, frequency or season of use in dispersed recreation activities, developed recreation sites, trails, or permitted uses. Recreational visits within the project area would remain near the same levels as previous years and traditional use patterns and recreational opportunities would not be affected. Hunting, hiking and other dispersed recreation and permitted uses, access, and opportunities are expected to remain unchanged.

No road closures would occur under Alternative 1, other than those identified by past decisions, but not yet implemented. Alternative 1 would result in fewer recreational opportunities that are free of motor-vehicle disturbance of noise and vehicle interactions for hikers, mountain bikers, and stock users compared to Alternative 2. Vehicle access to dispersed campsites, wildlife viewing sites, and firewood opportunities would remain largely unchanged from current conditions. Alternative 1would have mixed effects on activities such as mushroom pickers, as some prefer areas without the interference of roads, while others prefer the convenience of roads nearby.

In the long term, there would be increasing risk to forested areas by insect and disease epidemics and greater fuel loads, increasing the risk of large stand replacement fires. Long-term sustainability of some of the natural resource values that drive recreation use (e.g., see scenery section, below) would continue to diminish over time.

Scenery

Alternative 1 would not address the vegetation conditions that are outside the RV. Alternative 1 would not reduce the risk of uncharacteristic wildfire, which could cause undue effects to scenery, nor would it move the landscape toward the desired scenic conditions.

Alternative 1 would have no short term effects to scenic integrity, or scenic stability. Existing scenery integrity and scenic stability would remain the same. The indirect long term effects related to the existing conditions and trends could be substantial. The overstocked stands are under greater and greater stress, which is likely to lead to insect and disease epidemics. Fuel loads within the stands increase the hazards of stand replacement fire. All of these conditions would continue to degrade scenic stability. In the event of a stand replacement fire the scenic integrity would likely be greatly reduced by uncharacteristic fire.

Alternative 1 would maintain the existing landscape character, and a range of low to very high scenic integrity. In the short term, the landscape would remain as a mosaic pattern of natural appearing to slightly altered and altered landscape character and scenic condition as it currently exists. Vegetation

would continue to grow through the pattern of natural succession with a high risk of future disturbance, primarily wildfire.

Resiliency to fire, insects, and pathogens would continue to decline. The high fuel loadings have the potential to result in a sudden change to the landscape character that could result from a wildfire that would be seen as a burned off area or the landscape would continue to be affected by diseased tree and associated tree mortality. The current insect and disease infestations would continue to affect the landscape character visually and could result in changes from healthy green canopies to patches that are predominately brown. In the case of wildfire, the landscape character could dramatically change from a forested green setting to an area dominated by the visual evidence of wildfire. Fire intensity patterns would probably range from low to high as viewed in the foreground and middleground from the travel routes, particularly in the IRAs. Wildfire visual characteristics would be dominant and evident for 5 to 10 years or more; snags would be created as a result of wildfire. The snags would be dominant for at least 5 years, and then begin to fall and create a jackstraw effect viewed along the travel corridors and would appear visually out of character for a natural appearing landscape. In general, natural forest disturbances that result in extensive areas of dead or dying trees are perceived negatively. There would be some risk to losing the highly valued larger ponderosa pine and Douglas-fir if a wildfire were to occur. A sustainable green scenic forest may not be maintained over time because of this high disturbance risk related to high fuel loadings and potential for catastrophic wildfire.

Alternative 1 would be compliant with the Visual Quality Objectives of the Forest Plan, HCNRA CMP and Joseph Creek Wild and Scenic River Management Plan.

Research Natural Areas

Under Alternative 1, the Horse Pasture Ridge and Haystack Rock areas would remain as proposed RNAs and continue to be protected from uses that would reduce suitability for RNA designation. This management direction is listed in the WWNF Forest Plan, Pages 4-84 and 4-85, and will remain in effect until there is a revised Forest Plan or there is an amendment to this portion of the Forest Plan.

Inventoried Roadless Areas

There would be no decision to implement actions within Potential Wilderness Areas, Inventoried Roadless Areas, other undeveloped lands, or Oregon Wild's "citizen's unroaded" areas under Alternative 1. These areas would continue to depart from reference conditions in forest structure, composition, density and pattern due to current fire suppression and grazing policies. Potential Wilderness Areas identified during Forest Plan revision will still meet the criteria identified in FSH 1909.12 Ch. 71 as no evidence of past harvest or roads would be created through the no action alternative.

The forested landscape in these areas would continue to support increased density of fire intolerant species that create the potential for uncharacteristic fire severity and effects. Fire hazard would continue to increase with an associated increase of more intense fire occurring at severities and a scale than what would have occurred under reference conditions. This type of fire could cause a loss of important ecosystem components (such as large trees of seral species) and loss of a natural appearing landscape with high scenic quality. Alternative 1 would increase the risk to these characteristics.

Potential Wilderness Areas

Alternative 1 would not affect any PWAs. All current opportunities for solitude would remain, all inherent characteristics of the area would be retained, and no impacts from temporary roads would occur. Indirectly, if a fire were to burn through the area, sight distance would increase and the visitor's ability to experience solitude would decrease. Other characteristics important to these areas may be adversely affected by uncharacteristic fire.

Other Undeveloped Lands

Under Alternative 1, there would be no direct effects to other undeveloped lands because no activities would occur in these areas. The affected environment would remain unchanged, except by natural processes and ongoing management activities. Biological and ecosystem functions would continue. The landscape would likely continue developing complex fuel loads. A wildfire may burn more extensively and kill more trees within upland forest stands, which would result in larger acreages of blackened landscapes compared to prescribed fires. Some forest visitors may avoid blackened landscapes until green vegetation returns after three to five years. Fire is a natural occurrence and expected disturbance process in this landscape. All polygons of other undeveloped lands would continue to not meet inventory criteria as potential wilderness areas and would continue to not be an inventoried roadless area or a designated wilderness area.

Areas Identified as Unroaded by Oregon Wild

There would be no direct or indirect effects to areas identified as unroaded by Oregon Wild because no activities would occur in these areas. The affected environment would remain unchanged, except by natural processes and ongoing management activities as described in the IRA, PWA, and other undeveloped lands portions of this FEIS.

Cumulative Effects

There would be no cumulative effects associated with Alternative 1, as there are no proposed activities.

Unavoidable Adverse Effects

There are no unavoidable adverse effects related to Alternative 1.

Alternatives 2 and 3

Effects Common to all Action Alternatives

The Physical Environment

Surface Erosion

Approximately 12.6 miles of temporary roads are proposed in Alternative 2 (Map 9). Effective ground cover is often lost during the construction and use of temporary roads, which destabilizes the surface and soil structure. In some instances, entire soil horizons may be mechanically displaced during temporary road construction. BMPs (Appendix J) are designed to minimize these effects. Approximately 20 acres of the 178,000 acre analysis area on NFS lands would be directly affected by the construction and use of temporary roads in Alternatives 2 or 3.

In the short term, road traffic would likely increase under Alternatives 2 or 3 at approximately the same intensity, due to the proposed management activities. Vehicular traffic destabilizes material in unpaved travelways, cut slopes and fill slopes. Travelways are heavily compacted, and have low rates of infiltration, which increases surface runoff. Increases in road use can increase sediment production rates by many orders of magnitude (Reid and Dunne 1984, Ramos- Scharrón 2007). The Watershed Erosion Prediction Project (WEPP) model was used to characterize the potential increase in sediment yields, as a result of increasing road traffic across the entire haul system for the LJCRP. Sediment yields due to increased traffic were static except for a moderate increase along the 4655 road in the northeast portion of the project area and along the 150 spur of the 4650 road. These roads would be prioritized for erosion mitigation measures and evaluated for road improvements prior to haul. Any increases in sediment yield would persist at higher rates over the duration of project implementation but all increases in traffic are unlikely to be uniform over space and time and would depend largely on how implementation is phased for each portion of the analysis area. Improving the structure, stability and drainage of the haul road system would mitigate most of the erosion potential.

At the landscape scale, surface erosion may increase substantially in the event of a large scale disturbance. The treatments proposed in Alternatives 2 or 3 would mitigate some of this risk by restoring stand structures and species compositions (see the Vegetation/Disturbance section of this chapter).

Wildland fire management activities may increase surface erosion by reducing effective ground cover by burning or mechanical removal during fireline construction. Additionally, at certain temperature gradients, fire-induced water repellency may develop in soils, which inhibits water infiltration and increases surface erosion (DeBano 2000). In Alternatives 2 and 3, up to 90,000 acres of planned ignitions may occur. Refer to the Vegetation /Disturbance sections for more information.

At the site scale, surface erosion may affect site potential and site productivity in areas where material is gained or lost through management activities. Additionally, changes in soil composition and structure may result in moisture content changes and subsequent drought tolerance. Organisms dependent on soil characteristics and wildlife dependent on vegetative conditions expressed by soil composition, structure and depth may also be affected by surface erosion (Grigal 2000). However, due to the limited scope of the proposed treatments and the limited extent of potential effects when managed through BMPs, it is unlikely for these potential effects to extend beyond the site scale or to persist indefinitely. In Alternatives 2 or 3, the effects of surface erosion would not compromise soil integrity within or beyond the LJCRP.

Sediment from Road Reconstruction, Road Decommissioning, and Road Maintenance

Road reconstruction and road maintenance activities have the potential to indirectly introduce fine sediment into stream channels. Road maintenance prior to log haul would help maintain the designed drainage of the road surface, which reduces the potential for larger sediment inputs to runoff that eventually enters stream courses. Alternatives 2 and 3 propose to re-open closed roads. Additionally, Alternatives 2 and 3 propose to utilize approximately 12.6 miles of temporary road. Temporary road construction would establish four intermittent stream crossings that would be designed for use during the dry season and would be decommissioned immediately following harvest activities that use the temporary road.

Maintenance of the existing system roads prior to hauling would include measures to upgrade the quality of the road bed and to improve road drainage. This includes the placement of new aggregate surfacing where necessary, blading, removing debris from landslides, brushing of encroaching

vegetation, removing berms, ditch and culvert inlet cleanout, and repairing several sections of asphalt road surface. Aggregate road surfacing greatly minimizes the amount of fine sediment from road surfaces entering streams following log haul, especially during and following rainfall events. Additionally, deep patch repairs to the roadbed are proposed along some segments of the haul route.

Road-related ground-disturbing activities are designed to minimize the risk of sediment being transported to streams from erosion or surface run-off. Road work would be restricted to the dry season. This restriction would reduce the risk of surface erosion due to ground disturbance. The 12.6 miles of temporary road construction crosses four intermittent streams.

All new temporary roads would be decommissioned and re-vegetated directly following completion of harvest operations to help reduce compaction, increase infiltration rates, minimize surface erosion, and re-establish natural drainage patterns. When appropriate, temporary roads would be constructed on existing road footprints or in areas of previous disturbance. In instances where actions would greatly increase the potential to spread invasive plants or adversely affect sensitive species, avoidance would be preferred. Additionally, temporary road placement would be avoided on unsuitable soils or in steep areas that would be more prone to surface erosion (see PDCs, Appendix J).

Road maintenance prior to log hauling also increases the risk of road related sediment entering streams near road crossing during rainfall events. This increase is associated primarily with aggregate and native surface roads although ditch cleaning associated with paved roads is a potential sediment source. Any fine sediment created by road maintenance activities would most likely be washed from the road surface in the first few precipitation events of the fall that are sufficient to cause runoff from the road surface. Although there is a possibility of increased sediment entering streams due to these activities, most road-related sediment would be trapped and stored in the ditches or on the forest floor below cross drains.

Road maintenance and road reconstruction would likely cause short-term increases in surface erosion by destabilizing compacted soil and sediment aggregates. By design, road maintenance and road reconstruction are intended to minimize road-related erosion and erosive potential throughout periods of increased road use. Improvements, such as culvert replacements, ditch cleaning, surface recontouring, roadside revegetation and reinforcing road foundations are likely to have beneficial effects by minimizing surface sediment yield, reducing the probability of road failure and improving hydrologic function. Some road decommissioning would decompact and destabilize the surface, increasing the susceptibility of surface erosion. After effective ground cover is reestablished and the site is stable it will be a lower threat for surface erosion. The time for a site to stabilize varies but can take anywhere from three months to two years. In both action alternatives, six culverts would be upgraded to withstand a 100 year peak flow event, and approximately 85 miles of road would be reconstructed or maintained to limit road-related erosion and improve hydrologic function.

Decompacting the road surface during decommissioning or obliteration activities loosens the soil, thus making it more likely to be mobilized during the first significant run-off period unless the road is on relatively flat terrain, not near streams, or sufficient ground cover (mulch, woody debris, etc.) is provided. Project design criteria, best management practices, and R6 guidelines on seeding using native seed with input from the local botanist would help prevent erosion after the first significant run-off. Best management practices, specifically “exposed soils would have required erosion control treatments completed the same year they are constructed, even if they are not completed to final acceptance specifications. If the same area requires further disturbance to complete the road construction, it would be treated for erosion control and re-vegetated as needed to insure surface soil protection (Appendix J). In addition, best management practices and project design criteria addressing noxious weeds, with review from the local invasive species manager would be followed. Since there

is culvert removal associated with some of the proposed decommissioning activities, there is the potential to deliver sediment into stream channels during project implementation. Road decommissioning near streams would have short-term, construction-related effects. These projects may cause a short-term degradation of water quality due to sediment input and turbidity. Stream bank condition and habitat substrate may also be adversely affected in the short term. This would be a short-term effect since turbid conditions would dissipate soon after the in-stream work phase was completed, generally in a few hours. However with careful project design and mitigation measures such as erosion control, these effects are expected to be of a limited extent and duration.

Project design criteria and associated BMPs for road decommissioning (Appendix J) would reduce the risk of sediment entering any stream course. The impacts to water quality caused by sedimentation due to temporary road construction, or road decommissioning, if any, would be short-term and undetectable at the watershed scale.

Sediment from Harvest Activities

Thinning, particularly within RHCAs, is a potentially ground disturbing activity that has the potential to cause a temporary reduction in water quality by allowing sediment to enter stream channels from surface erosion or run-off. Tree falling, ground-based yarding methods, and to some extent cable yarding methods disturb soils that may result in minor erosion or displacement at the site level. Ground-based harvesting equipment and cable yarding does cause some direct soil displacement which would be mitigated through PDC. Most of the soil movement/erosion resulting from timber harvesting would travel short distances before being trapped by duff, woody materials, and other obstructions. The probability of overland surface runoff on uncompacted soil surfaces is also low for the soils in the LJCRP area.

Best Management Practices (Appendix J, AqEco) would incorporate delineation of PACFISH RHCAs along all intermittent streams in old forest structures. To further reduce the risk of surface erosion entering streams as fine sediment, only low impact harvesting equipment, which have minimal ground disturbance would be allowed as described in the PDCs (Soils-2, Soils-5). Mechanical harvesting equipment would be required to operate on slash-covered paths, and travel routes would be limited to one pass over a path whenever possible. Trees would be directionally felled away from the RHCAs to minimize the disturbance to the forest floor.

Riparian Habitat Conservation Areas would not be treated in alternative 3; and only about 10 percent of RHCAs would be treated in AAlternative 2. Hence, RHCAs would generally act as an effective barrier to any sediment being transported into stream channels by surface erosion or run-off and would minimize the risk of any channel or water quality impacts. The RHCAs would likely retain any displaced and eroded soil before it is transported to the stream channel. The RHCAs would also allow soil infiltration between the unit and any water source. Surface roughness, vegetation, and duff in RHCAs would filter most sediment coming off surfaces before reaching streams. The use of skyline or helicopter yarding systems on steeper ground would reduce ground disturbance, thus lowering the probability of soil displacement within the LJCRP area. Seasonal restrictions on ground-based harvesting operations would further reduce the risk of soil disturbance and run-off. Even if some soil movement occurred, the RHCAs would act as an effective barrier. The probability that measurable amounts of fine sediment would enter any stream within the project area as a direct result of forest vegetation treatment activity is low (See WEPP analysis in the Physical Environment supporting documentation).

Yarding would be accomplished utilizing a combination of tractor, skyline, and helicopter logging systems. Project Design Criteria (Soils-8) and BMPs (AqEco) would minimize erosion by using techniques such as seasonal restrictions and RHCAs.

All ground-based tractor operations would take place on slopes averaging less than 35% (Soils-2) and should operate in accordance with the PDCs (Soils-5, Soils-8) and BMPs (AqEco). This restriction may be waived if soils are dry or frozen or if operators switch to skyline or other non-ground based systems. Whenever possible, mechanical harvesters and forwarders should work on a layer of residual slash placed in the harvester path prior to advancing the equipment. Alternatively, operating over frozen ground (four inches) and snow cover (two feet) would mitigate most soils impacts. District or Forest Soil and Water specialists would be consulted in regard to any waiver pertaining to using ground-based logging systems outside the normal operating season.

All skyline yarding would incorporate one end or full suspension, such as when yarding over a stream channel or through corridors within RHCAs.

Some soil disturbance is expected to occur along skyline corridors in these units, making soil available for movement. Erosion control work following yarding activities would reduce the amount of soil that moves off site in the event surface runoff does occur. The RHCAs would intercept most soil movement and greatly reduce the amount of sediment delivery to any stream. Implementation of these BMPs would result in an un-measureable amount of sediment being delivered to streams.

Sediment from Log Haul

Log haul traffic on aggregate surface or native surfaced roads has the potential to introduce sediment in small quantities to streams. Traffic breaks down surfacing material resulting in finer surface gradation and increased sediment transport from the road surface. Any fine sediment created by hauling traffic would more than likely be washed from the road surface in the first precipitation event that is sufficient to cause runoff from the road surface. Any input of sediment is expected to be minimal, as the roads where there is a potential for surface run-off are asphalt or durable crushed rock. Native surfaced road use would be restricted to periods when road related runoff is not present and as such, little sediment is expected to leave the road bed while haul is occurring.

During the wet season, log haul would only be permitted on asphalt and rocked roads when conditions would prevent sediment delivery to streams. In periods of high rain-fall, the Forest Service would restrict log hauling to minimize water quality impacts. Haul would be stopped if there is rutting of the road surface or a noticeable increase in the turbidity of water draining to the road ditches or at stream crossings.

Log hauling would not measurably increase the amount of fine sediment in streams. The roads along the haul routes are generally rocked or paved at stream crossings, and road ditches are vegetated. Road maintenance prior to log haul would help maintain the design drainage of the road surface, which reduces the potential for sediment to runoff into stream courses. Road maintenance and reconstruction would have a beneficial effect on slope stability and would reduce the risk of water quality and resource damage from the use of these roads. The potential for sediment input into streams along the haul routes would further be minimized by permitting haul only when conditions would prevent sediment delivery to streams. An analysis of sediment delivered from haul routes and temporary roads to stream reaches was conducted using the Watershed Erosion Prediction Project model. Modeling indicates that there is negligible difference in the sediment derived from haul between Alternatives 2 and 3. Alternatives 2 and 3 use approximately the same haul system.

Chemical Contamination

Under Alternatives 2 or 3, a dust abatement (typically magnesium chloride) spill or petroleum spill could potentially result in direct effects to aquatic resources and the beneficial uses of water. Dust abatement would be applied to aggregate haul roads as needed, up to 260 miles total over the lifetime of the project. The risk of water contamination due to the application of dust abatement is minimized under Alternatives 2 or 3 by several mitigation measures that would be required under the timber sale contract. Dust abatement with chemical compounds under Alternatives 2 and 3 include maintaining an average 100 foot no-application buffer at perennial stream crossings. Moreover, the application of dust abatement materials would normally occur only once per year in a window of time when no rain is forecast for at least three days. The buffering of applications away from perennial stream crossings has been found to effectively mitigate pollution of adjacent waters (USDA Forest Service 1999). The rate of application of dust abatement compounds in the planning area would be “typical” and therefore is not expected to contribute to adverse riparian or aquatic effects.

Magnesium chloride is typically used on a limited basis and at low application rates, as compared to study areas where the most noticeable effects have been seen. Based on the literature review and typical application rates for dust abatement purposes that would be used in the LJCRP planning area, effects from these compounds to plants and animals in the riparian and aquatic environments would be negligible under Alternatives 2 or 3.

Timber sale purchasers would be required to have spill prevention and recovery equipment on site, they would be required to develop spill prevention plans if substantial amounts of fuel or other pollutants are stored in sale areas, and traffic control measures would be required in the timber sale contract. All of these requirements associated with Alternatives 2 and 3, detailed in Chapter 2, function to diminish the chances that potential direct effects to aquatic resources and the beneficial uses of water from project-related pollutants would actually occur. Thus, risk of chemical contamination is considered to be low for both Alternatives 2 and 3.

None of the alternatives are expected to appreciably affect water quality over the long-term (decades, or longer), and none are expected to contribute to chemical contamination or have a measurable effect on the nutrient regime unless an accidental spill were to occur. The chances of such a spill are offset as much as possible by a series of BMPs required for the actions in the alternatives.

Any impacts to water quality associated with contamination of water would be short-term and likely localized. As such, the broad-scale goals of the Clean Water Act as implemented through the Lower Grande Ronde TMDL (2010) and WWNF Forest Plan as amended by PACFISH would not be compromised.

Alternatives 2 or 3 would present more risk of indirect effects to downstream beneficial uses than Alternative 1 because of the amount of potentially polluting products transported to the project area. Alternatives 2 and 3 present similar risks of an accidental spill contaminating off-site or downstream waters and the beneficial uses of those waters. The likelihood of an accidental spill is believed to be low under Alternatives 2 or 3; therefore no mitigation measures would be applied to the transport of potential pollutants outside the timber sale areas.

Mass Wasting

Mass wasting is a natural geomorphic process that supplies sediment and debris to streams for the structure and complexity needed for quality aquatic habitat. Human activity can intensify mass wasting to an extent that degrades habitat by destabilizing slopes through vegetation removal, water diversions and road construction.

A review of historic landslide data from the Oregon Department of Geology and Mining Industries (2014) does not indicate occurrences of recent shallow landslides within the LJCRP analysis area. The floods during the winter of the 1996-1997 generated minor debris flows and incised many of the upland channels in the project area. The magnitude and distribution of the effects associated with the floods of 1996-1997 are characteristic of 50 – 100 year water event (Sondenaa and Kozusko 2003, US Geological Survey 2014). For all sediment modeling, 30 and 50 year weather data composites were used from the Wallowa weather station to statistically capture the 1996-1997 flood events. A Generic Erosion Potential model (Burnett 2007) was used across the landscape, which approximates mass wasting potential based on slope and slope convergence. Other site specific variables, such as soils (U.S. Department of Agriculture 2014), vegetative cover, climate and underlying geology were evaluated in the field and from the best available data. Based on this analysis, activities proposed in the action alternatives are unlikely to increase the timing, frequency or intensity of mass wasting events. Most risk is mitigated through the implementation of RHCAs, equipment restrictions on steep or unstable ground and the lack of new permanent features, such as roads, to intercept surface water. In both Alternatives 2 and 3, there are 110 acres of ground based timber harvest proposed in areas of lower relative stability or approximately 1.5 percent of areas proposed for ground based harvest and 12.6 miles of temporary roads.

Project design features, such as RHCAs, equipment restrictions on steep or unstable areas and the restoration of temporary roads and existing legacy roads greatly reduces the risk of a mass wasting event being triggered under Alternatives 2 or 3. At the landscape scale, surface erosion may increase substantially in the event of a large scale disturbance. The treatments proposed in Alternatives 2 and 3 would mitigate some of this risk by restoring stand structures and species compositions (see Vegetation/Disturbance sections of this chapter).

Soil Productivity

Detrimental Soil Conditions (DSC) directly impact soil productivity by displacement, compaction, loss of organic matter, rutting, erosion and loss of porosity. Land management activities, such as road construction and heavy equipment operation, have the greatest potential to create detrimental soil conditions. In Alternatives 2 or 3 there would be some effect to DSCs. As described in PDC Soils-7 and Soils-8 there are existing DSCs from past activities. Each of these activities has an expected impact to the DSC (Bennett 1982, Archuleta 1997, Siskiyou National Forest 1997, Archuleta 1999, Reeves et al. 2011), which can influence soil productivity.

While Reeves et al. (2011) offers a comprehensive list of expected detrimental effects, it appears these estimates may underestimate effects if certain conditions are present or absent. The following were used in DSC calculations to provide more locally adapted values: ground based 10 percent (Archuleta 1997, 1999), skyline 5 percent, helicopter 1 percent (Siskiyou National Forest 1997), prescribed burning 1 percent (Bennett 1982). Land managers can reasonably predict that helicopter and skyline harvest activities would not degrade soil conditions below acceptable tolerances (Reeves et al. 2011). Therefore, temporary roads and ground based harvest activities would be the primary focus and measure of DSCs. DSC surveys were conducted in a manner consistent with regional and local standards (PDC, Soils-7; Physical Environment Supporting Documentation).

Extensive soil degradation across a landscape may affect long-term productivity of growing sites, limiting the potential to express vegetation as it would under unimpeded growing conditions (Grigal 2000). Limiting site potential may compromise the potential of achieving a vegetative structural and species composition consistent with the RV, which, in turn, can affect wildlife species, natural resource economics and resilience to disturbances. However, the scope and extent of the actions

proposed under Alternatives 2 and 3 in the LJCRP, with or without remediation, are unlikely to have measurable effects on productivity beyond the site scale.

Mining

The direct effect to mining prospectors or future mining operators is a possibility in that the selection of these alternatives could modify motorized access that was previously available for the purpose of mining or prospecting.

If, as a result of implementing these alternatives, roads that are not designated as available for motor vehicle travel because they would be removed or would be physically closed with barriers, berms, or gates would limit access without additional coordination with the District Ranger and additional administrative oversight.

Generally, all alternatives (including Alternative 1) have the potential to increase the social and economic impacts to mining operators. In all alternatives, the potential for previous physical closure decisions to be implemented could continue to occur into the foreseeable future. It is expected that without a regular rotation of vegetation projects, it is highly likely that many would begin to re-vegetate within a 10 year period and would be grown closed within a 15 year period, decreasing motor vehicle access. It is unknown how much of an issue this would become; however, it is recognized as a potential effect of designated motor vehicle routes.

As roads are physically closed or decommissioned over time by previous site specific project decisions, or as they grow closed due to lack of maintenance, the cost to mining operations would increase as the burden to open and maintain access roads for mining shifts from the government to the operator. The operator would have to assume all cost associated with maintenance, operation, and reclamation of the road.

Socially, the need for regulatory oversight may increase under all action alternatives as roads are closed and decommissioned. Economically, the cost associated with maintaining roads to a standard that reduces impacts to adjacent national forest resources would be the responsibility of the operator. Due to the current absent demand for mineral resources within the analysis area, the anticipated cumulative effect to mining is minimal.

Water Quality and Temperature

The LJCRP is in compliance with the Clean Water Act of 1972 and the Lower Grande Ronde TMDL (2010). By implementing and monitoring water quality related Best Management Practices (see Appendix J), Alternatives 2 and 3 would minimize the probability of degrading waters within the LJCRP area or downstream. Any effects would by short lived and only detectable at the site scale.

Under Alternatives 2 and 3, the proposed activities may indirectly benefit water quality by potentially reducing the severity of wildfires. High intensity wildfires and fire suppression management have the potential to degrade water quality through increased runoff and erosion, accelerated nutrient inputs and through chemical spill or misapplications of fire retardant.

Water Quantity – Stream Flows

Alternatives 2 and 3 would have no direct, measureable effect on the hydrographs for waterways within the LJCRP area. A consistent record of streamflow data within the LJCRP area is lacking; however, other waterways adjacent to the planning area do not indicate a strong peak flow response to management actions (US Geological Survey 2014). No new permanent roads are proposed in any alternative that could further modify the drainage network. The proposed road closures and

decommissioning in alternatives 2 and 3 are unlikely to produce a measurable response in stream flows. Moreover, the proposed forest treatments would not alter stand densities in excess of the range of variation (See Vegetation/Disturbance sections). However, if the proposed treatments are successful in the mitigating the risk of a high intensity wildfire, there may be an indirect benefit of reducing the probability of adverse wildfire effects (widespread loss of canopy cover and ground cover, soil hydrophobicity) that have the potential to modify the timing and intensity of stream flows.

Water Quantity - Groundwater

Alternatives 2 and 3 would have no direct, measurable effect on groundwater resources. Source water protection would be satisfied through the implementation of BMPs (Appendix J) and the delineation of RHCAs. Equipment supporting the proposed restoration activities has the potential to locally and temporarily impact groundwater resources in the event of a chemical spill (See discussion on chemical contamination and stream flows).

Wetlands and Floodplains

Alternatives 2 and 3 would have no adverse impact on floodplains or wetlands and is therefore consistent with Executive Orders 11988 and 11990. Floodplains and wetlands would be protected by delineation of RHCA buffers in Alternative 3. In Alternative 2, conifers encroaching approximately three miles of Swamp Creek (within the floodplain) may be thinned to meet RMOs by taking steps to restore structure, pattern and species composition of overstory vegetation (Appendix J). All other floodplains and wetlands would be protected by applicable RHCA buffers in Alternative 2. Wetlands were initially identified through a review of the National Wetlands Inventory data that were derived from selectively field validated remotely sensed data. Floodplains were modeled using digital elevation models and calculating the area inundated during a 100-year flood (See Physical Environment Report).

Air Quality

Prescribed burning of forest fuels (logging slash or natural fuel treatment) would comply with Oregon Administrative Rules (OAR) 629-048-0001 to 629-048-0500 (Smoke Management Rules) within any forest protection district as described in OAR 629-048-0500 to 0575. These rules establish emission limits for the size of particulate matter (PM10/PM2.5) that may be released during these activities.

Huff (1995) found PM 10 smoke production was twice as high for wildfires as for prescribed fire because wildfires generally occur during drought periods in which there are low fuel moistures and more fuel available for consumption. Their research in the Grande Ronde Basin found the following levels of PM10 emissions (Table 41). This study did not look at PM 2.5 as a subset of PM 10 but smoke production models used to submit burn plans to the State of Oregon at the time of implementation would show the respective levels. Past experience with this modeling has shown a similar trend in the level of PM 2.5.

Table 41. PM10 emissions in the Grande Ronde Basin for prescribed fire and wildfire

Fire Type	PM 10 (tons/acre)
Wildfire	0.318
Prescribed Fire	0.167

Under Alternatives 2 and 3, up to 90,000 acres are available to manage with fire. Air quality and smoke emissions would be similar under both alternatives and would follow the established rules to

comply with the Clean Air Act prior to implementing planned ignition or using unplanned ignitions to meet the purpose and need of the LJCRP. The number of acres accomplished per year would be determined by established emission limits negotiated with the State of Oregon, funding, appropriate burn conditions, and personnel availability. Over the past decade the Wallowa Mountains Office of the WWNF has accomplished approximately 3,500 acres of prescribed fire annually with existing personnel during appropriate burn windows to meet prescription parameters. It is reasonable to expect a similar level of annual accomplishment.

The Biological Environment

Disturbance and Fire Regimes

Harvest, Stand Improvement, and Prescribed Fire

Treatments under Alternatives 2 and 3 are designed to use evidence based ecologically informed principles to restore function and processes and appropriate disturbance regimes in a landscape created by disturbance. Guidelines found in Franklin et al. (2013) and local range of variability estimates inform how disturbance regimes regulated forest structure and composition and contributed to landscape resilience. Alternatives 2 and 3 manipulate forest structure, density, and composition as well as landscape pattern in a way to reduce uncharacteristic disturbance due to density dependent mortality (insects) and compositional influenced mortality (disease and fire). These treatments also lead to a reduction in uncharacteristic moderate and replacement severity fire as a result of an increase in fire-intolerant species, decreased abundance of fire-tolerant species, multi-storied stands that increase ability of fire to influence canopy fuels, and densification of forest stands across the landscape that increase the continuity and amount of fuel across the LJCRP area.

Prescribed fire as a silvicultural tool is critical to restoring health, resiliency, adaptability and process to the forested landscape within LJCRP. Franklin et al. (2013) indicate that fire will be a constant in the dry forests of eastern Oregon and Washington and will neither be eliminated nor would it be desirable to do so. Alternatives 2 and 3 recognize the ecological need to manage fire (planned and unplanned) to meet the purpose and need of this project and to move the landscape toward more resilient conditions, while mitigating undesirable effects of higher proportions of unnaturally high severity fire. There would be areas of mixed severity from planned and unplanned fire that provide opportunities to regenerate early seral species at the stand and landscape scale. These opportunities may vary in size from < 1 acre to 10’s of acres. These conditions would affect the LJCRP at an ecologically important scale for the types of forested systems found in the project area.

Under alternatives 2 and 3, up to 90,000 acres would be available for implementation of planned and unplanned ignitions. It is anticipated that some of this would be done using planned ignitions but realizing the limitation of burn windows, cost, and personnel this project encourages the use of unplanned ignitions so long as it is exhibiting fire behavior conducive to meeting the restoration objectives described in Chapters 1 and 2.

Planned ignition priority areas are identified for alternatives 2 and 3 (Table 9; Maps 20, 21) and described in the project design features for this document. High priority areas represent the acres that are treated with either harvest or SI, or are in the dry upland forest potential vegetation group. Prescribed fire following harvest or SI serves to “complete” the first restoration step by mechanically moving forest structure, density, or composition toward the reference conditions as well as returning fire as a natural disturbance process to create natural patterns of heterogeneity. On acres treated with a combination of cutting and fire the departure from the natural fire regime would be moved toward desired conditions and a more natural disturbance regime.

On high priority areas outside harvest and stand improvement (SI) areas, planned and unplanned fire would be used to alter forest density, structure, composition, and pattern. In general, density would be reduced due to small diameter tree mortality from canopy consumption or cambium scorch, and this would move the landscape closer to RV and begin to restore natural disturbance regimes. Improving large and old forest structure would occur by fire supporting restoration of old or early seral trees species of large size and reducing the number of smaller diameter young trees within the stand. Early seral tree species would be favored (not killed) by fire due to their inherent adaptive strategies to survive fire (thick bark, self-thinning crown, etc.). Returning fire to the system is a direct way to influence the restoration toward reference conditions, disturbance regimes, and reference patterns on the landscape. There would be areas of mixed severity fire (similar to a group selection harvest) that would provide the necessary environment to successfully regenerate early seral species across the landscape, a characteristic that is currently underrepresented. The moderate priority areas are located in the moist upland forest potential vegetation group, which have a higher relative probability of moderate/replacement severity fire. Low priority areas are dominated by non-forest vegetation and are not critical to meeting the forested vegetation portion of the restoration objectives.

Activity Fuels

Activity fuels, slash and brush derived from harvest in the forest treatements and SI treatments, would create a short term increase in fuel accumulation and potentially increase the severity of wildfire should it occur prior to fuel treatment. Activity fuels would be treated in a variety of ways including, but not limited to, mastication, removal, pile (grapple or hand) and burn, cutting and scattering limbs, or prescribed fire.

Fire Management Decision Space

Alternatives 2 and 3 provide options for fire management to utilize planned and unplanned ignitions to influence the resilience and restoration of the LJCRP by reducing the amount of uncharacteristic severe wildfire. Alternatives 2 and 3 reduce the risk of large, severe wildfires, which leave more decision space than alternative 1 to allow unplanned fires to do the work of restoration, albeit to differing degrees. Alternative 2 prepares more acres for the re-introduction of fire, and reduces the risk of large, contiguous, severe wildfire, and therefore gives more options for using fire to protect important resource values such as old trees, late and old structure forests, riparian habitat conservation areas, wildlife habitat, IRA characteristics, PWA characteristics, or designated old growth. Alternative 3 treats less acres overall and in particular, subjects areas of high social value, such as RHCAs, IRAs, MA15, and PWAs to continued densification of fuel loads, and reduced resilience. Potential fire behavior would continue to be uncharacteristically severe, limiting the ability to manage planned or unplanned fire as a restorative process within and adjacent to these management allocations.

Forest Vegetation

Features specific to desired condition objectives have been designed into alternatives 2 and 3 to prevent adverse impacts and meet the standards and guidelines in the WWNF Forest Plan, as amended, under this EIS, and meet the LJCRP purpose and need. The comprehensive silviculture design is documented in Appendix J - Project Design Features, Mitigation Measures and Best Management Practices.

See the project record for the decision matrix used to determine treatment type and intensity to move project area toward RV.

The single tree selection (STS), group selection (GS) and intermediate treatments (IT) treatment types have a treatment intensity associated with them (high, moderate, low) indicating a post treatment desired density class. Table 42 illustrates the change from existing density class to post treatment density class based on treatment intensity.

Table 42. Relationship of treatment intensity to the desired post treatment density class

Post Treatment Density Class ↘		Treatment Intensity:		
		High	**Moderate**	**Low**
Existing Density:	**High**	*Low*	*Moderate*	*High*
	Moderate		*Low*	*Moderate*
	Low			*Low*

Understory and Rangeland Vegetation

Rangelands

Direct effects to rangeland resources and understory vegetation from activities proposed in Alternatives 2 and 3 would include temporary loss of understory vegetation. This includes forage plants, through ground disturbance from logging activities, crushing and piling related to logging activities and prescribed fire. Loss of forage and understory canopy cover through logging and burning activities may require a period of rest prior to grazing, depending on the time of year treatments occur, how much bare soil is exposed, and the condition of understory plants after treatments. This would have to be determined by the range manager and botanist after treatments have been implemented (Project Design Criteria, Range-1).

Indirect effects could include further degradation through spread of noxious weeds in pastures identified at risk by Wallowa County (2014). Indicators of Rangeland Health assessments showed most pastures were in fair to good condition, but a few had more bare soil than expected, as determined by factors such as soil type, topography, and plant association. Pastures with more bare soil than expected could be at greater risk of having noxious weeds and invasive annual grasses introduced or increased through ground disturbance related to restoration activities. North Wildhorse pasture in the Cold Springs allotment is of particular concern, since it is in HCNRA as well as the Wildhorse IRA. Project design criteria (see Invasive Plant sections and Appendix J) would reduce risk of spreading invasive non-native plants. For most of the pastures in LJCRP, low to moderate intensity fire may increase fire resilient grass species such as pinegrass (USDA Forest Service 2014a) and silvicultural treatments as well as prescribed burning may increase forage and browse cover (Young 1965, Kolb 1999, Long et al. 2008a).

Wallowa-Whitman Forest Plan standards and guides give direction to allocate forage resources on an allotment and/or management area to meet the basic plant and soils needs as the first priority. The HCNRA CMP gives similar guidance: For-O2: Manage livestock grazing within forested stands to ensure ecological function and sustainability of understory vegetation consistent with management of overstory vegetation objectives. Use grazing-related standards and guidelines to manage grazed forested understory vegetation; Gra-O1: Manage grassland vegetation to ensure continued ecological function and sustainability of native ecosystems. Maintain and/or restore the ecological status of grassland communities to their potential natural community (PNC), recognizing their HRV; and Gra-G1: Emphasize enhancement and/or restoration of potential native vegetation. Project Design Criteria

would guide forage use: Range–1 The range manager would work with the timber sale officer with respect to the timing and location of logging operations; Range–5 The botanist, invasive species specialist and range manager would work together to determine whether prescribed fire or other vegetation restoration activities would require resting portions of the pasture treated; and Range–7 the range manager would work with fire management to determine timing and location of prescribed fire. Range-2, 3 and 4 would help protect fences and keep livestock in planned locations.

Map 19 shows Alternative 2 treatments relative to grazing allotments in the LJCRP area. See the range specialist report for acres by pasture.

Noxious Weeds and other Non-native Invasive Plants

The risk of spreading noxious weeds is associated with ground disturbing activities that create bare soil openings in native vegetation; hot burns that kill native vegetation and sterilize the soil; and activities that have the potential to transport noxious weeds and invasive non-native plants to currently uninfested areas. Shade under forest canopies substantially limits weed growth. Invasive plant density drops in shaded environments (Hansen and Clevenger 2005, Pauchard and Alaback 2006, Buonopane et al. 2013). Buonopane et al. (2013) found high rates of noxious weed seeds in the topsoil and litter layer well within the forest adjacent to infested roadsides. This indicates that invasives would be readily introduced to nearby disturbed areas even if no invasive plants are visible under the existing forest canopy (USDA Forest Service 2015b). Areas infested with invasive non-native annual grasses also burn hot, especially where cheatgrass has established. Road improvements such as grading, rocking and clearing ditches are ground disturbing and have a high potential risk for spreading existing noxious weed populations. It is relatively easy to observe that weeds tend to concentrate along roads, where there is frequently disturbed soil, and nutrient rich run-off that concentrates in roadside ditches. Guidance for controlling noxious weeds can be found in both the WWNF LRMP: Standards 1 and 2; control noxious weeds using integrated pest management, and HCNRA CMP: NOX-01, manage noxious weeds to reduce adverse effects to native ecosystems. Region 6 NFM Invasive Species Program Management Direction outlines methods to prevent the introduction and spread of invasive species (Prevention Standards 1-8). Planned temporary roads are common to both alternatives, while mileage appears to be low, some temporary roads would be constructed through weed populations and the risk of spread is high.

Particularly relevant prevention standards mitigating road grading and construction in LJCRP are R6 Standard 7: Inspect active gravel, fill, sand stockpiles, quarry sites, and borrow material for invasive plants before use and transport; and 8: Conduct road blading, brushing and ditch cleaning in areas with high concentrations of invasive plants in consultation with District or Forest-level invasive plant specialists, incorporate invasive plant prevention practices as appropriate. Project design criteria to help prevent the spread of noxious weeds as a result of road grading and improvement are: INVP–1 Treat noxious weeds with approved methods as found, prior to ground disturbing activities; and INVP–3 Avoid prescribed fire and ground disturbance from activities such as logging operations and road grading where invasive plant populations, including non-native invasive grasses, are found.

Risks from prescribed fire are related to burning activity fuels. Piles that are too large can have prolonged duration and greater intensity, increasing the risk of sterilizing the soil. Bare open areas are ideal for noxious weed establishment. Prescribed fire and burning activity fuels has the potential to spread noxious weeds. R6 Standard 13: Native plant materials are the first choice in revegetation for restoration and rehabilitation where timely natural regeneration of the native plant community is not likely to occur. Project Design Criteria INVP–3: Avoid prescribed fire and ground disturbance from activities such as logging operations and road grading where invasive plant populations, including

non-native invasive grasses, are found; and INVP–5: All landings, burn piles, skid trails and other disturbed areas created as part of a this vegetation restoration project, would be rehabilitated and seeded as per Pacific Northwest Region, Invasive Plant Program Preventing and Managing Invasive Plants Prevention Standard 2 (October 2005), and FSM 2070.3, with the input and approval of the District Botanist, would help reduce risk of noxious weed spread related to prescribed burning.

Threatened, Endangered and USFS Region 6 Sensitive Plants

Direct and Indirect Effects to Federally Listed, Proposed and Candidate Plants

Currently there are no known Spalding's catchfly populations within the project area. Direct effects of fire and commercial thinning as well as indirect effects from invasive non-native plants and grazing were considered because they have the potential to degrade or reduce potential habitat for Spalding's catchfly. However, design criteria incorporated into the project proposal would preclude direct and indirect effects to Spalding's catchfly habitat from project activities. Connected actions including road maintenance, hazard tree removal, and various forms of hazard fuels treatments were considered and project design criteria would preclude effects from connected actions. Project design criteria include the Wallowa-Whitman National Forest Land Resource Management Plan and HCNRA CMP standards and guides for TES plants; specifically to maintain all native communities and ensure that no natural species shall be eliminated during vegetation management. Specific project design criteria are: No road construction activities, or staging areas (such as landings, parking, piling) on non-forested habitats such as lithosols, grasslands, or meadows; and clearance for TES plant populations would be done prior to project activities. Known TES plant populations would be flagged prior to road grading and other road improvements, designation of parking areas and landings, and logging, with work overseen by a journey level botanist. Detailed analysis for Spalding's catchfly can be found in the biological assessment.. Alternatives 2 and 3 may affect but are not likely to adversely affect (NLAA) Spalding's catchfly.

Direct and Indirect Effects to R6 Sensitive Plants

A detailed analysis of suspected and known TES plant species by habitat was done for LJCRP. Habitats considered were coniferous forest, grasslands, lithosols/shallow soils, rock outcrops/talus/scree, moist meadows/wet meadows/riparian/springs and seeps. The TES plant species rough rabbitweed (*Pyrrocoma scaberula*) and green-band mariposa lily (*Calochortus macrocarpus var. maculosus*) are documented from grasslands. White erigerons (*Erigeron disparipilus and E. davisii*) and Wallowa needlegrass (*Achnatherum wallowaense*) are documented from lithosols/shallow soils. The other habitats have suspected but no documented TES plant occurrences.

Coniferous Forest

For both Alternatives 2 and 3, coniferous forest habitat would be directly affected through ground disturbing activities associated with vegetation management, including commercial and non-commercial thinning, biomass removal, and activities associated with vegetation management such as yarding, slash piling, grinding, or scattering. Direct effects include crushing, uprooting, burial and other damage related to soil disturbance. Indirect effects to forested areas resulting from logging and thinning would be loss of canopy closure and resulting changes in microclimate, altering the hydrologic regime and changing light intensity. Forest standards and guides for diversity such as providing an ecologically sound distribution and abundance of plant and animal communities at stand, basin and forest levels, as well as allowing for all natural species to function following vegetation treatments would be followed. Project design criteria TES-1, clearance surveys for TES and invasive plant populations; BIOD-2 leaving tree islands; and BIOD-3, maintain coarse woody

debris; would prevent the loss of any currently undetected TES plant populations, including fungi and bryophytes.

Many of the areas proposed for vegetation treatment activities were not specifically surveyed for this project. Following forest standards and guides for TES plants and maintaining biodiversity, and using project design criteria would greatly reduce the risk of losing populations of sensitive plants in forest habitats; however, there is the chance that undiscovered populations of sensitive plant species may be impacted. Project activities may impact individual plants or habitat, but implementation of the action alternatives should not increase the need for Federal listing of any sensitive species. In general, the suspected sensitive plant species in the LJCRP area are found in moist upland forest rather than in dry upland forest. Direct and indirect effects may impact individuals or habitat, but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species (MIIH). See appendix F and specialist's report for species suspected in coniferous forest habitat.

Within the coniferous forest habitat type, the HCNRA "Biologically Unique Plant Communities" ponderosa pine/Idaho fescue and Ponderosa Pine/Bluebunch Wheatgrass plant associations are included because there are documented sites within LJCRP. Ponderosa pine totally dominates as the only tree species able to persist in the PIPO/FEID type. Both of these plant associations are uncommon in the HCNRA. Most of the ponderosa pine-dominated communities are successional to Douglas-fir. Although ponderosa pine/bunchgrass communities with Idaho fescue and bluebunch wheatgrass potentials are found throughout the inland Pacific Northwest, sites that are too warm and too dry for Douglas-fir establishment are limited in the HCNRA.

Grand fir/Pacific yew/queencup beadlily is not identified in the HCNRA CMP as a biologically unique plant community. This habitat should be conserved due to its contribution to biodiversity in the LJCRP area and its rarity within the Blue Mountain ecoregion. Johnson and Simon (1987) identified this plant association as being important to macrofauna such as deer and elk, as well as many species of birds. This plant association is at risk under both alternatives from both silvicultural treatments and prescribed fire. Pacific yew (*Taxus brevifolia*), is extremely sensitive to changes in microclimate and requires canopy closure to thrive, as well as long periods without disturbance (Busing et al. 1995). Yew is found in the LJCRP in closed canopy mixed conifer stands in moist sites, and Johnson (1998) describes yew as an indicator of a high water table. Pacific yew is fire intolerant and slow to recover after wildfire (Busing et al. 1995).Yew with a basal diameter (diameter at 6" above ground surface) of 9 inches and greater should be considered old trees (Crawford 1983). The suggested mitigation is no treatments within yew stands, and BIOD–2 leave tree islands in coniferous forest for conservation of native mycorrhizal fungi, yew, wet areas when these features are found or suspected in units.

Grasslands

There are two grassland species documented in the LJCRP, green-band mariposa lily and rough rabbitweed. Both are regional endemics, meaning they are only found in our part of the world. There are thirteen records (ORBIC 2013) of rough rabbitweed in the Joseph Canyon area; only one population is in the project area, the other twelve are adjacent, with eleven on the adjacent Nez Perce Tribe Precious Lands area, and one on BLM land. The known site of rough rabbitweed is just below (north of) the Allen Springs exclosure, which is not near any proposed thinning units, high priority prescribed burning areas, or any other activities associated with the LJCRP. The populations of green-band mariposa lily are slightly more plentiful with ten populations within the LJCRP area, and another six populations on other land ownerships. Both green-band mariposa lily and rough rabbitweed are concentrated at the very north end of the LJCRP area, extending north into other land ownerships. Green-band mariposa and rough rabbitweed tend to grow in grassland between stringers

of forest. See separate analyses for Alternatives 2 and 3 for effects determinations for grassland TES plants.

The HCNRA Biologically Unique Plant Community Mountain Big Sagebrush/Idaho Fescue plant association is considered with grassland habitats. This plant community is found on the extreme eastern edge of the LJCRP area. It is not documented within any treatment units, but it is close to the 4680 (Cold Springs) road system. Managing mountain big sagebrush with prescribed fire can have mixed results. This plant community is readily killed by fire and requires at least 15 years to recover after fire. Frequent fire suppresses mountain big sagebrush establishment, while long fire return intervals promote tree invasion into mountain big sagebrush communities. Fire return intervals of about 20 years can be beneficial to mountain big sagebrush (Johnson 2000). However, fire does not result in substantial increases of herbaceous perennials on sites dominated by exotic annuals. Suggested mitigation is to avoid activities associated with mechanical treatments in this community. Prescribed fire would benefit this community, although grasslands are low priority for prescribed fire in both alternatives.

Lithosols/ Shallow Soils

There are three sensitive plants documented from lithosol habitats: Wallowa needlegrass, Snake River daisy, and Davis fleabane. Snake River daisy and Davis fleabane occupy the same type of habitat and are virtually indistinguishable in the field, thus for this analysis would be considered together as the white fleabanes. During the course of the 2014 TES plant surveys, new populations of Wallowa needlegrass and white fleabanes were discovered, as well as extensions of previously documented populations. The white fleabanes found in 2014 have not yet been identified to species and were all tentatively lumped into Davis fleabane. Most of the new Wallowa needlegrass sites are extensions of existing sites. Wallowa needlegrass is found south of Red Hill. The white fleabanes are found north of Red Hill, with the largest concentrations in the Cold Spring Ridge vicinity and Wildhorse Ridge, both of which are in HCNRA. White fleabane populations are found in both the Wallowa District and HCNRA. Wallowa needlegrass is found only on the Wallowa District. See separate analyses for Alternatives 2 and 3 for effects determinations for lithosol/shallow soils TES plants.

The Biologically Unique Plant Community Douglas' buckwheat-Sandberg's bluegrass plant community type is found in shallow soils. Recommended mitigations are the same as for TES plants in lithosols/shallow soils.

Rock Outcrops, Talus, Scree

There are no documented species from rock outcrops, talus, and scree. Habitat could be degraded through thinning activities such as felling or yarding near forested rock outcrops, which could kill plants living there. Prescribed fire generally does not burn in this habitat type, due to the low fuel levels. The main activity that may impact this habitat type is rock quarrying, or road construction. The removal of rocks through quarrying or road construction could directly kill plants by excavating them. Quarrying may potentially indirectly impact this habitat by exposing roots of plants that are not directly removed.

Project design criteria that protect rock outcrop habitat would provide a high level of protection to these habitats. BIOD–4, avoid yarding over rock outcrops and talus slopes. Leave trees and shrubs adjacent to rock outcrops, talus as a microclimate buffer. Because the project design criteria would protect cliffs, rock outcrops, and talus in the project planning area, the implementation of Alternative 2 or Alternative 3 should have no impact (NI) to cliffs, rock outcrops, and talus habitats, or to any sensitive species that may occur there.

Moist Meadows, Wet Meadows, Riparian, Springs and Seeps

Effects to TES Plants found in this habitat are discussed in detail under Alternative 2.

The quaking aspen plant community types are included as one of the HCNRA CMP Biologically Unique Plant Communities. Although quaking aspen (*Populus tremuloides*) are not documented from the HCNRA portion of LJCRP, they are found within the project area and are considered important for conservation within the Blue Mountain ecoregion. Aspen can occur in meadows and meadow margins as well as in mixed conifer forest associated with shallow water tables. Aspen can benefit greatly from prescribed fire, if they are protected from ungulate use in seedling and sapling stages of growth. If aspen are found in meadow or forest habitats, suggested mitigations are to treat areas by thinning conifers, or removing conifer encroachment from meadows and using prescribed fire. In addition, fencing may be required until aspen regeneration has developed enough to withstand ungulate use. Project design criteria TESP-3: No road construction activities, or staging areas (such as landings, parking, piling) on non-forested habitats such as lithosols, grasslands, or meadows; and BIO –1: Avoid disturbing natural seeps and springs, wet meadows, moist meadows would conserve this community type.

Effects Common to all Habitats

The effects of road maintenance, decommissioning, and new construction are common to all TES habitats, except rock outcrops, and can directly kill or dislodge sensitive plants. Road work and new roads may also indirectly lead to an increase in grazing activity due to the increased ease of travel for animals on the roads. New temporary roads and improved roads may also lead to increases in the amount of off-road driving to collect firewood, camp, and retrieve game. Road maintenance activities contribute to the movement of invasive species along road shoulders and ditches, and to and from quarry and waste disposal areas. Invasive species may potentially outcompete or prevent the recruitment of new sensitive plant populations. Project design criteria are included that should help to reduce the chance of increasing invasive plant abundance in the project planning area. Closure of temporary roads and currently closed roads that would be reopened should help to reduce these impacts in the long term. The risk would only occur during the time that the sale is active until the roads are reclosed, and or, decommissioned.

Potential indirect effects of temporary road construction include vehicle use on the new road and adjacent areas, increases in invasive plants, and changes in water movement across the landscape. Road decommissioning and temporary road building is planned across limited areas in these habitat types. Project design criteria require areas with high potential habitat for sensitive plants to be surveyed for rare plants before project implementation.

Prescribed fire or slash pile burning could scorch sensitive plant individuals within the fire area, and also may kill plants under and directly adjacent to slash piles. Fire line construction has the potential to directly kill or dislodge sensitive plants in the area that is denuded. Natural fire generally occurs in mid to late summer. Prescribed fire is typically done when fuel moisture is conducive to achieving desired fire effects. Early spring or late summer/fall are typical times of year where burn parameters (relative humidity, fuel moisture, temperature) are conducive to successfully implementing prescribed burns that are easy to manage and create the desired fire effects (predominantly low-mixed severity). It is unknown if burning sensitive plants when they are actively growing would cause more mortality than when they may be senescent later in the summer. Project design criteria to use prescribed fire prior to green-up would help avoid detrimental impacts to herbs, grasses, and shrubs. Generally, during green-up, fuel moistures are typically too high to accomplish burn objectives. Prescribed fire

after silvicultural treatments would remove understory vegetation, woody debris, and litter, impacting microclimate as well as soil temperature and moisture.

In summary, both Alternatives 2 and 3 would protect all known populations of sensitive plants from ground disturbing activities through project design criteria and Forest Plan direction. A botanist would be consulted if any of the areas where the populations occur are within prescribed burn areas. Alternatives 2 and 3 may impact individuals or habitat, but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species (MIIH) in forested habitats, grasslands, and lithosol/rigid sagebrush/shallow soils habitats. In other habitats, where there are no documented species, there is protection of TES habitats through policies and mitigations; and where disturbance is not expected, both Alternatives 2 and 3 would be expected to have no impact (NI) on TES habitat or species.

Wildlife

Primary Cavity Excavators

Effects assume project design criteria Wild-1-Wild-14 (Appendix J) would be implemented. These include protection measures for large trees, large snags, down-logs during harvest and burning activities. Snags ≥ 12” are only to be removed due to safety considerations. Harvest of large trees (≥ 21” dbh) is allowed only in Alternative 2 on up to 5,000 acres, excluding areas within MA15, PFAs, and cool-moist large tree, closed canopied forests.

Snag habitat is currently adequate in the PPDF wildlife habitat type, and below reference conditions in the EMC habitat type. No snags are prescribed for harvest in any of the alternatives. However, it is likely that snag density would decline in areas treated due to safety, skid trails, firewood cutting, and other reasons (Harrod et al. 2009, Hessburg et al. 2010). Prescribed fire would also likely result in loss of snags, particularly in the large (>20”) size class (Finch et al. 1997, Pilliod et al. 2006). Fire severity during the burn operations contributes largely to the expected impacts to snags and downed wood loss and recruitment.

The vegetation treatments proposed would adversely impact current and future dead and defective wood habitat. Harvest treatment is proposed on about 38 percent and 24 percent of the forested landscape under Alternatives 2 and 3, respectively. It can be assumed that within treatment areas there would be a reduction in snags and logs due to skid trails, landings, safety reasons and prescribed burning. Proposed activities (tree harvest and prescribed fire) are expected to help create habitat for primary cavity excavators (PCEs) that use open forests (e.g. white-headed woodpeckers) and reduce habitat for those PCEs using dense forests (e.g. pileated woodpeckers). It can be assumed that the greater treatment acres in Alternative 2 compared to Alternative 3 would result in a greater reduction in snags and logs due to skid trails, landings, safety and prescribed fire, though mitigation measures are designed to minimize this loss.

It is unknown how the prescriptions using the ICO (individual, clumps, and openings) may affect the future development of snags. In the ‘clumps’ that are left un-harvested, natural snag creating mechanism such as density would remain and snags would continue to develop in both the short and long-term. However, in areas that are thinned ‘individuals’, snag creating mechanisms may be removed, thus at least in the short-term, natural snag creation may happen less often than in the current more dense stands.

Alternative 2 harvests more acres than Alternative 3, thus there is a greater reduction in snag and down-wood habitat elements in Alternative 2 due to safety and placement of skid trails, landings, and prescribed fire.

The potential removal of trees ≥21" dbh on up to 5,100 acres in Alternative 2 (32 percent of the commercial harvest area) may likely negatively affect the long-term recruitment of snag habitat, as these trees would no longer be available as potential snags (no trees ≥ 21" would be cut in Alternatives 1 and 3).

Because Alternative 3 does not remove trees ≥21" dbh and harvest occurs on fewer acres, the loss of current and future snag and down-log habitat is less than in Alternative 2.

Road closures and decommissioning would reduce disturbance and limit access for firewood cutting and snag loss. Miles of open roads and an 'open forest' for use by motor vehicles cumulatively limit the amount of snags across the landscape. Alternative 1 reduces open road miles from the existing condition by 52 miles (existing decisions that have not yet been implemented). Alternative 2 reduces the number of miles of open road from existing condition by 69 miles, and Alternative 3 reduces the miles of open road from existing condition by 9 miles.

The overall direct, indirect and cumulative effects would result in a small negative trend in dead and defective wood habitat in the short term. Mitigation measures (PDCs) would be in place to protect large snags during both harvesting and prescribed burning activities (Appendix J). The changes in habitat would be insignificant at the scale of the Forest. The LJCRP is consistent with the LRMP, and thus continued viability of MIS for dead and defective wood habitat is expected on the WWNF in both alternatives 2 and 3.

American Marten

Effects assume project design criteria Wild-1-Wild-14, and Wild-24 (Appendix J) would be implemented. These mitigation measures include protection measures for large trees, large snags, downed logs during harvest and burning activities. Snags ≥ 12" are only to be removed due to safety considerations. Harvest of trees greater than 21" dbh is allowed only in Alternative 2 and on approximately 5,000 acres, excluding areas within MA15s, PFAs, and cool-moist large tree, closed canopied forests. Wild-27 states: Because marten habitat is at the lower end of the RV, any harvesting within marten habitat (moist forests, large tree, closed canopy) is designed to maintain old forest characteristics. Canopy closure would remain ≥ 60 percent, and no harvest of trees ≥ 21" dbh in moist, large tree, closed canopied forests. LJCRP would maintain snags and large down wood that American marten need for denning, rest areas, and hunting. Large broken top and potentially hollow grand fir would be maintained for denning habitat.

Commercial harvest treatments in the LJCRP area would not contribute to the reduction of marten source habitat on the WWNF; large diameter trees and multiple canopy layers would be retained in both action alternatives. Treated stands would maintain canopy closure at ≥60 percent, and no trees ≥21"dbh would be harvested in marten source habitat. It is assumed that post-harvest these stands would be maintained as source habitat. It is likely that in the short-term they may meet minimum qualifications as source habitat, but the quality of the habitat may be reduced due to reduced complexity and tree density, and potential loss of snags and logs due to logging operations and safety.

Approximately 35 percent of marten source habitat has some form of forest treatment (38 percent in Alternative 2, 33 percent in Alternative 3; Table 36), which may cause a decline in the quality of source habitat in the short term. Approximately 110 acres (114 in Alternative 2, 108 in Alternative 3) would be harvested in marten habitat using group selection/moderate density. Group selections can

include openings that are ¼ - 4 acres. Martens respond negatively to low levels of habitat fragmentation (Hargis et al. 1999), it may be that openings as large as 4 acres would reduce the quality of the habitat for marten. In the longer-term, as trees continue to grow, American marten would continue to use these harvested areas for some, or all, of their life history functions.

Vegetation treatments in alternatives 2 and 3 are assumed to modify fire behavior and reduce the likelihood of a stand replacement event, thereby potentially retaining source habitat in the long-term. Treatments remain outside a larger block of moist larger tree structure within and adjacent to the MA15 located along Peavine Creek, providing some protection to this area by lessening the risk for high severity fire. In both Alternatives 2 and 3, there would be a loss of down wood, resultant prey availability and subnivean access due to fuels reduction treatments (Bull and Blumton 1999).

Because this project proposes some commercial treatment and because the planning area is currently at the lower end of the HRV, the overall direct, indirect and cumulative effects would result in a small negative trend of habitat quality. The loss of habitat quality would be insignificant at the scale of the Forest (Table 43) and would likely be short-term as the remaining trees continue to grow. The LJCRP is consistent with the Forest Plan, and thus continued viability of the American marten is expected on the WWNF in both Alternatives 2 and 3.

Table 43. Summary of impacts to American marten habitat (acres) by alternative at the scale of the project area as well as the entire Wallowa-Whitman NF.

Source habitat (acres) (% HRV)	Existing	Alternative 2	Alternative 3
Project Area Habitat	2,200 (17%)	2,200 (17%)	2,200 (17%)
Habitat treated but maintained as habitat		820	730
Wallowa-Whitman National Forest* (from Wales et al. 2011)	129,600 (16%)	129,600 (16%)	129,600 (16%)

Pileated Woodpecker

Effects assume project design criteria Wild-1-Wild1-14, and Wild-26-27 (Appendix J) would be implemented. These include protection measures for large trees, large snags, and downed logs during harvest and burning activities. Snags $\geq$ 12” are only to be removed due to safety considerations. Harvest of large trees is allowed only in Alternative 2 and on up to 5,000 acres, excluding areas within MA15s, PFAs, and cool-moist large tree, closed canopied forests. Wild-29, -30, -31 describe measures to protect pileated woodpecker nests.

Habitat for pileated woodpeckers declines in Alternative 2 by about 400 acres and by about 900 acres in Alternative 3 though the abundance of source habitat remains within the HRV (Table 34).

Additionally harvest would reduce the habitat quality on approximately 27 percent of source habitat in Alternative 2, and 16 percent in Alternative 3. Additionally the removal of trees ≥ 21" dbh in Alternative 2 on about 740 acres further reduces the quality of source habitat on those acres.

At the scale of the project area, the abundance of source habitat is projected to remain within the HRV under any of the alternatives. At the scale of the Forest, the abundance of source habitat is not expected to change significantly (Table 44), and the pileated woodpecker is expected to remain viable. The miles of open road would be reduced from the existing condition by 69 miles in Alternative 2, and 9 miles in Alternative 3. A reduction in road miles would be beneficial to this species.

Table 44. Summary of impacts to pileated woodpecker habitat by Alternative (acres of source habitat)

	Existing	Alternative 2	Alternative 3
Project Area (% HRV)	7,400 (16%)	7,000 (15%)	6,600 (14%)
Wallowa-Whitman National Forest*	206,200 (14%)	199,100 (13%)	199,600 (13%)

* acres calculated by Wales et. al. (2011)

Though some current pileated woodpecker source habitat would be harvested, and the quality of the habitat may be reduced, overall source habitat would remain within the RV for this species in the LJCRP area. Protection measures are in place to conserve large trees, large snags and down-logs during harvest and prescribed fire activities. In the longer term (> 20 years) habitat quality and quantity would continue to increase as the trees grow, canopy closure increases, and snags are created from normal disturbance processes. Therefore, the project would not contribute to a negative trend in viability on the WWNFt for the pileated woodpecker.

Northern Goshawk

Effects assume project design criteria Wild-1-Wild11, and Wild-15-23 (Appendix J) would be implemented. These provide protection measure for goshawk PFA's and large trees, large snags, down-logs during harvest and burning activities.

All alternatives maintain the abundance of source habitat within the RV (Table 35). Though commercial harvest occurs within source habitat in both Alternatives 2 and 3, the abundance of source habitat not treated remains within the RV. Much of the harvested areas retains canopy closure at ≥ 40 percent, and though habitat quality may be reduced, the area likely would provide habitat, and with time the canopy closure and tree size would increase. Additionally the harvest of large trees (≥ 21" dbh) in Alternative 2 would likely contribute to the loss of habitat quality in the harvested stands. Within the six known goshawk nesting areas, design elements would maintain overall stand structure within the 400 acre PFAs, with the desired condition to provide areas with larger trees, higher canopy, multiple canopy layers, large logs, and large snags.

Though some current goshawk source habitat would be harvested, and the quality of the habitat may be reduced, overall source habitat would remain within the RV for this species in the LJCRP area. PDCs measures would be in place to conserve PFAs, large trees, large snags and down-logs during harvest and prescribed fire activities. In the longer term (> 20 years) habitat quality and quantity would continue to increase as the trees grow, canopy closure increases, and snags are created from

normal disturbance processes. Therefore, the LJCRP would not contribute to a negative trend in viability on the WWNF for the northern goshawks (Table 45).

Table 45. Summary of impacts to Northern Goshawk habitat (acres) by alternative

	Existing	Alternative 2	Alternative 3
Project Area – source habitat (% of HRV)	19,000 (34%)	15,000 (27%)	15,800 (29%)
Wallowa-Whitman National Forest – source habitat*	440,300 (27%)	425,400 (27%)	437,200 (27%)

* acres calculated by Wales et. al. (2011)

Rocky Mountain Elk

Effects assume project design criteria Wild-29-31 (Appendix J) would be implemented. These include protection measures to reduce human disturbance during winter and calving season. Additionally Wild-29 provides guidance on retaining hiding cover patches in areas where forest treatment activities occur.

Forest treatment activities would result in a loss of cover (canopy closure > 40 percent) and an increase in potential forage (≤ 40 percent canopy closure) habitat. Research results on the effects of forest restoration treatments (thinning followed by primarily broadcast burning) in northeast Oregon have found that elk would likely respond positively to treatment in the spring due to an increased cover and abundance of some important forage species, while the opposite may be true for during the hotter summer months (Long et al. 2008b, Long et al. 2008a). In the summer areas with relatively open canopy cover, most grass species and many forb species have cured or senesced by about mid-July as a result of increased exposure to direct sunlight. Within untreated areas or areas with denser canopy cover, important forage species often persist for several weeks longer. The authors suggest that maintaining a mosaic of treated and untreated forest habitats across the landscape would likely be beneficial for foraging habitat. Recent research has shown that the adequacy of summer nutrition in the Pacific Northwest drives the productivity of elk and probably other ungulate populations (Cook et al. 2013).

Both forest treatment and prescribed fire activity may also contribute an increase in forage quantity and quality, especially in the spring. Alternative 2 proposes harvest on more acres than Alternative 3.

Increased miles of open roads have adverse effects on habitat effectiveness by taking land out of production, reducing the effectiveness of cover, and increasing disturbance to elk. Alternative 2 reduces the miles of open road from the existing condition by about 69 miles, while Alternative 3 proposes reducing open miles by about 9 miles. Open road densities are reduced from the existing condition in all of the subwatersheds in Alternative 2, and are reduced slightly in 3 subwatersheds in Alternative 3 (Table 3).

HEI scores are slightly improved in Alternatives 2 and 3 from existing condition, and meet LRMP guidelines (Table 37).

Historically there were game species, including elk that warranted serious conservation concerns due to depressed populations and range contractions resulting from unregulated market and sport hunting and loss of habitat. Many of the factors that contributed to the decline of large wild ungulates in the past do not exist today. Currently, elk populations on the WWNF are regulated by hunting and

predation. Elk numbers are substantially higher than what would constitute a concern over species viability. Elk would remain viable under all alternatives.

Landbird and Migratory Bird Habitat

Effects assume that Project Design Criteria and mitigation measures in Appendix J would be implemented. Several mitigation measures include protections for large snags, trees and down-wood during harvest and prescribed fire activities. In particular, Wild-10 states: Prescribed burning during active nesting period (e.g. May 20 or post leaf-out) for nesting landbirds will be coordinated with district or forest biologist.

Effects from this project to migratory birds would be variable and would depend on the species (see wildlife specialist's report). Alternative 2 would treat more acres and contain more prescribed burned than Alternative 3. In Alternative 2 canopy cover would be reduced on more acres, large trees would be harvested, snag levels would be reduced, and riparian areas would be treated toward RMOs. Road densities would be reduced more in Alternative 2 than any other alternative, which would likely benefit all of these migratory birds. Road-associated factors that adversely affect some species of migratory and resident birds include: snag and log reduction, habitat loss and fragmentation, negative edge effects, harassment or disturbance, collisions, displacement or avoidance, and chronic negative interactions with humans (Gaines et al. 2003).

In the short-term, some nesting habitat may be lost because of forest treatments and prescribed fire, but the scale at which it would occur is not expected to significantly reduce migratory bird richness or abundance. Some birds may experience shifts in home ranges as habitat is altered, but treatments would not result in their complete displacement from the project area. The short-term losses of relatively abundant, early-nesting species, such as the dark-eyed junco, may be a necessary tradeoff for the effective restoration of dry forests. Such losses may be further justified if populations of other species, such as the flammulated owl, white-headed woodpecker, and pygmy nuthatch, ultimately benefit from such restoration. While the long-term overall shift in forest structure would favor species dependent on open canopied forests, this is the forest type that is most outside of the RV. A mosaic of forest and rangeland conditions capable of supporting breeding migratory bird populations would exist if the project is implemented and move the landscape, thus habitat conditions closer to the RV. There is no indication that habitat changes from the project would result in reduced numbers of these birds that would be meaningful at local or landscape scales. See the Wildlife specialist's report in the project record for more information.

Threatened, Endangered, and USFS Region 6 Sensitive Wildlife Species

Effects assume that Project Design Criteria and mitigation measures in Appendix J and the Forest Plan would be implemented. Measures would protect known nesting/roosting/breeding areas and other important habitats known for TES species.

All alternatives of the LJCRP would have no effect (NE) to the Canada lynx because it is not considered present on the WWNF (U.S. Department of Agriculture and U.S. Department of Interior 2006).

The LJCRP area may contain some incidental roosting habitat for bald eagles, but does not contain nesting habitat. None of the alternatives would alter this habitat enough to make it unsuitable for bald eagles; therefore this project would have no impact (NI) on bald eagles or their habitat.

Peregrine falcons have been sighted within the LJCRP area. Potential nest sites have been identified but suitable nest ledges are limited as are larger bodies of water for prey concentrations. Alternatives 2 and 3 would have no impact (NI) on the peregrine falcon.

Habitat for the Lewis' woodpecker is uncommon in the LJCRP analysis area. Primary source habitat is provided in recent wildfire habitat; little of this habitat exists within the planning area. Riparian habitat and corresponding RHCAs would be conserved within the project area. Ponderosa pines over 21 inches dbh would likely not be cut; hence, large ponderosa pine habitat near riparian habitat would not be altered. LRMP standards and/or guidelines protect large (≥ 21" dbh) trees and snags, though some harvesting of large trees is permitted in Alternative 2 (Appendix J). Vegetation treatments would likely produce source habitat in the xeric pine types through the reduction in canopy closure, though the potential loss of large snags may reduce habitat quality. Overall, there would likely be a beneficial effect to Lewis' woodpecker from Alternatives 2 and 3.

The viability outcome forest-wide for the white-headed woodpecker historically was projected to be an "A" (suitable environments are broadly distributed and of high abundance across the historical range of the species), while currently the viability outcome is projected to be an "E" (suitable environments are highly isolated and exist at very low abundance relative to historical conditions). This results in a high level of concern for the viability of the white-headed woodpecker. The main factor leading to this level of concern is the historic loss of large, open canopied ponderosa pine habitat resulting in levels far below RV for these habitats. Alternatives 2 and 3 both increase the amount of source habitat composed of large, open canopied ponderosa pine forest. Both Alternatives 2 and 3 should benefit the white-headed woodpecker.

The primary threats to grey wolves are human disturbance, mortality from shooting and vehicle collisions (Wisdom et al. 2000). Primary concerns for activities that would affect grey wolves in the LJCRP area are 1) disturbance to denning or rendezvous sites, and 2) providing adequate habitat for populations of prey species such as elk (USDA Forest Service 2009). No denning or rendezvous sites have been identified within the LJCRP area (though a new pack is suspected to be using the area), and Alternatives 2 and 3 are not expected to impact big game prey availability (see section on Rocky Mountain elk). Any of the alternatives would have no effect (NE) to the gray wolf.

Fringed myotis appears to be most common in drier woodlands roosting in large trees and snags. Alternatives 2 and 3 propose forest treatments on 15,750 and 10,300 acres respectively. Though snags are not prescribed for harvest, large snags would be removed due to safety and logging operations (e.g. skid trails). Additionally in Alternative 2, large trees (≥21" dbh) may be removed. Removal of these large trees would result in a loss of potential roosting habitat. The road closures proposed in Alternative 2 would reduce the loss of future snags caused by firewood cutting and safety considerations. With this taken into account, Alternative 2 and 3 may impact individuals or habitat (MIIH) but are not expected to lead to a population decline of the species, or contribute to a trend toward federal listing of cause, or a loss of viability to the population or species.

No management activities are proposed in any of the alternatives at or near potential caves or mines that may provide Townsend's big-eared bat habitat. Although treatment is anticipated within foraging habitat for this species, it is to be undertaken with the intent of restoring vegetation to what was expected to occur historically. It is likely that proposed management activities may impact individuals or habitat (MIIH) under Alternatives 2 or 3 but would not contribute to a trend toward federal listing or cause a loss of viability to the population or species.

Johnson's Hairstreak

Under Alternatives 2 and 3, the harvest of trees from within OFMS stands of 4,000 acres and 3,000 acres, respectively, likely would directly impact Johnson's hairstreak by removing trees with mistletoe and potentially killing larvae should they occur within the LJCRP area. Alternatives 2 and 3 may also indirectly impact Johnson's hairstreak by reducing the available amount of larval host plants. However, mistletoe is abundant within the project area and the level of harvest proposed in Alternatives 2 and 3 would not significantly reduce the availability of host plants for this species. For these reason, Alternatives 2 and 3 may impact individuals or their habitat (MIIH) but are not expected to lead to a decline in the population of the species, or contribute to a trend toward federal listing or cause a loss of viability to the population or species.

Intermountain Sulphur Butterfly and Western Bumblebee

Prescribed fire has the potential to affect both the intermountain sulphur butterfly and the western bumblebee in the immediate short-term. Alternatives 2 and 3 both propose to burn more than 45,000 high priority acres, though not all acres would be burned at once. It is expected that implementation of the prescribed fire would take place over a 10 year time span. This has the potential to eliminate food plants and insects in those areas but also increase the viability of food sources in the coming years and renew flowering plants as long as the diversity of unburned and burned areas is retained. For these reasons, Alternatives 2 or 3 may impact individuals or their habitat (MIIH) but are not expected to lead to a decline in the population of the species, or contribute to a trend toward federal listing, or cause a loss of viability to the population or species.

Aquatic Habitat

Stand Improvement Activities

Alternative 2 and Alternative 3 propose 750 acres of stand improvement treatments within category 4 RHCAs. These acres would be treated to move these forested stands toward RV for the LJCRP area. Stand improvement treatment prescriptions would follow the activity restrictions as described in Table 46 for all category streams.

Table 46. Activity restrictions according to the Blue Mountains Project Design Criteria

PACFISH/ INFISH Category	Fish Bearing and Designated Critical Habitat Streams	Permanently Flowing non-fish Bearing and Ponds, Lakes and wetlands > 1 acres	Seasonally Flowing or Intermittent Streams, wetlands < 1 acres, landslides and landslide-prone areas	RHCA Restrictions* (Activities allowed outside the no activity stream buffer**)
Activity	**Default Activity Buffers**			
Thinning in RHCAs	100’	75’ on slopes < 30%	50’ on slopes < 30%	treatment by hand only (no ground based equipment) prior to treatment 500 – 2,500 stems per acre; post treatment fully stocked (generally 175 – 220 trees per acre) variable spacing all shade providing trees and long term wood recruitment trees retained only trees < 9” dbh

Timber Harvest Activities

Impacts to the RMOs for pool frequency, large woody debris (LWD), bank stability, lower bank angle, and width-to-depth ratio are unlikely. Thinning units, skid trails, and landings would not be located in RHCAs under Alternatives 2 and 3, unless identified under the PDCs or BMPs. Restricting these activities to areas outside of RHCAs would prevent adverse impacts to existing pool habitat and future pool habitat. RHCA widths for Category 1 streams are sufficient to prevent removal of trees that have the potential to fall into stream channels as LWD and create pool habitat.

Impacts to channel morphology RMOs (i.e. bank stability, lower bank angle, and width-to-depth ratio) would not occur because activities that could result in mechanical bank disturbance would not occur in RHCAs under Alternatives 2 and 3. Some areas of decreased bank stability may occur where herbaceous vegetation along streambanks is top-killed during burning activities.

Prescribed Fire Activities

Prescribed fire impacts to the RMOs for pool frequency, LWD, bank stability, lower bank angle, and width-to-depth ratio are unlikely. Proposed burning activities would not likely impact existing LWD or future LWD because the burn prescription would target consumption of material three inches and smaller. Fire intensities would not be high enough to consume trees or downed wood large enough to function as LWD (> 20” dbh) in stream channels. Prescribed fire activities would follow guidance outlined in the Blue Mountains Project Design Criteria, and therefore prescribed fire activities are not expected to result in a reduction of current or future levels of LWD or pool habitat under Alternatives 2 and 3.

Management Indicator Species – Aquatic Species

All of the LJCRP activities proposed would take place upslope from MIS fish presence, with the exception of approximately 31 acres of treatment along Swamp Creek. The direct effects to any MIS

fish species from this treatment would not be measurable. Therefore, there is no potential for direct effects to any MIS. There is potential for indirect affects to fish MIS downstream from the proposed activities. Aquatic habitat indicators potentially affected include fine sediment levels and LWD quantities. Road management could cause changes to local hydrology such as increased runoff rates, accelerated erosion and sedimentation. Tree removal could potentially reduce large wood availability in headwater streams not directly associated with MIS fish bearing streams. MIS life stages present in the area of exposure from the LJCRP activities include juvenile, adult, and eggs. These activities would occur upslope from MIS fish.

Implementation of Standards and Guidelines in tthe LRMP as amended by PACFISH (USDA Forest Service and USDI Bureau of Land Management 1995) and PDCs (Appendix J) would avoid adverse indirect effects to MIS. Road maintenance would result in an overall net reduction of road-related sediment delivery during the project and in the long-term. Road closures and some decommissioning proposed under Alternative 2 would result in further net reduction of road related sediment delivery. The result would be a beneficial effect to the sediment regime, caused by a reduction of anthropogenic-derived sediment delivered to the stream network as compared to current watershed conditions. Additionally, thinning densely stocked stands in the outer edge of RHCAs restore natural species composition and promote large tree growth. The largest trees are retained at expected stand densities. On perennial and fish bearing streams, there is a no harvest buffer 300 to 600 feet wide (total width) that when considered along with site potential tree height in the project area, would maintain all existing LWD that could potentially fall into streams.

Effects of Alternatives 2 and 3 on MIS species or their habitat across the project area, when considered cumulatively with other activities in the project area, would be beneficial to some of the important habitat indicators. A net decrease to fine sediment levels is expected, which would improve habitat conditions for MIS and their habitat. Reduced sediment delivery improves important aquatic elements such as cleaner water, higher quality substrates for spawning and rearing habitat, and less pool infilling. Thinning densely stocked RHCAs improves vegetation conditions, which leads to increased large wood recruitment and creates more fire resilient stands along streams. The cumulative effects are within the scope of anticipated effects to aquatic resources determined in the Forest Plan (USDA Forest Service 1990).

The LJCRP would improve habitat conditions for the aquatic MIS in the project area. Anthropogenic fine sediment delivery in the project area would be decreased, and reduced delivery would be maintained after the project is completed. In the long-term, there would be a reduction in artificially induced sediment entering the stream system, benefiting aquatic MIS and their habitat. Therefore, the project would not contribute to a negative trend in viability on the WWNF for these species.

The Social Environment

Recreation

The available types and annual use for dispersed recreation activities would not be affected unreasonably in the short and long term. No prohibitions are being made to the dispersed activities. Dispersed uses may fluctuate each year but other factors like weather, choosing a different vacation destination, fuel prices, and success/non-success of obtaining a hunting tag also influences use in an area.

The number, annual use and site capacity for developed recreation sites would not change in the short or the long term under any action alternative. All developed recreation sites would remain open, no

individual campsites/grounds would be altered, and use varies depending on factors other than the level of project activities.

The number of trail miles and use would not change in the short or long term. No prohibitions are being made to the number of trail miles or trails open and available for use. No change to cross-country travel is proposed in any alternative within the LJCRP area.

The number of permits and areas would not change in the short or long term. No changes in the terms of the permits or available locations are part of this project.

The specific project activities with potential to impact recreation are common to all the proposals in Alternatives 2 and 3. Each of these alternatives propose different levels of activities but the effects to the public involved in different recreation endeavors common to the area are relatively the same. Both alternatives would include four main project activities that would affect recreation:

- Commercial harvest
- Stand improvement harvest
- Prescribed burning (including post-harvest fuels treatment)
- Road and Access activities (i.e. danger tree removal along open system haul roads, haul roads, temporary road construction, permanent road reconstruction, road realignment, road decommissioning)

Dispersed Recreation - Timber harvest, post-harvest, and prescribed fire activities may restrict user access into a treatment unit due to safety purposes, or users may be discouraged from entering a unit due to the presence of equipment and workers. This may occur in peak summer visitations or during the fall hunting seasons. Downed trees, slash piles, loss of forest-products (i.e. mushrooms, berries), active fire and residual smoke may also discourage visitor use in an area. Noise and other disturbances may affect the quality of the recreation experience for an individual regardless of the proximity to the activity.

A change in natural features or landscape characteristics may elicit different responses in visitors. A visitor's sense of place includes attachments to external factors like natural features or landscape characteristics. Important landscape features may consist of large old growth trees and groves, variety of trees species, an open or closed tree canopy, rock formations, water bodies, and natural appearing openings. The proposed treatments such as harvesting trees, reducing slash or altering canopy cover would change or remove some of these natural features. In some cases the changing landscape would change the context of some types of dispersed recreational activities (i.e. studying nature, viewing wildlife, big game hunting, photography). More information can be found in the Scenery section, below.

Direct effects to recreationists accessing dispersed camps in the project area or other areas would occur on roads during haul periods and would last only for the duration of the project. The presence of large trucks or an increased frequency of traffic may discourage road use to these sites until the road work subsides. When roads are being constructed/reconstructed visitors may expect delays or closures during work periods.

Developed Recreation - Although similar to the effects of dispersed recreation, developed recreation is more limited due to the number of sites in LJRCP. Access to developed sites may be delayed or restricted during haul periods, or road construction. The presence of large log trucks and other equipment on haul routes may discourage users from driving the main access route to developed sites

or other associated activities outside of the developed recreation area. Noise and dust generated by equipment and increased logging traffic during harvest, post-harvest and smoke generated by prescribed fires may affect the quality of the recreation experience for a visitor regardless of the proximity to the activity. The frequency and intensity of these activities may vary from a few hours to several weeks. Some loss or change of vistas, scenery, natural features or wildlife viewing opportunities may result with the vegetation treatments and prescribed fire activities visible from the developed sites.

Slash piles and prescribed burning would change some of the natural features and may discourage trail user activities. Effects to portions of the campgrounds/trails in or adjacent to harvest units would be limited and short-term. There is a mitigation no-activity buffer of 100 ft. surrounding developed campgrounds.

Proposed road closures or decommissions would not affect developed campgrounds or trails.

Permitted Uses – All permitted uses are authorized under the term and conditions of a permit that allow activities not available to a non-permitted user. Most of these uses are tied to road access, and the removal of forest products is dependent on specific areas or vegetation. Permitted uses may be affected by project activities. Similar to dispersed recreation, timber harvest, post-harvest and prescribed fire activities have short term effects and may restrict or discourage entry into a harvest unit. Depending on the level of treatment activity, permit users may be displaced to other areas inside or outside LJCRP.

Increased obstacles like downed trees and slash piles, or loss of forest-products (i.e. mushrooms, berries) would also change harvest patterns. Residual smoke, dust, fire, noise and equipment activity is also not conducive to a quality recreation experience. The same effects for road use described in ‘Dispersed Recreation’ are also applicable to this recreation use. If roads are used for winter haul, they may be available for access by winter recreationists, like Christmas tree cutters who normally do not have access in many roads during the winter due to deep snow packs.

Long term effects of harvest and post-harvest treatments would elicit various responses from permit users. Permit holders like mushroom pickers would find short term benefits from open, disturbed mixed-conifer forest stands, whereas berry pickers may view the loss of berry patches as an adverse effect.

Scenery

The following summarizes the general effects to landscape character, scenic integrity, and scenic stability common to all action alternatives in the project area:

Landscape Character and Scenic Integrity

- No regeneration harvests larger than 4 acres would occur in the project area. Single tree selection would make up the vast majority of forest restoration treatments. Group selection treatments would make up less than 13 percent of treatment acres, and would create small openings less than 4 acres to support the regeneration of favored shade intolerant tree species such as ponderosa pine and western larch.
- Enhancement of landscape character would be done by thinning and reducing dense stands of trees, providing variety in spatial distribution of plant communities and moving toward more variety in age classes. Large diameter trees would be retained within the range of variability for the potential vegetation group, and would stand out as more dominant after removing small trees

around them; views into the forest would be more open. Retention of seral tree species such as ponderosa pine and western larch would be favored.

- The proposed management activities begin the transition of moving the forest setting on a landscape scale toward the sustainable landscape character by reducing natural fuels and reintroducing the natural role of fire.
- Utilizing existing landings, roads, fire lines and natural fuel breaks as proposed would reduce further visual impacts associated with implementation. In these areas, visual impacts are contained in areas already impacted rather than introducing new impacts.
- Thinning treatment methods create texture changes to the existing dense to mosaic textured landscape and would blend in well.
- On the landscape scale, by using prescribed fire in a timely manner and in phased treatments, it is expected to reduce the future risk of a potential high intensity wildfire that would affect scenic quality and stability.
- Road maintenance would bring existing roads to a minimum maintenance standard. Numerous closed roads would be temporarily opened for commercial material access and removal and re-closed after harvest operations are complete. There would not be any new roads that would result in introducing new linear corridors in the landscape.
- Stumps would be more evident in some areas of foreground of travel routes and dispersed sites. Coarse woody debris (slash) would be seen along travel routes before under burning, hand or machine piling, and pile burning. This would create a short term negative visual effect until the material is burned, decomposes or is softened by early successional grasses and forbs. The proposed under burning and pile burning may not entirely reduce the slash.
- Prescribed fire has the potential to create larger openings in the landscape than intended, possibly burn out of the area intended, and/or to burn trees that are desired to be retained for scenic quality or other resource objectives.

The effects of specific forest restoration prescriptions common to all action alternatives are described below. All forest restoration treatment types would use the “individuals, clumps, and openings” approach, which mimics stand tree patterns that would have been found historically.

Single Tree Selection, Group Selection, Intermediate treatment

Variable density thinning opens up the stands and provides greater viewing distances into the stand, which is preferable. The appearance of the stands would be improved by retaining large trees, especially ponderosa pine and western larch. There would be a variation in tree spacing that retains a variety of density patterns and species compositions similar to historical conditions. The reduction of tree stocking levels would improve the resilience of the stands by reducing stress and ladder fuels, which reduces the risk of high insect and disease outbreaks, and stand replacement wildfire. These are benefits that contribute to the improvement of scenic stability when carried out at a landscape scale. Group selection would differ from single tree selection in that it would create one-half to four acre naturally-shaped openings to initiate new cohort of seral species (ponderosa pine and western larch). Intermediate treatment is similar to single tree selection except that is emphasizes isolating mistletoe infections and creating conditions that reduce intensification of infection.

This treatment would create stumps, slash and soil disturbance that would be visible from foreground views. These effects would be minor within the first one to two years. As regrowth of shrubs and grasses occur these effects would be significantly reduced. Single tree selection would not create openings that are visible from middleground or background distances. Small openings from group

selection treatments would be consistent in size and shape with historic patterns, and could be visible from middleground or background distances. The effects of this prescription would not reduce the scenic integrity of the units.

Savanna

This treatment type would reestablish grassland/forest edges and historic grasslands that have conifer encroachment. This would enhance scenic quality by restoring open savannas toward historic conditions, and promoting the reestablishment of native understory grasses and forbs.

Wildlife Connectivity Corridors

In wildlife connectivity corridors, restoration treatments would retain at least 40 percent canopy closure in dry forests, and 50percent in moist forests. Effects would be similar to those of single tree selection, described above.

Planned and Unplanned Fire

Fire is used to reduce litter and ladder fuels, and restore natural ecological processes. Planned and unplanned fire would be used on up to 90,000 acres, with harvested and stand improvement areas in dry forest being the highest priority; direct effects to scenery would be usually minimal and short lived. A growing season reduces the effects to the remaining scorched tree trunks, and dead saplings. This treatment most successfully conserves scenery resources when thorough site preparation is done prior to under burning. Fire at low intensity is a natural occurrence in this area, and its effects do not degrade the scenic quality. This treatment can greatly improve a stand's resiliency to large stand replacement fire, which can adversely affect the scenic quality. Future prescribed burns, known as maintenance burns may be required in order to maintain the effectiveness of the proposed restoration treatments. These maintenance burns would be scheduled every 10 to 15 years, based on the average fire return interval in the LJCRP area. These maintenance treatments would protect the investment of an effective fuels treatment and increase the number of years before the area would need to be entered again for more extensive understory treatments.

Stand Improvement

This treatment reduces stocking levels within young, post disturbance stands to promote growth of desirable species and increase spatial heterogeneity toward the range of variability. Direct effects to scenery would be minimal and short term. The effects to scenery are limited to the foreground view effects of stumps, and slash. This treatment can improve stand resiliency to stand replacement fire, which can adversely affect the scenic quality.

Activity created fuels treatments

Upon completion of commercial harvest activities, non-commercial material would be felled by hand crews and piled (or grapple piled), and jackpot burned, and/or masticated or left (depending on fuel loading) to further remove ladder fuels. Low intensity prescribed burning would occur after these treatments in areas that support fire tolerant ecosystems and drier biophysical environments. The effect of this treatment is similar to the under burning of natural fuels, however the scorching and soil exposure is usually more intense. This treatment removes small saplings and fire intolerant trees to increase the conditions for fire resistant trees to dominate these stands. Removing these trees improves the large tree character and opens view into the remaining stands. These effects are consistent with low intensity fire.

Danger Tree Removal

Danger trees would be felled and removed along all haul routes used for timber sale activity. Removing large trees would create new stumps in foreground areas of recreation sites and scenic roads, but the scale would be small and maintain scenic quality.

Socioeconomics

Treatment Costs and Wildfire

Treatment is associated with a decrease in wildfire suppression costs and a decrease in net resource damage (Mercer et al. 2000). Prescribed burning is often preferred to mechanical thinning due to the lower cost of prescribed burning. However, depending on proximity to urban centers, a full accounting of the costs of prescribed burning may reveal that mechanical thinning is more economically efficient in some circumstances. The cost of smoke exposure, for instance, is higher when prescribed burning occurs near population centers. Mechanical treatment also has costs that are not accounted for in the cost of implementation, such as soil erosion. However, the indirect consequences of prescribed burning are more easily observable, which generally make it a less publicly popular treatment option.

Fuel reduction projects can significantly reduce the risk of catastrophic wildfire (Western Forestry Leadership Coalition (WFLC) 2009). Assessing the cost-benefit ratio of fuel reduction projects is questionable without information on the degree to which treatment reduces the risk of wildfire. Furthermore, the scale and cost of prevented wildfires is uncertain and widely variable. Anticipated reductions in the threat to human life and decreases in wildland fire related costs such as property loss, lost revenues and suppression costs are not included in the analysis of PNV for the alternatives. Fuels treatments under these alternatives would improve fuel conditions and make the surrounding area more resistant to large scale wildfires. While the PNV of restoration treatments is positive under all alternatives, the prevention of one fire could make the PNV of restoration activities significantly greater.

Timber Market and Forest Products

The LJCRP would likely increase the amount of timber on the market. In addition, the management alternatives assume high utilization by local processing, which seems likely according to the public meetings. While the market for timber may still be depressed, the current timber processors in the WWNF region seem to have enough product demand and capacity to process the forest products.

As a result of the restoration treatments proposed under all of the alternatives, the long-term provision of forest products would provide the opportunity for stewardship contracting and improved utilization. Populations in the analysis area would be supported by these restoration treatments. Many of the restoration treatments produce commercially-valuable forest products. Table 33 shows the project area’s potential for forest products in terms of maximum expected forest product volumes from treatments proposed under each alternative. These are the maximum annual volumes expected to occur over 10 years, or the life of the restoration project.

In addition, it is important to consider other benefits of harvesting timber on Forest land, such as the effects of removing fuels and improving wildfire mitigation and the potential to create jobs and income in the local economies. The benefits to the timber industry result from the healthy forest, as a result of the LJCRP, which can provide higher quality harvest of wood products. Harvest operations can also foster forest restoration efforts and generate income that can be retained locally to collect seed, prepare sites and plant the trees that would constitute the managed forest. The managed forest as

a result of the LJCRP can provide valuable ecosystem services, such as wildfire mitigation, recreation, water quality, air quality, genetic diversity and wildlife habitat.

Non-Market Values

Under the Affected Environment section above, ecosystem services were mentioned as a value that should be considered in the economic analysis, even though they can be difficult to quantify. Examples of ecosystem services that could be affected by the LJCRP are water quality, air quality, and biodiversity. These are all values that are not traded in markets and are often excluded from quantitative analysis. The non-market effects for each alternative are detailed below but exist under all alternatives.

As a part of ecosystem services, wildland fire is an integral natural process essential to sustaining healthy forest ecosystems. The restoration treatments under all of the action alternatives are expected to improve conditions of the forest health. Dense forests with high fuel loads can “threaten neighboring non-federal forests via their overcrowded and hazardous conditions that foster wildfire, pests, disease, and invasives” (American Forest Resource Council (AFRC) and Associated Oregon Loggers 2014). Trees weakened by pathogens and/or insects may also suffer greater mortality during fire than healthy trees (Parker et al. 2006). The LJCRP treatments are expected to reduce the spread of invasive species, improve biodiversity of plant and animal species, as well as improve the soil composition, water quality, air quality, and provision of aesthetically pleasing recreation opportunities.

Rangelands

None of the alternatives are expected to affect grazing operations in the Lower Joseph Creek area. There are no anticipated changes in AUMs on the allotments due to implementation of the LJCRP. The range AUMs are determined by permitting and LJCRP is not expected to change permitting. As a result, no changes in grazing-related employment and labor income are expected. Over the long term, improved forest health would improve forage quality and ranching viability. As noted in the Range report, there could be an increase in forage production due to the treatments. About 8-12 percent of the treated acres in allotments in Alternative 2 would show increased forage production and under Alternative 3, about 5-8 percent of the treated area in allotments would show increased forage production. Since the improvements to forest health are expected to be the greatest under Alternative 2, there would likely be the greatest improvement to rangeland under this alternative. Once the restoration treatments have had time to improve the forest health, there may be more land suitable for grazing under all of the alternatives. However, the permitted range would have to change outside of this EIS before the community would see effects to employment and labor income from grazing.

Heritage

The spatial boundary for effects, common to all action alternatives for heritage resources, is the extent of treatment units. The temporal boundary common to all alternatives is the duration of restoration treatments over time; estimated as 10 years. Environmental consequences for Alternatives 2 and 3 consider the application of design features and mitigation measures developed to protect the integrity of heritage resource values. Treatment activities associated with Alternatives 2 and 3 would comply with Section 106 of the National Historic Preservation Act (seq. 1966) and the Programmatic Agreement between the Pacific Northwest Region Forest Service, the Oregon State Historic Preservation Office and the Advisory Council on Historic Preservation (on file Wallowa-Whitman National Forest Supervisors Office).

Using the Programmatic Agreement as a guide, non-mechanized silvicultural practices (e.g. tree planting, cutting trees with a hand operated chainsaws) have little potential to affect historic properties. Activities associated with prescribed burning such as low-intensity burns, and fireline construction, would have moderate to low potential for effects, provided that historic properties sensitive to fire are avoided or protected.

Felling trees, skidding and landing logs, road construction and decommissioning, grading native surface roads, and the operation of wheeled and tracked vehicles have the greatest potential to effect heritage resources. Post-harvest activities often include piling and burning slash, obliterating temporary roads, and soil stabilization. Activities associated with mechanized silvicultural treatments pose the highest potential to impact heritage resources because they involve the operation of industrial-scale logging equipment.

Studies in experimental archaeology suggest that skidding logs can damage the upper 20 cm of an archaeological site after just one skid. Tracked vehicles with 14 pounds of surface pressure per square inch can cause vertical artifact displacement and damage to artifacts (Philipek 1985).

All sites located within or near ground disturbing treatment units would be visited and evaluated under the selection of any action alternative. Sites determined potentially eligible to the National Register of Historic Places would be avoided and protected. Known cultural sites located within non-commercial treatment units, such as pre-commercial thinning, prescribed fire, and road work would be guided by the Programmatic Agreement between R6 Forest Service and Oregon SHPO (2004) and would be evaluated for National Register eligibility.

Protection measures for potentially eligible sites would be in place prior to ground disturbing activities (see Appendix J for Heritage Design Criteria # 2, 3, and 10).

Tribal

The spatial boundary for tribal interests is the LJCRP analysis area. The temporal boundary is for the duration of project implementation, expected to be 10 years. The Forest will always recognize the Federal-Tribal trust responsibility and tier to the laws and Executive Orders that call for government to government and staff to staff consultation processes in an effort to inform potential effects to tribal interests. Staff to staff consultation was ongoing throughout all phases of analysis, and would continue through implementation. The Forest Service would also consult with tribal staff to develop consultation, management and/or protection strategies should specific concerns arise regarding potential effects to Nez Perce traditional use areas and resources.

Research Natural Areas

Alternatives 2 and 3 would designate into perpetuity 338 acres of NFS land as the Horse Pasture Ridge Research Natural Area and 425 acres as the Haystack Rock Research Natural Area. During or after establishment, a management plan specific to the Horse Pasture Ridge and Haystack Rock areas would be written. Interim management of the areas would be followed as outlined in the LRMP, pages 4-84 and 4-85. The objective is to maintain the natural condition of the areas. No forest products or minerals would be removed, livestock grazing patterns would not be changed, fire activity would be limited to suppression only (unless fire is part of an approved research project), off road vehicles would be excluded, and recreation use would be managed at a low intensity level. Environmental consequences disclosed in the 1990 Forest Plan Final Environmental Impact Statement are still valid, and conditions and effects have not changed. Management strategies would not change under the establishment, and no adverse or irreversible environmental consequences are expected.

Inventoried Roadless Areas

Prescribed Fire: Joseph Canyon, Wildhorse, and Cook Ridge IRAs

Prescribed fire is planned for up to 90,000 acres within the LJCRP analysis boundary including within the IRAs. Treatment units and dry upland forest (dominated by low to mixed severity fire) are the highest priority for restoring fire to maintain and restore characteristic ecologic structures (Table 9). Returning fire to the IRAs supports restoration by influencing composition, density, structure, and landscape pattern. Second tier prioritization would include moist upland forest where fires tended to be of mixed to high severity. These forest types have experienced some level of departure but not to the same degree as dry upland forest and forests influenced by dry type disturbance regimes. The remainder of the landscape (non-forest) would make up the third priority areas with the exception of RNAs, which the Forest Plan prohibits the use of prescribed fire unless part of an approved research proposal. Table 47 shows the amount of high priority prescribed fire proposed under both alternatives. Alternative 2 proposes more than Alternative 3 because there would be no harvest or stand improvement within IRAs under Alternative 3.

Table 47. High priority prescribed fire areas by action alternative.

Roadless Name*	Alternative 2 (acres)	Alternative 3 (acres)
Joseph Canyon	8,700	8500
Wildhorse	9,800	8600
Cook Ridge	400	400
Total	18,900	17,500

*Mountain Sheep IRA has minimal area of high priority prescribed fire there would be no effect to roadless characteristics within this IRA.

The direct effects from prescribed fire would be the short term visual impact of smoke (during the fire) and blackened vegetation. Mortality would occur in fire sensitive species and small diameter in-growth. Prescribed fire would be conducted to favor early seral tree species (ponderosa pine, western larch) of any age, and PDC's are designed to protect habitat structures such as large snags and down wood (Appendix J, Wildlife). Trees would remain blackened longer than herbaceous, shrub, or grassland vegetation. Areas where prescribed fire occurs would appear as more open stands of early seral species, more light would be allowed through the forest canopy supporting a variety of understory plant species. In the long-term, the continuation of prescribed fire or use of unplanned ignitions managed to meet resource objectives would create a resilient landscape that would be natural appearing with high scenic quality, serve as potential for reference landscapes under historic disturbance regimes, and would support a wide variety of plant and animal communities associated with the LJCRP landscape. In the long term, it would be difficult to discern the difference between a naturally functioning fire regime and the type of prescribed fire planned for the LJCRP within the IRAs.

Short term prescribed fire effects include smoke, ash, blackened vegetation, small diameter tree mortality, potential incidental loss of existing large snags, and incidental creation of large snags through low level mortality of existing larger diameter live trees. These would be visible for one growing season to many decades (scorch marks on the boles of trees). These features would be expected to occur under reference conditions for the type of disturbance regime expected on this landscape. In the long term (many decades), the use of prescribed fire would support the restoration of forest structural attributes such as species composition, density, structure, and pattern. Therefore,

prescribed fire under both action alternatives would be consistent with and benefit many of the roadless characteristics and the restoration and maintenance of characteristic ecosystem structure.

High Quality or Undeveloped Soil, Air and Water Quality

Potential air quality impacts from prescribed fire would be seasonal in nature occurring predominantly in early spring or late fall. These impacts would only occur during prescribed fire activities and would generally dissipate within a week of ceasing activity. Implementation of landscape prescribed fire or activity fuel reduction within and surrounding the IRAs would follow the Clean Air Act (CAA) requirements and authorized through Oregon Department of Forestry that administers Oregon Administrative Rules (OAR) 629-048-0001 to 629-048-0500 (Smoke Management Rules) for smoke management. Compliance with CAA, DEQ, and OAR require smoke and particulate matter production predictions during the time of prescribed fire to follow the permitting process that mitigates long-term health and visual impacts.

Sources of Public Drinking Water

There are no known sources of public drinking water in the Joseph Canyon, Wildhorse, Cook Ridge or Mountain Sheep IRAs. Furthermore, conservative riparian protections are prescribed in the IRAs that restrict the removal of large diameter vegetation in the RHCAs, which would protect all beneficial uses of water (See Appendix J). Therefore, this IRA characteristic would be maintained.

Diversity of Plant and Animal Communities

We do not have adequate information to determine whether native plant diversity is higher or of better quality within the IRAs in LJCRP vs. outside IRAs. Plant diversity and quality of habitat is expected to be similar within and outside IRAs. Concentration of livestock probably has the most influence on lowering habitat quality, e.g. cover of native plant species. Project design criteria Range–5 would ensure that the botanist, invasive species specialist and range manager would work together to determine whether prescribed fire or other vegetation restoration activities would require resting portions of the pasture treated, which would help protect plant diversity in IRAs.

Habitat for Threatened, Endangered, proposed, candidate, and sensitive species and for those species dependent upon large, undisturbed areas of land

Wildlife: It is not expected that habitats for these species would be affected differently within the IRA as compared to outside. See discussion of potential affects to these species under the TES section of the FEIS. The most likely species that may be adversely affected by the management proposed within the IRA would include the fringed myotis, Johnson's hairstreak, Intermountain sulphur butterfly, and the Western bumblebee.

- The fringed myotis may be affected by the loss through harvest of large trees and snags. There would only be incidental harvest of large trees or snags due to safety concerns. The treatments proposed within the IRA meet the generally small diameter condition as shown in Figure 1.
- The Johnson's hairstreak may be affected by the reduction in mistletoe.
- The Intermountain sulphur and western bumblebee may be affected by loss of preferred plants immediately following prescribed fire.

These potential effects within the IRAs are likely short-term or negligible at the scale of the IRAs within the project area. Protection measures exist for large snags, old trees, and unique habitats such as rock faces (Appendix J).

Plants: The main threats to grassland sensitive plants (Davis fleabane, rough rabbitweed, Nez Perce mariposa lily, and Wallowa ricegrass) would be direct impact from ground disturbing activities such as harvest activities and road improvement for haul. There would be no road building within the IRA under any alternative.

Project Design Criteria (Appendix J) are established to minimize or avoid effects to these plant species from harvest, road improvement, and prescribed fire activities. Reintroduction of natural disturbance regimes would have a beneficial overall effect to all native plant species under the LJCRP.

Reference Landscapes

The LJCRP desired landscape condition is informed by reference conditions and historic variability in structure, composition, density, pattern, and disturbance regime. Treatments are designed to move these attributes closer to reference conditions to provide resiliency to stands and the broader landscape. The activities proposed in LJCRP would bring the landscape character closer to reference conditions and therefore would have a beneficial impact on the IRAs ability to represent reference landscapes within the LJCRP analysis area and Blue Mountains.

Traditional cultural properties and sacred sites

There would be minimal effect to traditional cultural properties and sacred sites due to the integration of implementation timing with the Nez Perce tribe. PDCs (Tribal-1 to 4) ensure this coordination takes place to minimize impact to tribal members. Existing and discovered sites would be managed to produce “no effect” or “no adverse effect” through avoidance as outlined in PDCs (Heritage-1 to 11).

Potential Wilderness Areas

Prescribed fire and stand improvement treatments within the Joseph and Wildhorse PWAs would affect roadless characteristics in the same way disclosed for their associated IRAs. It is assumed in this analysis that prescribed fire and stand improvement treatments would have no effect on the potential wilderness inventory criteria found in FSH 1909.12 Chapter 71. Prescribed fire would be the only treatment that would occur in the Cook Mountain PWA under any action alternative. Table 48 shows the amount of high priority prescribed fire and stand improvement that would occur by alternative. There would be no stand improvement treatments in potential wilderness under Alternative 3. All acres affected by these treatments would remain in the inventory of PWA since no substantially noticeable development (e.g. road building, harvest, etc.) would occur.

Table 48. Amount of high priority prescribed fire within potential wilderness areas by action alternative.

PWA Name	Prescribed Fire Alternative 2	Prescribed Fire Alternative 3	Stand Improvement Alternative 2
Joseph	1,100	1,100	0
Wildhorse	5,500	5,200	350
Cook-Mountain	70	70	0

Lands - National Landmarks and Parklands

There are no National Landmarks in the project area. Therefore, no impacts would occur for any National Landmark. There are no lands within the proposed project area that would be characterized as parklands; therefore, there would be no impacts on any parklands.

Prime Farmlands, Rangelands, and Forestlands

The project area is not located in or adjacent to prime farmlands; therefore, there would be no impacts to prime farmlands. The project does not contain prime rangeland because of soils and climate, and none of the proposed activities in the project would convert rangelands to other uses. The rangelands within the LJCRP would likely benefit indirectly from the restoration of forested vegetation in either Alternatives 2 or 3. The reduction of stand densities would allow more light to the forest floor, thus increasing the abundance of forbs and shrubs. Therefore, there would be no adverse impacts on prime rangelands. The project would not convert forestlands to other uses. All lands designated as forested would be retained and managed as forested; therefore, there would be no adverse impacts on prime forestland.

Cumulative Effects Common to Alternatives 2 and 3

Table 3 lists approximate acres of the various vegetation management, fuels treatment and prescribed burning activities as well as wildfires that have occurred within the project area from 2004 to 2013. Table 4 summarizes ongoing non-forest management activities in the LJCRP area. See Chapter 2, Affected Environment for more information on how past harvest, fuels treatment, prescribed fire and wildfire have influenced the existing character of the vegetation and natural fire regimes found in the LJCRP area.

Physical Environment

Climate

Climate change effects are a component of cumulative impacts. Changes in climate influence vegetation, water, and disturbance frequencies; and these changes, in turn, influence one another. A change in one aspect causes a cascade of responses that, in some cases, counteract and, in others, magnify the initial change. Such interactions make prediction of the likely effects of climate change difficult at the scale of the LJCRP analysis area even if the nature of the climate change were known. For now, it is certain that changes would occur at a continental scale; however, how climate change impacts local landscapes is not well understood.

Climate-informed modeling completed for the Blue Mountains by the USFS PNW Research and Development program (Peterson et al. 2014) suggest that Alternatives 2 and 3 generate considerably more large tree forest than Alternative 1 under the best case climate model (MIROC; Appendix C), but very little large tree forests remain after 90 years under the three other climate models studied.

However, until the environmental responses are better understood, it would be difficult to predict with accuracy the environmental outcomes of particular land-use activities. Species most at risk of climate change are those with small geographic ranges (e.g., local endemics), narrow physiological tolerances, limited dispersal abilities, narrow habitat associations, strong interspecific dependencies, low genetic diversity, and those that have recently experienced population declines. Impacts of climate-related extremes, such as heat waves, droughts, and wildfires, reveal substantial exposure and vulnerability of some ecosystems to climate variability (IPCC 2014). Tools to predict the potential climatic changes as influenced by the LJCRP activities over the next 10 to 15 years have yet to be devised, but it seems unlikely that measurable changes would occur relative to this project (potential temperature and precipitation increases being the most likely climatic change in this part of the continent) over the short life of this planning document.

Alternatives 2 or 3 would serve to similarly maintain carbon stocks by reducing uncharacteristic fire disturbance and producing wood products, which serve to sequester carbon. In general, due to the

scale of the LJCRP, and the relatively moderate current carbon density of eastside forests (see Affected Environment, Chapter 2), activities of Alternatives 2 or 3 are unlikely to affect forest carbon density appreciably in the LJCRP or analysis area.

Changes in the timing of streamflow reduce water supplies for competing demands. Increasing wildfire, insect outbreaks, and tree diseases are already causing widespread tree die-off (Melillo et al. 2014). All climate scenarios run for LJCRP show a landscape becomes dominated by mountain big sage, and warm-season shrubland. Grasslands nearly disappear. Without active management, conifer forest of all types decline to less than 10 percent, although one model shows ponderosa pine as a co-dominant with shrublands. Modeling shows that thinning and prescribed fire would conserve forests to mid-century (see Appendix C- Landscape Modeling Methods). Given the dry conditions predicted in the project area, an increase in non-native annual grasses is likely. However, vegetation adapts to changing climate in various ways. Individual plants adjust to climatic changes through phenotypic plasticity via traits like growth phenology and biomass allocation. Populations adapt through natural selection of traits based on genetic variability within the population and through long distance pollen or seed dispersal. Species also adapt to changing climate through migration, resulting in establishment of new populations in favorable habitats and the extirpation of populations from unfavorable habitats (Peterson et al. 2014). In a study of modeled response to climate change for rare plants in California, 60 of 156 species were predicted to have declines in climatic suitability, regardless of modeling technique; however, species in topographically dissected landscapes may be less vulnerable to climate change because they can find suitable climates locally as climate changes (Anacker et al. 2013). Given the complex topography in LJCRP, perhaps the majority of understory species would be able to persist on the landscape, though at a reduced scale.

Global climate change has the potential to have impacts to aquatic habitat through increases in water temperature and changes in stream flows in response to changes in climates[7]. Long-term changes to aquatic habitat in the analysis area may occur as a result of global climate. These changes may include:

- Increases in water temperatures in response to increases in air temperature
- Changes in runoff patterns in response to an increase in the amount of winter precipitation that falls as rain
- Decreases in summer stream flows in response to a reduction in snowpack
- Reduced duration of spring runoff, but higher peak flows due to an increase the amount of winter precipitation that falls as rain

Activities proposed under Alternatives 2 or 3 are unlikely to have measureable cumulative effects with global climate change because:

- The proposed thinning activities are unlikely to result in a change in runoff patterns because a significant decrease in forested cover would not occur.
- Potential increases in water temperature as a result of proposed burning are unlikely to occur in the analysis area and if increases do occur they are unlikely to be measureable.

7 For more information developed by the Forest Service to highlight potential impacts to aquatic habitat in the Pacific Northwest, see http://www.fs.fed.us/ccrc/topics/salmon-trout.shtml

Chemical Contamination

Most past and on-going land management operations throughout LJCRP area, such as silvicultural activities, timber sales, and all forms of road work use a variety of potential chemical contaminates (such as dust abatement, petroleum, concrete, adhesives, cleansers, herbicides, etc.) that pose a risk of entering waterways if spilled or mishandled. The level of timber harvest and associated road work on NFS land within the LJCRP area has diminished over the last two decades. Therefore, the level of additive effects that can contaminate water from such actions has also diminished.

The probability of alternatives 2 or 3 resulting in any cumulative effects to water contamination hinges on whether a substantial spill of petroleum or dust abatement products occurs. Should a spill occur and clean-up measures fail, a cumulative effect could be realized.

Soils

The cumulative effects discussion for soils resources focuses on soil productivity in the context of Detrimental Soils Conditions for the LJCRP area. Erosion would be included in the water quality discussion in the context of sediment delivery to streams. The LJCRP area has legacy impacts to soil productivity spanning nearly a century. These impacts include soil compaction, rutting, displacement, severely burned soil, surface erosion and soil mass movement resulting from management activity (Reeves et al. 2011). The duration and magnitude of these impacts are highly variable and depend on soil characteristics, physiographic characteristics, soil conditions at the time of impact, and the type of impact. Therefore, all known previous vegetation management activities (approximately 45 years) within the LJCRP area will be considered for the cumulative effects analysis. Furthermore, activities that are proposed in the LJCRP that have the greatest potential to produce DSCs, such as ground-based harvest and temporary road construction would be considered regardless of any known previous vegetation management activity. Approximately 45 percent of the units proposed for thinning were thinned since 1970. Several of these units have experienced multiple management entries. Reentry to these units could have cumulative effects that, without mitigation and/or site remediation, exceedLRMP Standards and Guidelines for DSCs. Additionally, both action alternatives propose the same amount of temporary roads (12.6 miles). Therefore, the activities in either Alternatives 2 or 3 would, in part, contribute to existing impacts that could, in turn, persist for decades. To manage this risk and comply with LRMP Standards and Guidelines, PDCs (Soils 1 – 8) and BMPs would be implemented (Appendix J). One PDC (Soils-7) discusses the need for DSC surveys. The project area would be surveyed, using established protocols prior to implementation. These surveys would not only evaluate legacy impacts, compared with the proposed LJCRP activities, the surveys would also evaluate remediation appropriateness (Soils-8) and opportunities to restore legacy impacts. Both Alternatives 2 and 3 would be compliance with LRMP Standards and Guidelines for DSCs. See the Physical Environment Supporting Documentation for more information.

Water Quality

The cumulative effects discussion for water quality will address the effects to the beneficial uses of water as designated by the Oregon Department of Environmental Quality for all waters within the Grande Ronde Basin. The designated beneficial uses of water for the Grande Ronde Basin include: public domestic water supply, private domestic water supply, industrial water supply, irrigation, livestock watering, fish & aquatic life, wildlife and hunting, fishing, boating, water contact recreation, aesthetic quality and hydro power. There are a variety of activities and disturbances, on both public and private lands that have the potential to impair the beneficial uses of water. Examples include: wildfire, prescribed fire, and road related work, unpermitted water uses, mass wasting events, chemical contamination, vegetation management activities, grazing and agriculture. The scale and

intensity of the proposed treatments under either Alternatives 2 or 3 would not have any measurable direct, indirect or cumulative effect to the beneficial uses of waters downstream from those within the LJCRP area. The LJCRP does not propose any changes to water use or any flow modifications; therefore, this discussion will focus on effects from the proposed management activities that have the potential to impact the beneficial uses of water at the scale of the site, reach, stream and/or waterbody within the analysis area.

Under Alternatives 2 or 3, there is an increase in potential for the chemical contamination of waters from equipment spills, leaks and misapplications of approved chemicals. BMPs would be implemented to manage this risk and there are no documented water quality limitations in the LJCRP area that pertain to chemical contamination. Therefore, there is no cumulative effect for chemical contamination of waters.

Partners and members of the public expressed concerns over sedimentation of waters within the LJCRP area (see Aquatics Sections) but no waters are currently listed as water quality impaired for sedimentation (Table 22). Fine sediment is typically mobilized in waterways during high flow events, such as the one that occurred during the winter of 1996 to 1997. Therefore, this 17 year period, ending at present, is the temporal bound for fine sediment accumulated from management within the LJCRP area. Wildfires and vegetation management activities with the potential to deliver seditment to streams disturbed a significant portion of the landscape from 2004 to 2014 (Table 3). From 1997 to 2004 there was an additional 2,500 acres of vegetation management activities but no large wildfires within the analysis area. An analysis was conducted of potential sediment production from haul activities, vegetation management and the current road system (See Physical Environment supporting documentation). Erosion and sediment delivery to streams from either Alternatives 2 orment loads at an unmeasurable level and thus have a cumulative effect. The Blue Mountains Forest Resiliency Project (FRP) is a proposed large landscape project on NFS lands that adjoins the LJCRP and any activities that occur upstream of the LJCRP has the potential to contribute to cumulative effects on water quality. If the FRP treatments reduce the risk of uncharacteristic disturbances, then Alternatives 2 or 3 in combination with the FRP would have the potential to mitigate future sediment inputs from high intensity wildfires.

Air Quality

Past harvest, fuels treatments, prescribed fire and wildfire have occurred over the past 10 years. These past treatments generally reduced forest fuel loading and altered their characteristics such that wildland fire would behave more similar to what would be expected under a natural fire regime. The cumulative effects of these past treatments would serve to reduce the amount of particulates released into the atmosphere. Ongoing activities such as cattle grazing and fire suppression alter the natural disturbance regime allowing increased fuel accumulation (fire suppression and grazing) or a re-arrangement of fuels such that the area burned would be different than historical (grazing).

Air resources are somewhat unique in that past impacts to air quality (past wildland fire or prescribed fire) are not evident. Smoke emissions during the spring and fall months primarily result from Federal prescribed fire activities in northeast Oregon and western Idaho. The Blue Mountains Forest Resiliency Project is a proposed large landscape project on NFS lands that adjoins the LJCRP and has the potential to contribute to cumulative air quality effects. Federal land managers currently coordinate to manage the cumulative effects of prescribed burning across these ownerships. Private landowners also treat fuels on their property. Private/Federal burning activities are coordinated with Oregon Department of Forestry subject to the Department’s smoke management rules.

Other sources of emissions come from summer wildfire, agricultural burning, and home heating in and around local communities. Wildfires and agricultural burning typically coincide in mid to late-summer. Home heating is normally limited to winter months. These occurrences generally produce small additive emissions and are not expected to impact air quality at the time prescribed fire activities are planned.

Biological Environment

Vegetation Management and Disturbance

For the cumulative effects analysis, the spatial context being considered is the 98,600 acre project area. Cumulative effects are discussed in terms of wildfire and vegetation management activities that have occurred since 2004 and as changes in the existing condition due to present and foreseeable activities, including the effects of the alternative being discussed. The time frame considered is approximately 10 years in the future at which time the majority of the actions proposed would have been completed and the vegetation response to these actions has occurred.

Table 3 lists approximate acres of the various vegetation management, fuels treatment and prescribed burning activities as well as wildfires that have occurred within the project area from 2004 to 2013. See Chapter 2: Affected Environment for more information on how past activities have shaped the existing conditions in the LJCRP area.

The following is a discussion of effects of past management activities and wildfires in terms of the analysis metrics specific to the vegetation resource.

Forest Cover Type – Planting activities increased occurrence of ponderosa pine and western larch within understocked areas. Thinning treatments favored ponderosa pine and western larch and discriminated against grand fir. Prescribed fire and wildfires also favored fire resistant tree species.

Forest Structural Stages - Thinning treatments generally retained old and large trees. Sanitation treatments may have removed some old forest structure. Prescribed fire and low severity wildfire resulted in periodic tree mortality of susceptible old trees. Mixed and high severity wildfire killed a large proportion of the old forest structure and increased acres within the stand initiation structural stage.

Tree Density Class - Thinning treatments resulted in forest density within the low to moderate density classes. This in turn had a beneficial effect of improved forest growth. Prescribed fire and low severity wildfire also led to localized reduction of forest density.

Pattern - The thinning treatments resulted in some irregular tree spacing. These treatments were incidental to reestablishing forest openings and attaining a mosaic of openings and tree clumps of varying sized and shapes. Mixed severity wildfires resulted in a mosaic of tree mortality and a pattern with indiscriminate openings and tree clumps. The remaining treatments and low severity wildfire resulted in some irregular tree spacing and clumping.

Size Class Distribution – Thinning treatments, prescribed fire and low severity wildfire generally favored larger trees and removed trees in the smaller size classes. This resulted in a size class distribution emphasis toward larger tree size classes. Moderate and high severity wildfire removed trees among all size classes.

Insects and Disease – Susceptibility was reduced in the thinning and prescribed fire treatments and low severity wildfire by enhancing stand conditions that are conducive to improved forest health

(trending toward RV). Thinning treatments also removed dwarf mistletoe infected trees reducing the percent of trees infected as well as creating conditions that slowed or inhibited mistletoe spread. Prescribed fire and low severity wildfire also led to localized reduction of forest density and dwarf mistletoe infection.

The treatments proposed in the LJCRP in conjunction with past and reasonably foreseeable future treatments would reduce the risk of reintroducing fire at a natural and ecologically appropriate scale and severity. The Blue Mountains FRP is a proposed large landscape project on NFS lands that adjoins the LJCRP and has the potential to contribute beneficial cumulative effects on fire regimes and transmission of fire across landscapes.

Rangelands

For the effects analyses, the spatial context being considered is the LJCRP area. The baseline year used for this analysis is the year 2014 as the existing condition. In this analysis, all past activities and events are included in the existing condition description. In the effects discussion, post treatment refers to the time the final activity is accomplished (assumed to be the year 2024), “short-term” effects refers to effects over the 10-year period (year 2034). Cumulative effects are discussed in terms of changes in the existing condition due to present and foreseeable activities, including the effects of the alternative being discussed. The time frame considered is approximately 10 years from the time the final activity would be accomplished, at which time the majority of the responses to these actions would have occurred.

Livestock grazing has occurred in most of the project planning area for decades and has resulted in changes in plant communities, especially in non-forested and riparian areas. Grazing affects plants through herbivory and trampling. Grazing can cause changes in shade, soil compaction, soil disturbance, and alteration of nutrient cycling. The degree of impact to plant species from grazing is related to the timing, duration, and intensity of the grazing action, as well as the individual characteristics and habitat requirements of the species. Grazing would continue to occur in the project planning area.

When silvicultural activities from the last thirty years are mapped, it becomes apparent that the same areas have been treated repeatedly. About 45 percentof the LJCRP commercial treatments would return to previous treatment areas. Road grading, piling and landings associated with past and proposed future vegetation treatments could temporarily restrict the movement of livestock and access to forage. As a result of project design criteria Range–1, the range manager will work with the timber sale officer with respect to the timing and location of logging operations, timber harvest within the project area is not anticipated to impact ongoing grazing operations. All gates would be closed while livestock are within the allotment adjacent to the harvest units. Given project design criteria Range–5, the botanist, invasive species specialist and range manager would work together to determine whether prescribed fire or other vegetation restoration activities would require resting portions of the pasture treated; as well as WWNF Forest Plan and HCNRA CMP standards and guides would reduce adverse effects associated with the LJCRP.

Prescribed fire can improve forage conditions if burning is conducted when native perennial grasses and forbs are dormant. Burning too hot, or when plants begin to grow, typically in the spring can kill or hinder native plants and promote weedy species. Prescribed fires would be planned to avoid damaging fences and water improvements (i.e., project design criteria Range–5: The botanist, invasive species specialist and range manager will work together to determine whether prescribed fire or other vegetation restoration activities would require resting portions of the pasture treated; Range–6: If any fences are damaged during burning operations, repairs must be made immediately to prevent

livestock from entering areas outside of established allotments; and Range–7: The range manager would work with fire management to determine timing and location of prescribed fire). Burn blocks would be planned in a manner that does not interrupt planned livestock management on the allotments. All burns would be coordinated with the District Range Management Specialist to reduce adverse effects associated with LJCRP.

Wildfires can increase forage in locations where they are low to moderate intensity. In forested range, high intensity fire generally reduces understory vegetation for a number of years (Matthews 2000). The Cache Creek (2012), Jim Creek (2006), Jim Creek (2000), and Teepee Butte (1988) fires covered around 70 percent of the HCNRA portion of LJCRP area. The Joseph Creek/Starvation Ridge fire (1986) burned about 31,000 acres in the Wallowa District portion of the LJCRP area. Post-fire seeding that was not targeted to specific areas of concern, such as the aerial seeding of non-native forage species after the Joseph/Starvation fire, may have had adverse impacts on native grass species. Without any seeding, bluebunch wheatgrass generally regains pre-fire cover the year after it burns. Idaho fescue can take a few years to regain pre-fire cover, but other components of Idaho fescue communities recover in the first year after burning (Johnson 2005). Changes in the timing and location of grazing in response to wildfire are beyond the scope of this project; however, WWNF LRMP standards and guides and HCNRA CMP standards and guides for range would be followed.

Ungulates tend to congregate in riparian areas, drawn by good forage and browse, water, and thermal cover (Roath and Krueger 1982, Gillen et al. 1984, Kauffman et al. 1984). Current range management practices use springs, ponds, salting, fences, and herding to encourage livestock movement (Wallowa County 2014). LJCRP would create more open forest in the uplands, as well as improve grasslands with savannah treatments to remove encroaching conifers and prescribed fire. Better quality upland forage in addition to current management practices would help keep livestock dispersed on the landscape. LRMP and CMP standards and guidelines, as well as project design criteria for range (recommending range management communication with timber sale personnel, fire management, botanical and noxious weed specialists, and protection of range structures such as fences and spring boxes) would prevent adverse effects related to LJCRP.

The Blue Mountains FRP is a proposed large landscape project on NFS lands that adjoins the LJCRP and has the potential to contribute cumulative effects to fire regimes and the transmission of fire across the landscape, as well as indirect cumulative effects to forage production from forest thinning and prescribed burning in allotments shared between the two projects (including the Cold Springs, Doe Creek, Chesnimnus, Swamp Creek and Davis Creek allotments).

Noxious Weeds and other Non-native Invasive Plants

For the cumulative effects analysis, the spatial context being considered is the 98,000 acre project area. Cumulative effects are discussed in terms of wildfire and vegetation management activities that have occurred since 2004 and as changes in the existing condition due to present and foreseeable activities, including the effects of the alternative being discussed. The time frame considered is approximately 10 years in the future at which time the majority of the actions proposed would have been completed and the vegetation response to these actions has occurred.

Herbicide use on the WWNF is currently guided by the 2012 partial vacatur (2012). This includes the use of herbicides on known selected sites within LJCRP. New and existing sites not identified for herbicide in the partial vacatur are limited to mechanical treatments.

Roads are a vector of weed spread and transport, thus unregulated road use, construction of temporary roads, and re-opening of previously closed roads increases the risk. Grazing could also increase the

risk of spread and introduction of non-native species. Livestock can transport seeds and other plant reproductive material over distances. The possible increase in the number of non-natives due to project activities coupled with transport by livestock could increase the risk for areas outside of the actual project and treatment area boundaries (Merriam et al. 2006). Conversely, the Blue Mountains FRP has the potential to increase the risk of spread of non-natives from outside the project area, while decreasing the risk of uncharacteristically severe fire transmission into the LJCRP area. Large scale and intense wildfire disturbance would create ideal areas for the introduction and spread of non-native plants. These impacts along with timber harvest disturbance (including log landings, skid trails, etc.) could compound invasive plant spread. These disturbed areas are likely sites of invasive plant infestations and surveys of completed timber sales, restoration of disturbed areas, and treatment of infestations would reduce the overall risk of establishment and spread of invasive plants. Ongoing treatments of non-native species help to mitigate the risks posed by management activities. Treatment continues on an annual basis within previously inventoried invasive sites as per the direction from the Region 6 Preventing and Managing Invasive Plants Environmental Impact Statement (USDA Forest Service 2005) and current WWNF direction. Cooperation among project personnel and forest invasive species specialists can increase the efficiency of this treatment by identifying areas early and beginning a treatment protocol prior to site expansion.

Threatened, Endangered, and USFS Region 6 Sensitive Plants and Biologically Unique and Rare Combinations of Outstanding and Diverse Ecosystems

For the cumulative effects analysis, the spatial context being considered is the project area. Cumulative effects are discussed in terms of wildfire and vegetation management activities that have occurred since 1985 and as changes in the existing condition due to present and foreseeable activities, including the effects of the alternative being discussed. The time frame considered is approximately 15 years in the future at which time the majority of the actions proposed would have been completed and the vegetation response to these actions would have occurred. In the past, present, and reasonably foreseeable future, there have been, and will continue to be, projects and activities within the planning area that may cause impacts to sensitive plants and their habitats. Projects and activities that create ground disturbance, change vegetative composition, and change domestic animal grazing patterns may potentially cause detrimental impacts to sensitive plant populations and habitats. These actions include road construction, timber harvest, fuel reduction treatments (landscape and pile burning, lopping and scattering of slash), fire suppression, recreation development, mining, and livestock grazing. Restoration efforts such as road decommissioning and stream improvements may potentially impact sensitive plant populations and habitat. Road construction and recreation developments have permanently altered native plant habitat in limited areas of the LJCRP area.

Grazing in most likely to complicate restoration efforts, especially in dry open forest habitats, where palatable browse and grass is most accessible. Dewey (2013) noted that livestock grazing causes trampling of Wallowa needlegrass. Pasture condition should be assessed by the district range specialist and the district botanist after restoration treatments occur and prior to putting livestock out to graze (Project Design Criteria Range-5). Premature use of treated pastures can lead to increased bare soil, erosion, decreases in native bunchgrasses and increases in invasive annual grasses.

Moist and wet meadows, riparian areas, springs and seeps may be more exposed after logging, thinning and/or prescribed fire, making them more vulnerable to use by both wild and domestic ungulates. Many of the springs in the project area have been converted to ponds, or diverted to troughs, locally drying soil and making water less available to vegetation.

Wildlife

Cumulative Effects on Dead and Defective Habitat

Past, present and foreseeable actions were reviewed to determine potential effects to dead and defective wood habitat. Other actions that would contribute to potential cumulative effects include hazard tree removal and firewood gathering. Within the LJCRP area (nearly 100,000 acres), there are no other vegetation management projects planned in the foreseeable future.

Cumulative effects of the LJCRP and the potential for hazard tree removal and firewood gathering have the potential to impact habitat and may increase risks to dead and defective wood habitat. This increased risk to loss of snags is of most concern in the Moist Forest PVG.

Alternatives 2 and 3 proposed harvest and prescribed burning activities are expected to help create habitat for Primary Cavity Excavators (PCEs) associated with open forests and reduce habitat for those PCEs using closed-canopied forests. Both alternatives would retain snags >12 inches diameter, except those lost for operational reasons or during prescribed burning. Snag losses by prescribed fire are assumed to be very low since burning prescriptions are aimed at retention of large diameter woody materials. This would result in minor effects to overall abundance of snags on the landscape.

Alternative 2 proposes harvests (commercial and non-commercial) on about 40 percent of the overall forested acres (Table 33). Alternative 3 proposes harvests (commercial and non-commercial) on about 20 percent of the overall forested acres. PDCs for the retention of snags and down wood would help maintain existing levels of this habitat for primary cavity excavators, which in turn would provide for secondary cavity nesters. Connectivity corridors with higher stand densities, and skips within stands would provide diversity of canopy cover and stand structure at various scales across the landscape as well as maintain some levels of natural snag creation.

Road closures and decommissioning would reduce disturbance and limit access for firewood cutting and snag loss. Open roads provide access to firewood cutters into the areas. Loss of snags to firewood gatherers would contribute in localized areas of snag loss in combination with the loss from harvest operations. Miles of open roads and an ‘open forest’ for use by motor vehicles cumulatively limit the amount of snags across the landscape.

The cumulative effects of the proposed activity in either Alternatives 2 or 3 would have a beneficial effect for some species and an adverse effect for others. White-headed woodpecker, which is a species of population viability concern, would benefit from treatments that accelerate the development of open canopied stands that maintain large snags, while habitat for species associated with closed-canopied forests with snags may decline.

Cumulative Effects to Pileated Woodpecker and Northern Goshawk, MIS species and other older forest associated wildlife

The cumulative effects analysis area for these MIS (pileated woodpecker, northern goshawk) is summarized together as these species use overlapping habitats. These species are generally associated with structurally diverse, closed canopied forests with larger tree structures. Additionally pileated woodpeckers use primarily large snags for nesting, foraging and roosting and are associated with down woody debris. Past timber harvesting, firewood gathering and an extensive road system have likely reduced some of these habitat components (e.g. large snags) within some areas in the LJCRP area. Additionally fire suppression has likely changed the abundance of these habitats, as would fire suppression in the foreseeable future. Fire suppression particularly in the dry forests has led to an increase above RV of source habitat for both these species. Past vegetation management projects have

been incorporated into the existing condition to evaluate the current abundance of these structural conditions for these species.

Alternatives 2 and 3 propose harvest and prescribed fire activities that are expected to reduce the amount of closed canopied forests, and the quality of habitat would decline through the loss of canopy closure, loss of large trees (≥ 21”) (Alternative 2 only), and loss of large snags from operational procedures. Although some of these important habitat components would be reduced, they would not be eliminated. This may reduce the potential of the area to provide habitat for goshawks and pileated woodpeckers in the short term (0-20 years); however, the quantity of source habitat for these species is projected to increase and remain within the HRV in the longer term (≥ 50 years) (see Appendix C).

Both Alternatives 2 and 3 would retain snags >12 inches diameter, except those lost for operational reasons or during prescribed fire activities. Potential loss of snags for operational reasons would result in a minor effect since the existing snag component is generally within RV (see cumulative effects for Primary Cavity Excavator MIS for more information on effects to snags/logs).

Continued fires suppression may increase fuel loadings, increasing the likelihood of stand replacement disturbance events. In Alternatives 2 or 3 the risk of large scale fire would be reduced. Large-scale stand replacing fires would not provide source habitat for northern goshawk or pileated woodpecker. However, the amount of post-fire habitat in the planning area is below RV, and some wildlife species are associated with post-fire habitat (e.g. black-backed woodpecker).

The LJCRP would impact pileated woodpecker and goshawk habitat. Though some current source habitat would be treated, and the quality of the habitat may be reduced, overall, source habitat would remain well within the RV for these species within the LJCRP area (Tables 34 and 35), and at the scale of the Forest (Tables 44 and 45). The RV for the WWNF for pileated woodpeckers is 1-39 percent and the RV for northern goshawks is 1-46 percent (Wales et al. 2011).

Primarily as a result of an abundance of source habitat in many areas above the median RV, the viability of goshawks in the Blue Mountains was calculated to currently be an A outcome (low concern) (Wales et al. 2011). Low concern for viability is defined as: current habitats are of moderate or higher abundance and quality relative to historical conditions, and are widely distributed or if gaps in distribution are present they are similar to historical distribution of habitat. A viability assessment completed for the Blue Mountains Forest Plan Revision indicates a moderate viability concern for the pileated woodpecker on the WWNF; suitable environments are moderately distributed and/or exist at moderate abundance across the historical range of the species (Wales et al. 2011).

Cumulative Effects to American Marten, MIS species

This species is generally associated with structurally diverse, closed –canopied forests with larger tree structures. Additionally marten are associated with down woody debris. Past timber harvesting, firewood gathering and an extensive road system have likely reduced some of these habitat components. Past vegetation management projects have been incorporated into the existing condition to evaluate the current abundance of these structural conditions for marten. Currently within the planning area, source habitat for marten is at the lower end of the RV.

PDCs within forest treatment stands (in either Alternatives 2 or 3) within marten source habitat provide for maintenance of >60 percent canopy closure and no harvest of trees ≥ 21” dbh.

Outside of source habitat in the moist forests, the reduction in canopy closure due to forest treatment would likely be short-term. As the canopy closes, and the trees grow, these areas would likely transition to source habitat for marten.

Alternatives 2 or 3 would retain snags >12 inches diameter, except those lost for operational reasons or during prescribed fire activities. This would result in a minor effect since the existing snag component and eventual down log component (see cumulative effects for Primary Cavity Excavator MIS for more information on effects to snags/logs).

Fire suppression has contributed toward creating denser forests. While these conditions may facilitate snag development due to increasing stress, over-stocked stands may in some cases inhibit tree growth, which may in the long-term suppress the growth of trees and eventually snag development in the larger size classes of snags, an important attribute for many PCEs. Continued fire suppression may increase fuel loadings, increasing the likelihood of stand replacement disturbance events. In Alternatives 2 or 3 the risk of large scale fire would be reduced. Large-scale stand replacing fires would not provide source habitat for marten.

This project would impact marten habitat in the LJCRP area. Though some current source habitat would have forest treatment, the prescription is to maintain these areas as source habitat, although the quality for the treated habitat is of lower quality. Overall, source habitat would remain nearly within the RV for these species in this project area (Table 36), and at the scale of the WWNF (Table 43). The RV for the Forest for marten is 19-29 percent (Wales et al. 2011). A viability assessment completed for the Blue Mountains Forest Plan Revision indicates a low to moderate concern for the American marten on the WWNF. Historically, habitat was of moderate to low abundance with gaps in distribution, and these conditions are similar at the scale of the WWNF currently (Wales et al. 2011).

Cumulative Effects to Landbirds including Neotropical Migratory Birds

Past timber sales, fires, roads, grazing, and prescribed fires have modified and converted migratory bird habitat in the LJCRP area. Past logging has led to the current lack of old, big trees in the area due to selective harvesting, and was likely detrimental to species that depended on contiguous conifer cover and avoided forest edges. Grazing has modified understory fuels and fire suppression has interrupted historic fire return intervals. Consequently, many stands are now overstocked with young trees and are vulnerable to insects, disease, and wildfire.

An extensive road network built to facilitate timber operations has had a long-term impact on the area and continues to provide access for recreationists, hunters, permittees, woodcutters, and others. Roads also facilitate the removal of snags as fire wood and for safety considerations (Gaines et al. 2003, Bate et al. 2007, Wisdom and Bate 2008). Gaines et al. (2003) reviewed 238 articles on the effects of recreation trails and roads on wildlife and found the most commonly reported interactions included displacement or avoidance where animals were reported as altering their use of habitats in response to roads or road networks (Cassirer and Groves 1990, Klein 1993, Hutto 1995, Mace et al. 1996, 1999, Johnson et al. 2000). Disturbance at a specific site was also commonly reported and included disruption of animal nesting, breeding, or wintering areas (Skagen et al. 1991, Linnell et al. 2000, Papouchis et al. 2001). Collisions between animals and vehicles were commonly reported and affected a diversity of wildlife species, from large mammals (Gibeau and Heuer 1996, Lehnert et al. 1996) to amphibians (Ashley and Robinson 1996). Finally, edge effects associated with roads or road networks constructed within habitats, especially late-successional forests, were commonly identified (Hickman 1990, Miller et al. 1998).

Grazing is an ongoing activity in the project area. While grazing does not affect forest canopies, shrub and grass habitats can be altered by vegetation removal, which leads to reduced structural diversity. A simplification of the vegetation likely causes a shift to generalist species (Knopf 1996). Grazing should not affect migratory bird shrub or grass habitat because grazing following the Forest Plan

standards should leave adequate shrub and grass cover, and is designed to allow for normal recovery rates that do not delay regeneration.

Because treatments prescribed in Alternative 2 or 3 would begin to shift the LJCRP area toward the overall long-term goal of increasing forest resiliency and moving toward RV, it is not expected to have adverse cumulative effects. Forest treatments are designed to increase open-canopied habitats especially in larger tree structures that are below RV. Prescribed fire is designed to maximize retention and protection of large diameter live trees, snags, and logs. A mosaic of forest and rangeland conditions capable of supporting breeding migratory bird populations and more similar to the RV would exist under Alternatives 2 or 3.

Cumulative Effects on MIS Rocky Mountain Elk

Past, present and future management activities have contributed to cumulative effects on big game habitat and consequently distribution of big game populations in the LJCRP area. These activities include: past timber harvesting practices, understory thinning, fire suppression, prescribed fire, wildfires, livestock grazing, road construction, road closures and decommissioning. Cumulative effects from the LJCRP and previous timber harvesting can have both beneficial and adverse impacts to big game habitat. Past changes in structural conditions due to harvest are incorporated in the existing condition data. While the increase in forage can be beneficial during late winter, spring, and perhaps summer months, the reduction in cover can have adverse effects on these hunted species during the fall hunting seasons. However, decades of fire suppression has contributed to higher stand densities that are beneficial for big game distribution by providing hiding cover, offsetting cumulative effects of vegetation projects that move timber stands toward historic open forest conditions. Although Alternatives 2 and 3 are moving the landscape to more open-forested conditions, closer to the RV, overall the landscape would still be above the RV for closed-canopied forests, offering security areas for elk.

Research conducted at the Starkey Experimental Forest and Range in Northeast Oregon and associated research sites is providing new insights regarding the importance of maintaining adequate nutritional resources for elk (Cook et al. 2013), and of minimizing human disturbance effects through effective management of motorized access and cover (Rowland et al. 2000, Naylor et al. 2009).

Current restoration efforts across the WWNF are moving forested stands to more resilient forests, though some of these areas may not be utilized due to greater distance to cover from open roads, reducing security, and increasing vulnerability to hunting pressure. These large treated blocks may lack escape cover, and since there are high road densities forest wide, elk habitat quality could decline in some localized areas until cover is reestablished. Additionally, loss of cover and higher road densities may lead to displacement of animals onto private lands and conflicts with private land owners.

The reduction of cover and road closures are reflected in the HEI analysis for each alternative. Although there is a large loss of cover, the LJCRP area meets the Forest Plan Standards for HEI in both Alternatives 2 and 3. PDCs include measures to provide cover by retaining non-thinned patches of forest trees (“clumps” and “skips”) and avoid placing ‘openings’ along more heavily used open roads.

Wildfires and prescribed fire may also create quality forage for wild ungulates. Cumulative effects from harvest, thinning, and prescribed fire in the same units can reduce ground cover and concealment for fawns and calves, possibly increasing predation rates.

The WWNF contains a road network totaling around 9,120 miles of documented roads, of which about 4,630 are open to motorized vehicles. These roads can have adverse cumulative effects to big game and reduce the effectiveness of existing habitat. Additionally, motorized cross county travel is an additional cumulative effect potentially leading to increased disturbance and vulnerability. The effectiveness of road treatments varies depending on terrain and public compliance. Currently in 6 of the 10 subwatersheds road densities are above LRMPstandards in MA 1. Alternatives 1 or 2 would reduce these densities, while Alternative 3 has relatively minor change to the abundance of open roads.

Elk populations are managed by ODF&W and current population objectives (management objectives) are much higher than a minimum level needed to sustain viability. Based on the number of hunt tags issued annually and surplus animals harvested, population viability is not a concern. Elk populations on the WWNF in most hunt units are above or at management objectives. Therefore, Alternatives 2 and 3 are not expected to contribute to a negative trend in elk viability on the WWNF.

Cumulative Effects on MIS from the LJCRP in combination with future projects

The Blue Mountains FRP has the potential to contribute cumulative effects on forest structure, density, cover, pattern, tree species composition, and fire regimes, and hence habit for wildlife MIS. The purpose and need of the FRP is similar to that of the the LJCRP with the intent to move all habitats to within the natural range of variability, and viability for MIS are analyzed at the Forest-wide scale for both projects. Cumulative effects of the LJCRP and FRP are expected to have similar trends to those of the LJCRP, and will be disclosed in the FRP EIS.

Aquatic Habitat

Past management activities in the LJCRP are summarized in Tables 3 and 4. Potential impacts from these activities on aquatic habitat have likely abated. The Blue Mountains FRP is a proposed large landscape project on NFS lands that adjoins the LJCRP and has the potential to contribute to cumulative effects. The FRP proposes forest treatments similar in type, extent and effect as the LJCRP, although specific treatment locations are not yet known. The FRP does not propose new road construction, but is likely to include road maintenance. Impacts from road construction and reconstruction are discussed separately.

The analysis area for aquatic resources for the LJCRP includes portions of 15 livestock grazing allotments. Bank alteration, browsing of shrubs and high fine sediment levels along streams within the active allotments are being addressed by improved management and administration of the grazing that occurs in riparian areas.

Noxious weed treatment is an ongoing project that occurs within all LJCRP area subwatersheds. These treatments were determined to either have No Effect or to May Affect, Likely to Adversely Affect Snake River steelhead. Consultation with NOAA Fisheries has been completed for the May Affect, Likely to Adversely Affect determinations.

Currently, the WWNF is treating noxious weeds with herbicides approved in the WWNF Invasive Species EIS (see Affected Environment, Non-native invasive plants section, above). Mitigation measures that include type of chemical treatments, application rates, area treated, timing, and buffers on streams significantly reduce the risk of effects from this activity. However, the overall risk of adverse aggregate effects due to noxious weed treatment is rated moderate because they are not completely controllable.

A limited amount of dispersed camping occurs in the LJCRP area, but due to the relatively steep topography and limited camping along perennial streams, this activity is rated as having a low risk of cumulative effects on aquatic resources, listed fish or their habitat.

There are two developed campgrounds in the LJCRP area: Coyote and Dougherty. Both have limited use primarily during hunting season and during the summer. This activity is rated as having a low risk of cumulative effects on aquatic resources, listed fish or their habitat.

Regularly scheduled road maintenance occurs every one to seven years depending on the condition of the road, available funding, the assigned maintenance level, and the maintenance priority. Other scheduled maintenance activities occur as specific needs are identified. Maintenance levels for roads are determined by the road management objectives, the intended use, operational requirements, and budget levels. Maintenance activities occur primarily from late April to late November depending on the actual condition of the road and moisture level. Maintenance levels are summarized in the following paragraphs.

Four types of road surface occur in the LJCRP area: (1) native (dirt surface), (2) improved (pit-run surface, spot-rocked), (3) aggregate (crushed rock surface), and (4) asphalt concrete pavement. The surface types vary for each maintenance level of road depending on the long-term objectives for the road.

Road maintenance practices can vary to provide additional protection to soil and water resources. Seeding of closed roads and low-use roads would be intensified. Keeping maintenance equipment away from streams and wet areas and limiting the number of stream crossings would be emphasized to protect soil and water resources. The use of pit-run (3- to 6-inch) rock on roadbeds would be used to increase protection from erosion. Emergency repair of roads would occur after natural disasters such as flash floods or unusually high spring runoff for all maintenance levels.

The short-term effects from all of the transportation activities would be minimized through PDCs (such as instream work windows, operating under dry conditions, etc.). In the long-term, Alternatives 2 or 3 would protect and improve existing aquatic habitat. The overall risk of adverse aggregate effects for transportation activities in the short term is rated moderate. The overall risk of adverse aggregate effects for transportation activities in the long term is rated low with a long term beneficial benefit.

There are six culverts proposed for replacement within the LJCRP area. These culvert replacements are proposed to eliminate migration barriers to juvenile fish and to allow passage of 100-year flows. These projects were given a likely to adversely affect (LAA) determination in the consultation with NOAA Fisheries due to the short-term possibility of sediment input to streams. In the long term, however, these projects are expected to have a beneficial effect on listed fish species and habitat.

Collection of fuelwood, Christmas trees, saw logs and house logs (up to three truck loads per permit), and posts and poles are permitted only in Management Areas 1, 3, 6, 10, and 11 (Maps 11a and 11b). Harvest of these products is not permitted in administratively prohibited areas such as developed campgrounds or within 100 feet of wet areas, seeps, springs, bogs, and standing or flowing water. No trees are permitted to be cut within 300 feet of perennial fish-bearing streams. Compliance with these regulations is monitored by USFS Special Forest Product Coordinators and Law Enforcement Officers. These activities are given a low risk rating for cumulative adverse effects to listed fish species.

Timber production and livestock grazing are the primary land use activities occurring on private lands adjacent to the LJCRP area. Logging operations on private timber lands are required to follow Oregon's Forest Practices Act and are monitored for compliance by Oregon Department of Forestry. Private lands adjacent to the south and west boundaries of the project area have recently been logged. It is assumed that logging was conducted in accordance with the Oregon Forest Practices Act and therefore impacts to aquatic habitat were successfully mitigated.

Activities, such as roads and timber harvest, on private lands that are likely to result in cumulative effects with activities proposed under LJCRP are assumed to be limited. Road densities on private lands in the LJCRP area exceed the consultation guidance for Snake River Steelhead on public lands. Both values would be rated as functioning at unacceptable risk using NOAA Fisheries Matrix of Pathways and Indicators thresholds.

Past and current management activities have had, and are having impacts to aquatic habitat and aquatic species (including Snake River steelhead and redband trout) in the LJCRP area. These impacts have resulted in a decline in aquatic and riparian habitats in the LJCRP area. Water temperatures and fine sediment levels in the project area are likely higher today then prior to European settlement. Current activities (including livestock grazing) on NFS lands are managed under the standards and guidelines of the WWNF LRMP as amended by PACFISH which were developed to speed the recovery of riparian and aquatic habitats. The majority of streams in the project area are assumed to be recovering from past degraded conditions. However, fine sediment levels are elevated in the LJCRP area. Grazing and roads are the two major management activities in the analysis area contributing to fine sediment effects.

Social Environment

Recreation

Past projects and actions that have affected recreation uses include timber harvest, road construction, and recreation uses and have been incorporated into the existing condition for the LJCRP. This project in combination with current projects has a slight potential to influence dispersed recreation activities by displacing big game hunters, berry pickers, and other recreational uses both during implementation and in the longer-term, post implementation. The Blue Mountains FRP is a proposed large landscape project on NFS lands that adjoins the LJCRP and could have cumulative effects to recreation in similar ways to past and present activities.

Scenery

The geographic boundary for this cumulative effects analysis is the LJCRP area and the temporal boundary is approximately 10 years, the amount of time needed for evidence of logging, restoration activities associated with road management and ecological function to soften and blend into the landscape more completely.

Vegetation management has occurred in the past in the LJCRP area. There have been numerous timber sales, fuels reduction treatments, and activities associated with hazard tree removal in developed campgrounds and along travel routes. Roading, timber harvest and recreation development have changed the landscape from a natural appearing forested landscape.

The activities of past management activities in total combine to maintain a range of scenic integrity levels from high to low in the designated viewsheds within the LJCRP area.

Vegetation management would continue to occur as routine hazard tree removal in developed recreation sites and along travel routes. A sustainable forest would be promoted, the larger diameter trees (>20”) would be retained and become more healthy as competition from other vegetation would be reduced. The large trees would have more nutrients, water, and space for growing and would be more visible for viewing along the travel routes. The landscape character would be scenically and ecologically improved as the vegetation patterns become more diverse as a more complex forest structure is established and old growth characteristics become more dominant. The Blue Mountains FRP is a proposed large landscape project on NFS lands that adjoins the LJCRP and would reinforce these beneficial cumulative effects to scenery. Overall, the trend is that scenic natural appearing landscapes would be more apparent over time in the forested setting within the LJCRP area.

Heritage

The temporal boundary for analysis of cumulative effects on cultural resources is expected to be 10 years. The spatial boundaries include the extent of treatment units. Land management activities such as grazing, road building, vegetation management and recreation impacted heritage resources for more than 100 years through active site disturbances to passive disruption of historic habitats and traditional uses. The LJCRP has the potential to impact heritage sites and resources in Alternatives 2 and 3 proportional to the scale and intensity of the prescribed treatments. This potential impact is largely mitigated through project design and surveys. Activities with a greater potential to disturb ground cover include temporary road building and ground based harvest. There is no scheduled vegetation management activities in the reasonably foreseeable future outside of those proposed in the LJCRP. However, recreation and fire management activities are expected to continue to occur at the same levels for the next 10 years as they did in the preceding 10 years. With the implementation of Alternatives 2 and 3, there may be a decrease in ground disturbing fire management activities over the 30 years following implementation of the LJCRP. Overall, the cumulative effects on heritage resources as a result of Alternatives 2 and 3 are not considered to be adverse due to compliance with the Programmatic Agreement between the Pacific Northwest Region of the Forest Service and the Oregon State Historic Preservation Office (2004), PDCs (Appendix J, PDC’s #2, 3, and 10), mitigation and development of site protections.

Tribal

Prescribed fire, thinning, dispersed recreation, grazing, timber harvest, wildfire and the exercise of treaty rights have and will continue to occur into the foreseeable future. Although tribal members are concerned about the risk of the pace and scale of accelerated restoration, ecological objectives, as identified in the purpose and need, would likely offset adverse effects to tribal values. See cumulative effects discussions for all resources.

Inventoried Roadless Area, Potential Wilderness Areas, and Other Undeveloped Lands, and areas identified as unroaded by Oregon Wild

See discussions under cumulative effects for Alternatives 2 and 3.

Socioeconomics

The Blue Mountains FRPt is a proposed large landscape project on NFS lands that adjoins the LJCRP and has the potential to contribute to cumulative beneficial economic effects. (i.e. jobs and labor income are expected to increase from both BMFRP and LJCRP projects). Other cumulative effects to recreation and wildfire resilience will impact the social values held in the area. The recreation section explains that the LJCRP, in combination with current projects, has a slight potential to influence dispersed recreation activities by displacing big game hunters, berry pickers, and other recreational uses both during implementation and in the longer-term, therefore the social values for human use of

the area could have negative cumulative impacts. However, since both projects aim to improve the health of the forests and wildfire resilience, the cumulative long-term impacts will be positive for social values that rely on healthy forests. Also see cumulative effects discussion for Socioeconomics for Alternatives 2 and 3.

Short-term Uses/Long-term Productivity

Short-term effects of forest management and prescribed fire would reduce inter-tree competition and free up growing space for residual trees and understory vegetation. Under Alternatives 2 or 3, the proposed actions and associated PDCs would not affect long-term productivity of forest vegetation and timber resources.

Unavoidable Adverse Effects

Alternatives 2 or 3 may affect Snake River steelhead or its designated critical habitat and are likely to adversely affect (LAA) the species and its designated critical habitat. Impacts to Snake River steelhead may occur as a result of short-term immeasurable increases in fine sediment (see effects to aquatic habitat section) relating to the replacement of aquatic organism passage and treatment of RHCAs. This short term increase in fine sediment relative to the existing fine sediment levels would cause the effect to be adverse for listed Snake River steelhead. This determination is made under Section 7 of the ESA for federal actions.

Irreversible/Irretrievable Commitments of Resources

Under Alternatives 2 or 3, the proposed cutting and harvest of live trees would represent an irreversible and irretrievable commitment of the trees cut and harvested, although regeneration would occur.

Alternative 2: Direct, Indirect, and Cumulative Effects

The Physical Environment

Soils

Surface Erosion

The effects of surface erosion are approximately the same between Alternatives 2 and 3 due to the same amount of ground based harvest and temporary road building. The potential for surface erosion within one year of implementation is slightly higher in Alternative 2 due to potentially higher haul traffic, more harvest activities and more road decommissioning. In the year following implementation, the potential for surface erosion would likely be lower under Alternative 2 than Alternatives 1 and 3 due to reestablishment of ground cover and stabilization of disturbed areas, including decommissioned roads. Alternative 2 would decrease the probability of an uncharacteristic wildfire disturbance (scale and intensity) that would have the potential to greatly increase surface erosion that would affect site productivity and water quality relative to Alternatives 1 or 3.

Sediment from Harvest Activities

There would be a negligible difference in sediment produced from harvest activities between Alternatives 2 and 3 (See Physical Environment Supporting Documentation). There is the potential for Alternative 2 to produce more sediment relative to Alternative 3 at a scale corresponding to the intensity of the treatment. See “Effects common to all alternatives”.

Sediment from Log Haul

See “Effects common to all action alternatives”. There is the potential for Alternative 2 to produce more sediment from log haul relative to Alternative 3 at a scale corresponding to the intensity of the treatment. Both alternatives would use the same haul routes and the difference in intensity would be too small to evaluate the effects between Alternatives 2 and 3.

Mass Wasting

See “Effects common to all action alternatives”.

Soil Productivity

There is the potential for Alternative 2 to produce more detrimental soil conditions (DSC) than Alternative 3. There would be minor additional contributions to DSCs in Alternative 2 from skyline and helicopter harvest systems but these activities would not cause an exceedance of the WWNF Forest Plan Standards. Under Alternative 2 there would be more opportunity for DSC remediation as there are more stands being treated. See the PDCs (Soils-7, Soils-8). See “Effects common to all action alternatives”.

Air Quality

See “Effects common to all action alternatives”, above.

The Biological Environment

Vegetation and Disturbance Regimes

Table 49 lists the cutting treatments proposed under Alternative 2, approximate acres for each treatment and the percent of the total treatment acres each treatment type represents. The following is a list and

description of other treatments that are proposed for Alternative 2 and are not listed in the description of treatment type table.

- Single Tree Selection in MA15 –similar to other single tree selection treatments with emphasis on old growth characteristics.
- Meadow Restoration – removal of young trees that have encroached onto meadow complex adjacent to Swamp Creek.

Table 49. Alternative 2 – Acres by cutting treatment type in the LJCRP area

Treatment Type	Approximate Acres	Percent of Treatment Acres (Percent of Forested Acres)
Stand Improvement	5,400	25%
Single Tree Selection – High Intensity	4,800	23%
Single Tree Selection – Moderate Intensity	5,800	26%
Single Tree Selection – Low Intensity	1,200	6%
Single Tree Selection in MA15 – Moderate Intensity	650	3%
Single Tree Selection in MA15 – Low Intensity	10	<1%
Group Selection – High Intensity	1,800	9%
Group Selection –Moderate Intensity	590	3%
Group Selection – Low Intensity	40	<1%
Intermediate Treatment – High Intensity	120	1%
Intermediate Treatment – Mod Intensity	120	1%
Intermediate Treatment – Low Intensity	90	<1%
Savanna*	530	3%
Meadow Restoration* (Swamp Creek)	31	≤1%
Cutting Treatment Total (Forested Acres)	**21,170 (20,610)**	**100% (37%)**
Forested Acres – No Cutting Treatment	**34,690**	**(63%)**
Total Forested Acres	**55,300**	**(100%)**

*Savanna and meadow restoration treatments are in areas that do not meet the definition of forested.

A total of 21,170 acres of cutting treatments are proposed. Moderate and high intensity single tree selection treatment types account for almost half of the forest treatment acres and SI (non-sawlog) treatments add another 25 percent. Under this alternative, approximately 39 percentof the forested acres within the project area would have a cutting treatment.

Within the 2,430 acres of stands with a group selection treatment type, there may be a need to plant approximately 500 acres to ensure the prescribed post treatment stocking and species mix is attained.

Logging Systems

Logging systems were estimated by the interdisciplinary team using a combination of slope, distance to specified roads, and limited use of temporary roads to access the proposed harvest units. The associated acres by estimated logging system are listed in Table 50. Map 25 shows the estimated logging system by unit and logging system type. The final logging system selection by stand would be completed during implementation, considering the final decision and site specific constraints and opportunities.

During FEIS analyses, the Regional logging engineer field verified a seven percent sample of treatment stands, and found the original estimates to differ from the field verification by -9 percent, 85 percent, and -26 percent for ground based, line, and helicopter system, respectively (see the project record for more information). Consequently, the analysis of effects for all resources took a conservative approach and considered the potential range in acres by logging system represented by -26 to +85 percent of the original estimated acres. Further, individual resource effects were assessed by stand relative to the potential for implementation of more impactful logging system(s) than the original estimated system (e.g., if a ground based system were implemented instead of an estimated helicopter or skyline system), and no

specific resource concerns were identified. In general, as a result of project design criteria, best management practices, and Forest Plan standards and guidelines applied at the stand level by resource, implementation of logging systems within the ranges specified in table 50 would result in no differences in effects. Specific design features and best management practices for each logging system are listed in Appendix J.

Table 50. Alternative 2 - Acres by logging system

Logging System	Original Estimate of Approximate Acres	Percent of Total Harvest Treatment Acres	Analyzed Range in Approximate Acres (-26 to +85% of the original estimate)	Analyzed Range in Approximate Percent of Total Harvest Treatment Acres
Ground Based (Tractor)	6,200	39%	4,600-11,470	29-73%
Line	4,500	29%	3,300-8,300	21-53%
Helicopter	5,000	32%	3,700-9,250	24-59%
Total Harvest Acres:	15,700	100%		

Forest Cover Type

Cover type percent by PVG and percent change from existing condition due to Alternative 2 treatments are listed in Table 51. The largest movement toward RV would be in the ponderosa pine cover type. There would be a 10 percent increase in the dry PVG and another 2 percent increase in the moist PVG. There would also be notable changes to the Douglas-fir cover type with a 9 percent reduction in the dry PVG and a 2 percent reduction in the moist PVG. Alternative 2 would move all cover types in both PVGs closer to RV with the exception of lodgepole pine in the moist PVG.

Forest Structural Stages

Table 52 summarizes the forest structural stage percent PVG and percent change from existing condition due to Alternative 2 treatments. Largest movement toward RV would be in the OFSS structural stage with a 6 percentincrease in the dry PVG and 2 percent increase in moist PVG. The SE stage would experience movement away from RV in both PVGs. Alternative 2 would result in movement toward RV in OFSS and SI and movement away from RV in all other stages. This is due to the time lag of development from the UR/YFMS structural stages to the OF structural stages. This provides an opportunity for restoration to further move the percentage of dry PVG OFSS stage within RV.

Tree Density Class

Table 53 displays the density class percent by PVG and percent change from existing condition due to Alternative 2 treatments. Alternative 2 would move or maintain all density classes within RV for both PVGs.

Pattern

Alternative 2 would treat 21,170 acres using the ICO approach for restoring forest spatial pattern. ICO is designed to use evidence of historic stand structure during a time where characteristic disturbance created a heterogeneous landscape pattern. There would be about 48,200 acres of high priority prescribed fire with up to 90,000 total acres available. The return of fire as a relevant process would support the creation and maintenance of characteristic pattern within the LJCRP.

Size Class Distribution

Thinning treatments would result in an immediate increase in average tree diameter by favoring dominant and codominant trees. The treatments would also increase average tree diameter in the short term by reducing inter-tree competition and improving individual tree growth.

Table 51 displays the estimated post treatment size class distribution and the percent change from the existing distribution under Alternative 2. For both the dry and moist PVGs, tree size class would be trending toward larger tree size classes with a 9 and 7 percent increase respectively in the >20 in size class.

Table 51. Alternative 2 – Post treatment distribution of forest cover types in the LJCRP area

Potential Vegetation Group	Cover Type	Acres	Percentage of Potential Vegetation Group (Percent Change from Existing)	Range of variation (%) (Powell 2010)
Dry upland forest (UF)	Ponderosa pine	16,200	38% (+10)	50-80
	Douglas-fir	18,000	42% (-9)	5-20
	Western larch	720	2% (+1)	1-10
	Lodgepole pine	90	<1% (-<1)	0
	Grand fir	7,000	16% (-2)	1-10
	Engelmann spruce	0	0% (0)	0
	Unknown	260	1%	
Dry UF Total		42,300	100%	
Moist upland forest (UF)	Ponderosa pine	1,700	13% (+2)	5-15
	Douglas-fir	5,600	43% (-2)	15-30
	Western larch	760	6% (+2)	10-30
	Lodgepole pine	170	1% (-1)	25-45
	Grand fir	4,600	36% (-<1))	15-30
	Engelmann spruce	70	1% (-<1)	1-10
	Unknown	40	<1%	
Moist UF Total		13,000	100%	
Grand Total		55,300		

Table 52. Alternative 2 – Post treatment distribution of forest structural stages in the LJCRP area

Potential Vegetation Group	Structural Stage	Acres		Percentage of Potential Vegetation Group (Percent Change from Existing)		Range of variation (%) (Powell 2010)
Dry UF	OFSS	2,600		6% (+6)		40-60
	OFMS	9,000		21% (+1)		5-15
	YFMS	2,700	19300	6%	46% (+1)	5-10
	UR	16,600		39%		
	SE	3,700		9% (-9)		10-20
	SI	7,500		18% (+1)		15-25
	Unknown	180		<1%		

Potential Vegetation Group	Structural Stage	Acres		Percentage of Potential Vegetation Group (Percent Change from Existing)		Range of variation (%) (Powell 2010)
Dry UF Total		42,300		100%		
Moist UF	OFSS	220		2% (+2)		10-20
	OFMS	4,300		33% (+3)		15-20
	YFMS	1,800	4,700	14%	36% (+<1)	10-20
	UR	2,900		22%		
	SE	1,700		13% (-5)		20-30
	SI	2,100		16% (+<1)		20-30
	Unknown	20		<1%		
Moist UF Total		13,000		100%		
Grand Total		55,300				

Table 53. Alternative 2 – Post treatment distribution of tree density classes in the LJCRP area

Potential Vegetation Group	Tree Density Class	Acres	Percentage of Potential Vegetation Group (Percent Change from Existing)	Range of variation (%) (Powell 2010)
Dry UF	Dry High	6,400	15% (-18)	5-15
	Dry Mod	9,500	22% (-10)	15-30
	Dry Low	26,200	62% (+28)	40-85
	Unknown	180	<1%	
Dry UF Total		42,300	100%	
Moist UF	Moist High	3,300	25% (-20)	15-30
	Moist Mod	5,200	39% (+11)	25-60
	Moist Low	4,400	34% (+9)	20-40
	Unknown	50	2%	
Moist UF Total		13,000	100%	
Grand Total		55,300		

Table 54. Alternative 2 – Post treatment tree size class distribution in the LJCRP area

Potential Vegetation Group	Tree Size Class (diameter range in inches)	Acres	Percentage of Potential Vegetation Group (Percent Change from Existing)
Dry upland forest (UF)	<5	5,300	13% (-4)
	5-10	2,900	7% (+5)
	10-15	10,700	25% (+13)
	15-20	12,500	30% (+2)
	>20	10,700	25% (+9)
	Unknown	180	<1%
Dry UF Total		42,300	100%
	<5	1,500	11% (-5)

Potential Vegetation Group	Tree Size Class (diameter range in inches)	Acres	Percentage of Potential Vegetation Group (Percent Change from Existing)
Moist upland forest (UF)	5-10	1,400	11% (+5)
	10-15	2,700	21% (-6)
	15-20	3,400	26% (-2)
	>20	3,900	30% (+7)
	Unknown	70	<1%
Moist UF Total		13,000	100%
Grand Total		55,300	

Disturbance and Fire Regimes

See “Effects common to all action alternatives”, above. The action alternatives vary in effect based solely on intensity of treatment represented by the number of acres. Alternative 2 includes more acres of harvest and SI, thereby directly improving forest structure, density, and composition and associated fire regime characteristics.

Prescribed Fire

Alternative 2 proposes about 48,200 acres of high priority prescribed fire. Alternative 2 has the largest beneficial effect on fire regime departure and landscape resiliency through implementation of prescribed fire and a greater amount of forest treatment and stand improvement. Alternative 2 proposes prescribed fire on approximately 4 to 6 percent of the landscape per year compared to the reference of 6 – 15 percent. In high fire years, approximately 5 – 10 percent is predicted to burn from wildfire. This is within the reference fire regime and expected natural burn pattern insofar as the area adapting to and with fire as a disturbance process.

Activity Fuels

There would be more activity fuels created with the implementation of Alternative 2 as compared to Alternative 3. The treatment of activity fuels in “Effects common to all action alternatives” remains the same. Disposition of activity fuels is a key part in ensuring that fire severity does not increase due to the additional accumulation of fuels as a result of silvicultural activity (forest treatment and stand improvement). There is no increased impact to fire risk under Alternative 2 when compared to Alternative 3.

Fire Management Decision Space

Alternative 2 creates the most decision space of Alternatives 2 and 3 to manage wildland fire (planned and unplanned ignitions). State-and-transition modeling for the LJCRP area (Appendix C) indicates that during a high fire year in the LJCRP area, the amount of the landscape that burns is within the expected fire regime extent (6-15 percent/year). Although there is no difference between expected acres burned with planned and unplanned ignitions, (4 – 6 percent) depending on the year, there is a large benefit to managing unplanned ignitions under Alternative 2 due to the active management of IRA, PWA, Old Growth Preservation areas, and RHCAs. This creates an environment with less ecological and social risk of having unwanted fire effects in one year, such as uncharacteristic severe fire or fire affecting a large portion of the area (particularly within or adjacent to IRA, PWA, Old Growth Preservation areas, and RHCAs), that would impact the character of forest succession and fire regime. Alternative 2 affects the ability of wildland fire in a positive manner to become a restorative process at an ecologically appropriate scale and severity.

Insect and Disease Susceptibility

Table 55 lists the estimated, Alternative 2 post treatment susceptibility ratings for the six insect and disease agents associated with the PVGs and cover types within the LJCRP area. The following is a comparison of expected post treatment ratings to existing ratings, as an indication of stand conditions that are conducive to improved forest health and trending toward the range of variation (RV).

Table 55. Alternative 2 – Post treatment insect and disease susceptibility in the LJCRP area

Potential Vegetation Group	Agent	Susceptibility Rating - % of Forested Area					
		Low		Moderate		High	
		Post Trt.	RV Range	Post Trt.	RV Range	Post Trt.	RV Range
Dry upland forest (UF)	Defoliators	31%+	40-85%	45%+	15-30%	24%-	5-15%
	Douglas-fir Beetle	17%+	35-75%	53%+	15-30%	29%-	10-25%
	Fir Engraver	41%=	45-90%	45%=	10-25%	14%=	5-10%
	Bark Beetles in P Pine	22%-	5-10%	59%+	15-30%	19%-	40-90%
	Douglas-fir Dwarf Mistletoe	14%=	25-55%	39%=	15-40%	46%=	20-35%
	Root Diseases	34%+	30-60%	52%+	25-50%	14%-	5-25%
Moist upland forest (UF)	Defoliators	10%+	5-10%	29%=	20-30%	61%-	35-90%
	Douglas-fir Beetle	6%+	30-60%	30%+	20-40%	64%-	10-30%
	Fir Engraver	20%+	30-70%	37%+	20-35%	43%-	10-20%
	Bark Beetles in P Pine	28%-	40-70%	64%+	15-35%	8%-	5-25%
	Douglas-fir Dwarf Mistletoe	12%+	30-65%	33%=	20-45%	55%-	10-20%
	Root Diseases	22%+	5-15%	56%+	20-50%	22%-	35-75%

+ increase from current; - decrease from current; = same as current.

Dry PVG

- Defoliators and Douglas-fir beetle would be outside RV for all ratings, with a higher percentage in the low and moderate ratings and lower percentage in the high rating than existing condition.
- Fir engraver would be the same as existing condition for all ratings.
- Bark beetles in ponderosa pine would continue to be outside RV for all ratings, with the low rating moving closer to RV.
- Douglas fir mistletoe would continue to be below RV for the low rating, above RV for the high ratings and within RV for the moderate rating.
- Root diseases would continue to be within RV for the low and high ratings, the moderate rating would increase outside RV.

Moist PVG

- Defoliators would continue to be within RV for all ratings. The low rating is higher; the moderate rating is the same and high rating is lower than existing condition.

- Douglas-fir beetle would move toward RV for the low and high ratings and continue within RV for the moderate rating.
- Fir engraver would be outside RV for all ratings. The low and high rating would move toward RV.
- Bark beetle in ponderosa pine would move further below RV in the low rating, and above in the moderate rating and remain within RV for the high rating. Bark beetle susceptibility is heavily weighted to cover type, size class, and forest structure. Since Alternative 2 is moving toward a desired condition of a mixed ponderosa pine cover type, increased size class and old structural stage, susceptibility increases in many cases from low to moderate.
- Douglas-fir dwarf mistletoe would be outside RV for the low and high ratings. The low rating would move up toward RV and the high rating would move down toward RV.
- Root diseases would be outside RV for all ratings. The ratings would continue on the current trend of above RV for the low and moderate ratings and below RV for the high rating.
- Dwarf Mistletoe and the Degree of Mistletoe Infestation – PDCs common to all treatment types include discriminating against mistletoe infected trees, discriminating against host species (Douglas-fir) and creating conditions that minimize potential for spread to uninfected trees. This would result in a reduced mistletoe infection wherever mistletoe infections occur within the 21,378 acres of forest treatment proposed under Alternative 2. This includes 336 acres of forest treatment in moderate to heavily mistletoe infected stands.

Timber Resource

There would be approximately 15,700 acres of harvest treatment (acres treated that remove timber volume) and there would be approximately 10,400,000 cubic feet of timber volume removed as a result of all forest stand treatments. This would be a direct beneficial effect of Alternative 2.

Rangelands, Understory Vegetation, and TES Plant Species

Rangelands

See the effects common to Alternatives 2 and 3. Treatments in Alternative 2 (Map 19) would have the greatest beneficial impact on forage production where post treatment takes density to less than 40 percent cover. Moist upland forest treatments where density would be reduced to less than 40 percent canopy cover would occur on less than one percent of the LJCRP area. Using a conservative estimate of 10 percent increase in forage for dry upland forest stands that are taken to low density, about 8-12 percentof the project area in Alternative 2 would show increased forage production. Allotments that would have over 1,000 acres treated to less than 40 percent canopy closure would be Cold Springs, Cougar Creek, and Swamp Creek. Allotments that would have 500 -1,000 acres treated to less than 40 percent canopy closure would be Davis Creek, Hunting Camp, Table Mountain and Teepee Elk. The amount of forage depends on many factors, such as annual variations in precipitation, heat, soil, and competing vegetation. Project Design Criteria Range-1 (coordinating timber sale operations with the timber sale administrator) would help avoid impacts to ongoing grazing operations.

Noxious Weeds

Alternative 2 would treat areas in designated old growth (MA15) and IRAs, resulting in more acres of commercial harvest, and thinning than Alternatives 1 or 3. While direct effects of timber harvest on non-native plants are difficult to predict and quantify, they would occur through ground disturbance and introduction of invaders into new areas. Disturbance associated with timber harvest and fuels reduction are expected through movement of heavy equipment, soil displacement, vegetation compression, and burnt ground from prescribed fire activities; but the amount of disturbance can vary depending on activity

density and type. For example, the effects of pre-commercial thinning are generally much less severe, due to the minimal level of soil disturbance, than the effects associated with commercial harvest or yarding activities. Project activities can introduce new species into areas by transporting non-native plant material on machinery or personnel.

Alternative 2 includes meadow restoration adjacent to Swamp Creek (a RHCA Class 1 stream), where there is a large scattered population of meadow hawkweed. Project Design Criteria would mitigate risks of invasive species spread due to project activities (INVP–4: Do not disturb meadow hawkweed in Swamp Creek, or other locations within the project area, through ground disturbance that would create bare soil or move seeds or vegetative parts of meadow hawkweed plants to new locations. Machinery used in Swamp Creek Meadow must be washed prior to leaving site).

Alternative 2 would implement all previous decisions for road closures made by the WWNF and close some additional road segments to move toward LRMP road density standards for aquatic and wildlife habitat. The overall differences in risk of spread of noxious weeds between Alternatives 2 and 3 in miles are nominal. The length of external haul routes is common to both alternatives.

To protect LJCRP from the spread of noxious weeds and invasive plants through activities related to vegetation treatments, R6 guideline 2 (clean all heavy equipment (bulldozers, skidders, graders, backhoes, dump trucks, etc.) prior to entering NFS Lands) and project design criteria) would be implemented (i.e., INVP–5 No parking, decking or piling on established weed sites; INVP–6 All landings, burn piles, skid trails and other disturbed areas created as part of a this vegetation restoration project would be rehabilitated and seeded as per Pacific Northwest Region October 2005 Invasive Plant Program Preventing and Managing Invasive Plants Prevention Standard 2, and FSM 2070.3 with the input and approval of local botanist; and INVP–7 Known invasive plant populations would be flagged and/or mapped prior to road grading and other road improvements, designation of parking areas and landings, and logging, with work overseen by the invasive species specialists. Equipment operators would receive maps with known sites and instructions to avoid flagged or otherwise identified areas.

Threatened, Endangered and USFS Region 6 Sensitive Plants

Coniferous Forest

Sensitive plants found in coniferous forest are discussed in detail under effects common to all action alternatives.

Ponderosa pine/Idaho fescue and ponderosa pine/bluebunch wheatgrass plant associations should be conserved within the project area through prescribed fire and thinning. Alternative 2 would have more benefit to these biologically unique communities than Alternative 3 because there are more acres of proposed treatment. Fire suppression is the main threat, but noxious weeds and invasive annual grasses are also a threat. Project design criteria such as minimizing prescribed fire and ground disturbance in areas with weeds as well as PDCs Range-5 and -7, using interdisciplinary input to assess areas for treatment and timing of prescribed fire with respect to noxious weeds, range resources, and sensitive plants are recommended.

Alternative 2 could have greater impact on the biologically unique plant community grand fir/Pacific yew/queencup beadlily than Alternative 3 because it would provide more opportunity for commercial thinning in moist mixed conifer forest. See effects common to all action alternatives for more detail and mitigations.

Grasslands

Two green-band mariposa lily populations are adjacent to units that would be treated in Alternative 2, but not treated in Alternative 3, because the green-band mariposa populations are within the Wildhorse IRA and in the HCNRA at the end of the TeePee Butte Road. The units are planned as helicopter based logging systems. Potential direct effects to green-band mariposa lily would include crushing by tree felling or machinery parked in open areas, as well as some soil disturbance from removal. Indirect effects could be negative in the case of spreading invasive annual grasses and noxious weeds through ground disturbance and prescribed fire. Beneficial indirect effects could be the removal of conifers encroaching into grassland stringers and nitrogen release as a result of prescribed burning. HCNRA CMP standards and guides to protect and manage habitats and populations of TES plant species to ensure their continued existence would be implemented (TES-01, TES-02, and TES-G2). PDC Gra-O1 (manage grassland vegetation to ensure continued ecological function and sustainability of native ecosystems. Maintain and/or restore the ecological status of grassland communities to their potential natural condition recognizing their RV), from the HCNRA CMP is specific to maintaining grassland ecosystems and would be used as guidance for conserving native grasslands while implementing grazing. Project design criteria to protect grassland stringers and sensitive plant habitat in grasslands are TESP-2 (No road construction or staging areas on non-forested habitats), and INVP-3 (avoid prescribed fire and ground disturbance from vegetation treatment and related activities where invasive non-native species are found). Direct and indirect effects to grasslands may impact individuals or habitat, but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species (MIIH).

Lithosol/ Shallow Soils

Alternative 2 would have the most activities near lithosol habitat, although the activity areas in Alternative 3 are still substantial. Direct effects to TES plants found on lithosols are crushing plants with machinery; burying plants during grading and landing construction; damaging plants during felling and yarding; and burying plants under slash piles. Indirect effects are soil compaction and spread of noxious weeds and invasive annual grasses (Brooks 2009, Dewey 2013). WWNF Forest Plan standards and guides as well as HCNRA CMP standards and guides would be followed for the white fleabanes, and the LRMP would be followed for Wallowa needlegrass. Both the LRMP and the CMP provide guidance to maintain natural plant communities and to maintain all native species within projects (LRMP 4-30 to 4-31, CMP TES-01, BIO-S1).

Project design criteria TESP-2 (no road construction or staging areas on non-forested habitat), and TESP-3 (avoid disturbing Davis fleabane/Snake river daisy populations adjacent to Cold Springs Road and feeder roads) would help prevent adverse effects related to road construction, landings and piling. PDC RANGE-5 (the botanist, invasive species specialist and range manager would work together to determine whether prescribed fire or other vegetation restoration activities would require resting portions of the pasture treated) would be used to ensure the recovery of native plants and habitats, as well as biological soil crusts. With mitigations, Alternative 2 may impact individuals or habitat, but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species (MIIH) in Lithosols in the LJCRP area.

Moist Meadows, Wet Meadows, Riparian Areas, Springs and Seeps

There are no documented species from moist meadows, wet meadows, riparian areas or springs and seeps, however there are twelve suspected TES plants in these habitats. The only treatment in Alternative 2 within Category 1 RHCAs is in Swamp Creek, where lodgepole would be thinned. Category 4 RHCAs (intermittent streams) in forest treatment stands would be treated in Alternative 2, and there would be a 25 foot variable width no harvest and no equipment buffer established during implementation by a hydrologist or fisheries biologist. Both the LRMP and the CMP provide guidance to maintain natural

plant communities and to maintain all native species within projects (LRMP 4-30 to 4-31, CMP TES-01, BIO-S1). Seeps and springs would be protected from logging and thinning activities with project design criteria such as BIO –1 (avoid disturbing natural seeps and springs, wet meadows, moist meadows, this includes removing shrubs and trees; except in Swamp Creek).

Swamp Creek moist meadow habitat is infested with the invasive plant meadow hawkweed. Project design criteria INVP–4 (do not disturb meadow hawkweed in Swamp Creek, or other locations within the project area, through ground disturbance that would create bare soil or move seeds or vegetative parts of meadow hawkweed plants to new locations) would be followed. Machinery used in Swamp Creek Meadow must be washed prior to leaving site. If standards and guides and PDCs are followed, direct and indirect effects are unlikely in these habitats and no impact (NI) is expected.

Aquatic Habitat

Forest Treatment Activities

Under Alternative 2, RHCA, as prescribed in PACFISH, would be utilized to protect aquatic and riparian habitats in the LJCRP area (see Design Criteria in Appendix J). These RHCA delineations would occur on Category 1, 2, and 3 streams, ponds and wetlands.

Category 4 RHCAs would be delineated as prescribed by PACFISH, but would have a silvicultural treatment within the RHCA that would be used to maintain and restore RMOs for the Category 4 stream and RHCA. Only those Category 4 RHCAs that are not in OFSS would be treated (approximately 1,800 acres). Those RHCAs that are in OFSS are assumed to be at the RMO for sediment and large wood debris recruitment. The silvicultural prescription would be similar to the upslope treatment prescription with the addition of a 25 foot variable width no treatment buffer on either side of the Category 4 stream channel. Mechanical thinning activities, skid trails, and landings would be located outside of RHCAs. Forest treatment stands would be logged using a combination of ground-based and aerial logging systems.

Under Alternative 2, commercial thinning activities using mechanical equipment would occur over about 16,000 acres. Ground disturbing activities (i.e. yarding, development and use of skid trails and landings) would be limited to areas outside of RHCAs.

No effect to stream temperature from the Category 4 RHCA treatments would be realized.

With no site specific stand data on Category 1 and 2 RHCAs, there would be no forest treatment proposed in Alternatives 2 and 3 for those RHCAs, except for Swamp Creek. Any proposed treatment prescriptions for Category 4 RHCAs would follow a minimum 25 foot variable width no treatment buffer on either side of the channel. This would provide protection from equipment disturbance to the channel banks and maintain the existing supply of large woody debris to the channel.

The treatment outside the no treatment buffer would follow the treatment prescription for the upslope stand. The area from 25 to 100 feet is similar in species composition and stand structure, as well as the range of variation, to the upslope area. This treatment would provide the long term stand conditions for the RHCA to provide for the maintenance of the site specific riparian management objectives. This treatment would reduce the influence of uncharacteristic wildfire on stand structure and composition, and potentially contribute to a reduction in the effects of climate change on stand structure (and in-turn stream flow), and the effects of insect infestations on the stand. Additionally, forest treatment would result in faster growth of residual trees due to reduced competition, thus increasing the size of potential coarse woody debris. In this manner it would provide for resilience to the vegetation in the likely event of future disturbance.

Only 31 acres of a Category 1 stream RHCA (located in the upper Swamp Creek subwatershed), would be treated. These acres would be treated to remove some existing shade producing trees (all trees over 15 in dbh would be left) but in the long term serve to restore the meadow storage capacity thereby reducing water exposure to direct solar radiation and reducing stream temperatures in the long term.

Danehy and Kirpes (2000) found that the riparian microclimate gradient on four perennial streams in the Grande Ronde Basin of eastern Oregon extended no more than 10 meters (30 feet) from the edge of the stream channel into the upland forest. Beyond 10 meters humidity was similar to upland conditions.

A study conducted by Chan et al. (2004) on four different buffer widths with upland density management (thinning) suggests that riparian buffers of various configuration results in relatively small changes in the riparian climate. Buffer widths in the study were 1) streamside retention (less than 25 feet), 2) variable width (about 57 feet), 3) one site potential tree width (about 201 feet), and 4) two site potential tree widths (about 400 feet). The study involved small headwater streams, and results of the study found that the area between the stream and 15 feet lateral distance from the stream is uniquely riparian with respect to microclimate. This 15 foot zone is remarkably resistant to microclimate changes from upland thinning treatments.

Anderson et al. (2007) studied the effects of thinning on the riparian microclimate in western Oregon. Three buffer widths (measured from stream center) were used for mechanical thinning and are: 1) streamside retention averaging nine meters (about 27 feet), 2) variable width averaging 22 meters (about 66 feet), and 3) one site potential tree height averaging 69 meters (about 207 feet). The study concluded that: riparian microclimate gradients are strongest within 10 meters of the center of the stream (about 30 feet), upslope thinning has little detectable effect on the stream center microclimate, buffer widths defined by the transition from riparian to upland vegetation or topographic slope breaks appear sufficient to mitigate the impacts of upslope thinning on the microclimate above the stream, and there was no apparent mitigation associated with wider buffers.

Treatment of the 31 acres (0.50 mi of Designated Critical Habitat (DCH)) would affect only 2.7 percent (0.4 percentof total DCH miles) of the total acres of Category 1 streams in the Lower Swamp Creek subwatershed. The retention of all trees over 15 inch dbh, as well as the 25 foot variable width no harvest buffer, would retain shade producing vegetation. There would be no affect to stream temperature from the treatment of 31 acres of the RHCA in Swamp Creek.

For all other Category 1 and 2 streams, restricting activities to areas outside of RHCAs would prevent adverse impacts to existing stream shading along perennial streams. The RHCA widths adjacent to these streams, 300 feet for Category 1 streams and 200 feet for Category 2 streams, are sufficient to prevent removal of trees that provide stream shading. Therefore, measurable increases in stream temperatures would not result from proposed forest treatment activities in these streams.

Road Activities

Fine sediment levels in streams have been shown to increase as the density of roads in a watershed increase (Cederholm and Reid 1987). To access treatment stands no new road construction would be needed for the LJCRP. Road reconstruction would need to take place on 82.6 miles of road in the LJCRP area (Table 32). The WEPP-Road Model estimates that soil eroded off the road segments used for haul routes would be unlikely to reach the nearest stream channels (see Physical Environment supporting documentation).

The total road density for the Lower Joseph Creek Watershed in the LJCRP area is under the requirements of the 1998 Biological Opinion for Snake River LRMPs for Snake River Steelhead (2 miles per square mile of total roads). The total road density for Upper Joseph Creek Watershed is over the 2.0 miles per

square mile density requirement There are a number of subwatersheds that contain Snake River steelhead that have elevated road densities (Tables 56 and 57). The higher road densities, which are an indicator of fine sediment delivery to fish bearing streams, would have an effect on steelhead and redband trout production. These higher densities are found in three subwatersheds in the LJCRP area.

Table 56. Total road density by subwatershed within the Upper Joseph Watershed by alternative

Subwatershed Name	Alternative 1		Alternative 2		Alternative 3	
	Total Roads	Total Rd Density	Total Roads	Total Rd Density	Total Roads	Total Rd Density
Broady Creek	45.8	2.85	45.8	2.85	49.8	3.11
Horse Creek	18.2	2.01	18.2	2.01	18.2	2.01
Rush Creek	22.4	2.53	20.6	2.33	22.7	2.57
Lower Cottonwood Creek	7.2	0.68	7.2	0.68	7.2	0.68
Upper Cottonwood Creek	25.8	1.35	25.8	1.3.5	25.8	1.35
Peavine Creek	25.5	1.45	24.5	1.45	25.4	1.45
Watershed Total:	**172.2**	**2.43**	**195.6**	**2.19**	**219.2**	**2.45**

Table 57. Total road density by subwatershed within the Lower Joseph Watershed by alternative

Subwatershed Name	Alternative 1		Alternative 2		Alternative 3	
	Total Roads	Total Rd Density	Total Roads	Total Rd Density	Total Roads	Total Rd Density
Cougar Creek	53.0	2.61	38.9	1.92	53.02	2.61
Sumac Creek	46.6	3.11	40.3	2.69	46.6	3.11
Lower Swamp Creek	41.8	1.80	41.8	1.80	41.5	1.78
Davis Creek	30.8	2.48	27.9	2.25	30.75	2.48
Watershed Total:	**219.2**	**2.45**	**148.9**	**2.10**	**171,8**	**2.42**

Temporary roads would be constructed to access forest treatment units. An estimated 12.6 miles of temporary roads would be constructed. The temporary roads would not be constructed in RHCAs, except at four stream crossings, for a total of 800 feet and 0.027 acres. The temporary roads would be decommissioned following completion of haul activities. Analyses conducted in WEPP indicate a low probability of measurable sediment delivery from these temporary roads (see the Physical Environment supporting documentation).

The combination of road re-construction, temporary road construction and road decommissioning, opening and use of closed roads, and log haul traffic would likely result in an increase in erosion rates in the LJCRP area. Increases in erosion rates would occur in the short-term and then trend toward background levels. RHCAs would likely moderate much of the increase and the amount of sediment reaching stream channels and would likely result in an immeasurable increase in fine sediment levels in the stream channels (see Physical Environment supporting documentation).

PACFISH standards and guideline for timber harvest activities and RHCAs were developed to limit impacts to aquatic habitat from timber harvest activities. There is a low likelihood that increases in fine

sediment resulting from the proposed timber harvest activities would result in measureable increases in fine sediment in fish bearing streams in the analysis area.

Prescribed Fire Activities

Prescribed fire activities would occur in RHCAs in accordance with Blue Mountains PDCs. The use of low intensity fires in RHCAs would reduce fire intensities by reducing fuel loading. Reduced fire intensities in RHCAs would 1) reduce the potential for mortality of trees that provide shade, 2) reduce the amount of downed woody material consumed, and 3) reduce the amount of burned area in the RHCAs thus reducing the amount of ground cover loss. Typically, only about 40 to 60% of the area in an RHCA is actually burned due to the use of low intensity fires and higher fuel moistures. See the Vegetation/Disturbance specialist's report for a more detailed description of the expected post-burn conditions.

The majority of the burned areas in RHCAs would be concentrated along the outer edges of the RHCAs where fuel moisture levels would be lower compared to areas closer to stream channels. Prescribed fire would result in a greater area of ground cover consumption in RHCAs adjacent to intermittent streams due to lower fuel moisture levels compared to perennial streams.

The burn prescription would target consumption of woody material 3 inches and smaller with nearly all material in this size class consumed. Therefore, fire severity would not be high enough to consume significant quantities of downed wood that play a role in trapping fine sediment on hill slopes, in intermittent stream channels, and on floodplains. Some ground cover would be consumed but would be quickly replaced as litter fall occurs in the first year following burning and herbaceous plants recover in the second year following burning. A measurable increase in fine sediment in stream channels as a result of prescribed fire activities is unlikely due to the combination of a predicted patchy, low severity burn in RHCAs and typical recovery of ground cover within two years of prescribed fire activities.

Prescribed fire activities would result in a low severity fire in RHCAs adjacent to perennial streams in the LJCRP area. This would be accomplished by low intensity fire when fuel moisture levels are high. These techniques result in low intensity fires that burn in a patchy distribution of burned and unburned areas in RHCAs. Trees killed by prescribed fire in RHCAs would primarily be understory trees (< 9 in. dbh). Understory trees of this size typically do not provide significant levels of stream shading.

Few riparian shrubs are also expected to be killed as a result of the prescribed fire because they are present in the more moist riparian areas. Where the above ground portions of riparian shrubs are killed, they would likely sprout back relatively quickly because the low severity fire would not be hot enough to kill the roots.

Prescribed fire in RHCAs adjacent to intermittent streams poses little risk of increasing stream temperatures because these streams are normally dry during the summer and fall months. Based on these factors, the LJCRP is unlikely to result in a measurable increase in water temperature and a degradation of water quality in streams.

Threatened and Endangered Aquatic Species

Alternative 2 of the LJCRP may affect Snake River steelhead or its designated critical habitat and likely to adversely affect (LAA) the species and its designated critical habitat. Impacts to Snake River steelhead may occur as a result of short-term immeasurable increases in fine sediment (see effects to aquatic habitat section) relating to the replacement of aquatic organism passage and treatment of RHCAs. This short term increase in fine sediment relative to the existing fine sediment levels would cause the affect to be adverse for listed Snake River steelhead.

Management Indicator Species – Aquatic Species

Alternative 2 of the LJCRP may impact individual redband trout and their habitat (MIIH), but would not likely contribute toward federal listing or loss of viability to the population or species. Impacts to redband trout may occur as a result of short-term immeasurable increases in fine sediment (see effects to aquatic habitat section).

Alternative 2 of the LJCRP may impact individual Snake River steelhead and their habitat (MIIH), but would not likely contribute toward loss of viability to the population or species. Impacts to Snake River steelhead may occur as a result of short-term immeasurable increases in fine sediment (see effects to aquatic habitat section).

Most streams in the LJCRP area currently exceed the 20 percent RMO for fish bearing streams for fine sediment. Forest treatment activities are limited to about 1,800 acres within RHCAs. Prescribed fire activities would occur in a larger area but the effects relative to sediment would be mitigated by implementation of the project PDCs. Short-term potential increases in fine sediment from proposed prescribed fire and forest treatment activities are unlikely to result in measurable increases in fine sediment in streams in the LJCRP area.

Impacts from activities proposed under Alternative 2 may result in short-term degradation of habitat for Snake River steelhead and redband trout. However, anticipated immeasurable increases in both fine sediment and water temperature are within habitat tolerances for steelhead and redband trout.

Alternative 2 of the LJCRP may impact individual western ridge mussels and their habitat (MIIH), but would not likely contribute toward federal listing or loss of viability to the population or species. Impacts to western ridge mussels may occur as a result of short-term immeasurable increases in fine sediment (see effects to aquatic habitat section).

Cumulatively, aquatic habitat should improve over time in the LJCRP area. Fine sediment levels should decrease through time as a result of improved road closures and decommissioning activities. Alternative 2 may result in a short-term increase in fine sediment resulting from prescribed fire activities.

In the long-term, Alternative 2 would improve vegetative conditions and maintain the natural fire regime in the LJCRP area, which would have beneficial impacts to western ridge mussels and their habitat.

Wildlife

Primary Cavity Excavators

Effects assume project design criteria Wild-1-Wild-14 (Appendix J) would be implemented. These include protection measures for large trees, large snags, downed logs during harvest and prescribed fire activities.

Also see “effects common to all action alternatives”.

Under Alternative 2, the forest treatments proposed would adversely impact current and future dead and defective wood habitat. Forest treatment is proposed on about 40 percent of the forested landscape (Table 33). It can be assumed that within treatment areas there would be a reduction in snags and logs due to skid trails, landings, safety reasons and prescribed fire. Forest treatment and prescribed fire are expected to help create habitat for primary cavity excavators (PCEs) that use open forests (e.g. white-headed woodpeckers) and reduce habitat for those PCEs using dense forests (e.g. pileated woodpeckers).

Alternative 2 treats more acres (21,200) than Alternative 3 (13,300), thus there is a greater reduction in snag and down-wood habitat elements in Alternative 2 due to safety and placement of skid trails, landings, etc. Even when not prescribed for removal, research has found that thinning treatments resulted in losses of pre-treatment snags (Agee 2002, Harrod et al. 2009)

The potential removal of trees ≥ 21 in. dbh on up to 5,000 acres in Alternative 2 may adversely affect the long-term recruitment of snag habitat, as these trees would no longer be available as potential snags, nor contribute to potential snag development from tree crowding (no trees ≥ 21 in. would be cut in Alternatives 1 and 3). A Forest Plan amendment would be required for harvesting of trees ≥ 21 in. dbh, which considers the effects described above (see Chapter 3, Forest Plan Amendments – Alternative 2).

The closing of roads would have a beneficial effect on the abundance of snag and down wood habitat. Bate et al. (2007) and Wisdom and Bate (2008) found that snag numbers were lower adjacent to roads due to removal for safety considerations, removal as firewood, and other management activities (Bate et al. 2007, Wisdom and Bate 2008, Hollenbeck et al. 2013). Alternative 2 would have less impact than Alternative 3 because fewer roads would be open to the public.

Under Alternatives 2 or 3, up to 90,000 acres of prescribed fire would be available for implementation. Alternative 2 proposes the most amount of high priority fire. In the east Cascades of Washington, burning and thinning treatments tended to increase snag density in one study, although they were often small-diameter snags (e.g., 20–39.9 cm dbh) (Hessburg et al. 2010). Additionally, other research suggests prescribed fires would likely result in loss of snags, particularly in the large (>20 in) size class (Finch et al. 1997, Pilliod et al. 2006).

This project impacts less than 40 percent of forested habitat across the WWNF; hence, the overall direct, indirect and cumulative effects would result in a small negative trend of snag/downed wood habitat in the short term. Mitigation measures are in place to protect large snags during both harvesting and prescribed burning activities. The changes in habitat would be insignificant at the scale of the Forest. The LJCRP is consistent with the LRMP, and thus continued viability of MIS for dead and defective wood habitat is expected on the WWNF in both action alternatives.

Pileated Woodpecker

Effects assume project design criteria Wild1-Wild14, and Wild26-27 (Appendix J) would be implemented. These mitigation measures include protection measures for large trees, large snags, downed logs during harvest and prescribed fire activities. Snags ≥12 in. are only to be removed due to safety considerations. Harvest of large trees is allowed only in Alternative 2 and on approximately 5,000 acres, excluding areas within MA15s, PFAs, and cool-moist, large tree, closed canopied forests. Wild-26-27 describes conservation measures to protect pileated woodpecker nests.

Also see “effects common to all action alternatives”.

Table 34 compares conditions of pileated woodpecker source habitat by alternative. Alternative 2 would maintain source habitat within RV, but would have lower habitat quality compared to Alternative 1 and 3 since it includes a greater extent of forest treatments.

Alternative 2 allows for cutting of trees ≥21in. across about 33percent of the area treated (Table 58), where the other alternatives allow none. The loss of large (≥21 in.) trees in Alternative 2 would more negatively affect pileated woodpeckers and other cavity nesting and large tree dependent wildlife species than Alternatives 1 and 3 (however, also see “Site-Specific Needs for Amendments to the Eastside Screens” in Chapter 3, which summarizes how more large trees may be lost to fire given the No Action Alternative than would be lost to fire or removed via harvest given the action alternatives). A Forest Plan

amendment would be required for harvesting of trees ≥ 21in. dbh, which considers the effects described above.

Table 58. Percentage of treated forest in Alternative 2 where trees ≥21 in. dbh could potentially be removed.

	Harvest acres	Acres with trees ≥21" potentially removed	% Harvest area with trees ≥21" potentially removed
Dry forest PVG	12,000	4,800	41
Moist forest PVG	3,400	200	6
Total Commercial Harvest	15,400	5,000	33

Under Alternative 2, the abundance of open roads across the LJCRP area would be reduced by 69 miles compared to the existing conditions. As compared to Alternatives 1 and 3, this reduction in the amount of open roads would have the greatest beneficial impact of any of the alternatives.

Though some current source habitat would be harvested, and the quality of the habitat may be reduced, overall risk of large scale fire would be reduced, and source habitat would remain within the RV for this species in the LJCRP area. Therefore, the LJCRP would not contribute to a negative trend in viability on the WWNF for the pileated woodpecker.

American Marten

Effects assume project design criteria Wild-1-Wild-14, and Wild-24 (Appendix J) would be implemented. These include protection measures for large trees, large snags, and downed logs during harvest and prescribed fire activities. Wild-24 states: Because marten habitat is at the lower end of the RV, any harvesting within marten habitat (moist forests, large tree, closed canopy) is designed to maintain old forest characteristics. Canopy closure would remain ≥ 60 percent, and there would be no harvest of trees ≥ 21in. dbh in marten habitat. Alternative 2 would maintain snags and large down wood that American marten need for denning, rest areas, and hunting. Large broken top and potentially hollow grand fir would be maintained for denning habitat.

Also see “effects common to all action alternatives”.

Under Alternative 2, there are 3,400 acres proposed for forest treatment in moist forest PVG, of which 820 acres are within what currently qualifies as marten source habitat (moist, large tree, closed canopy; Table 36). These 820 acres represent about 38 percent of the current source habitat for marten in the project area. The design criteria for these prescriptions maintain >60 percent canopy closure, and multi-story conditions; and no trees ≥ 21in. would be harvested. It is assumed that post-harvest these stands would be maintained as source habitat. It is likely that in the short-term they may meet minimum qualifications as source habitat but the quality of the habitat may be reduced due to reduced complexity and tree density, and potential loss of snags and logs due to logging operations and safety.

As discussed in the PCE section above, densities of large snags (>20 in. dbh) in moist forest are below RV in the snag density classes that provide habitat for American marten (see the Wildlife specialist’s report for more information). Snag habitat is likely to be a limiting factor for marten in these habitat types. Harvesting on 3,400 acres would also add to a reduction in snag habitat, further declining potential and future habitat quality for marten in the LJCRP area.

In Alternative 2, marten habitat is being treated on 110 acres with a prescription 'GS_Mod' (group selection – moderate). Group selections can include openings that are 1/2-4 acres. Martens respond negatively to habitat fragmentation (Hargis et al. 1999) and openings as large as four acres could reduce the quality of the habitat for marten. In the longer-term, as trees continue to grow, American marten would continue to use these harvested areas for some or all of their life history functions.

The potential removal of trees ≥ 21 in. dbh on about 200 acres of moist forest not currently source habitat for marten in Alternative 2 may adversely affect the long-term recruitment of snag habitat, as these trees would no longer be available as potential snags and down wood. Additionally, the harvest of large trees within the moist forest may lead to a delay in development of source habitat and or lower the quality of potential source habitat in the longer term. A Forest Plan amendment would be required for harvesting of trees ≥ 21 in. dbh, which considers the effects described above.

The additional road closure of 17 miles proposed in Alternative 2 relative to Alternative 1 would likely benefit marten. Open roads can contribute to a loss of quality of habitat through loss of snags and downed wood due to firewood harvest and safety (Godbout and Ouellet 2008).

The forest treatments proposed in Alternative 2 are assumed to modify fire behavior and reduce the effects or likelihood of a stand replacement event, thereby potentially retaining source habitat in the long-term.

The overall direct, indirect and cumulative effects would result in a small negative trend of habitat quality. The loss of habitat quality would be insignificant at the scale of the WWNF and would likely be short-term. Alternative 2 is consistent with the LRMP, and thus continued viability of the American marten is expected on the WWNF.

Northern Goshawk

Effects assume project design criteria Wild-15-23 would be implemented. These mitigation measures include protection measures for PFAs. Additional protection measures exist to protect large trees, large snags, down-logs during harvest and burning activities (Appendix J).

Also see "effects common to all action alternatives".

Under Alternative 2, the abundance of source habitat for goshawks is reduced by about 4,000 acres (Table 35) as a result of forest treatment. The amount of source habitat remains with the RV at about 27 percent (1-46 percent). After harvest, approximately 20 percent (3,800 acres) of the source habitat would have had harvest, yet it would meet the definition of source habitat (canopy closure ≥ 40 percent (dry forest PVG) or > 60 percent (moist forest PVG) and overall tree size of ≥15 in. dbh). On approximately 2,300 acres, trees ≥21in.dbh may be harvested. After harvest, source habitat would likely be of lower quality due to the loss of canopy closure, loss of large trees, and loss of large snags and logs due to safety concerns and logging systems.

Although trees with mistletoe are likely to be removed in all forest treatment stands, especially in the prescriptions 'Intermediate Treatments' (180 acres), the loss of mistletoe may also reduce the quality of source habitat. The removal of trees with dwarf mistletoe brooms may be detrimental to northern goshawk and other species that nest in mistletoe brooms (Bull 1997).

Under Alternative 2, the closure/decommissioning of 17 miles more than Alternative 1 (under existing decisions) should benefit northern goshawks, as human disturbance has been documented to adversely affect this species. As compared to Alternatives 1 and 3, Alternative 2 would reduce the potential for human disturbance the most due to closing or decommissioning the most miles of open roads.

Alternative 2 would impact goshawk habitat in the LJCRP area. Though some current source habitat would be harvested, and the quality of the habitat may be reduced, overall source habitat would remain within the RV for this species in this project area. Protection measures would be in place to conserve PFAs, large trees, large snags and downed logs during harvest and prescribed fire activities. Therefore, Alternative 2 would not contribute to a negative trend in viability on the WWNF for northern goshawks.

Rocky Mountain Elk

Effects assume project design criteria Wild-29 –31 (Appendix J) would be implemented. These include protection measures to reduce human disturbance during winter and calving season. Additionally Wild-34 provides guidance on retaining hiding cover patches in areas where harvest activities occur.

Table 37 summarizes LRMPstandards for road density by management area and alternative. The HEI standard of ≥ 0.5 in MA1 is met in both the Lower and Upper Joseph Creek watersheds. The percent cover on the summer ranges remains above 30 percent (LRMP direction), though it is reduced to 40 percent in the Upper Joseph Creek watershed. The reduced cover would likely lead to increase forage quantity and quality especially in the spring. However, this reduced cover may decrease hiding cover (≥ 40 percent canopy closure), particularly in the Upper Joseph Creek watershed and the entire winter range habitat. On winter range habitat, the percent cover is reduced by about 5 percent in both watersheds.

Alternative 2 changes about 8,100 acres of cover to forage across the entire planning area. Both forest treatments and prescribed fire may also contribute an increase in forage quantity and quality, especially in the spring. All vegetation treatments have been designed to improve the overall landscape structure toward RV and become more resilient to natural disturbance patterns, and should benefit elk foraging opportunities.

Depending on the implementation schedule, the LJCRP would temporarily increase road density in the analysis area by constructing 12.6 miles of temporary roads and at times open currently closed roads for administrative use. Combined with the loss of cover to harvest and increased human presence, there would likely be a short-term negative impact to habitat effectiveness for elk.

Through the reduction in nearly 70 miles of open roads as compared to the existing condition, open road densities in two subwatersheds (Rush and Cougar Creeks) remain above 3.0 miles/square mile in MA1 where the Forest Plan standard is 2.5 miles/square mile (Table 38). Overall the reduction in miles of open roads is greatest in this Alternative (69 miles) as Alternative 3 proposes to reduce miles of open roads by about 9 miles. This reduction in miles of open roads proposed in Alternative 2 would benefit elk in providing security to reach quality forage, and reduce human disturbance thus helping to keep elk from moving to private lands that often have less human disturbance. Additionally of concern is the unregulated OHV and full-sized vehicle use of closed roads, which has been shown to negatively affect elk and elk habitat, and has not been accounted for in the HEI calculations.

Old Growth Management Areas, Late-old Forest Habitat, and Connectivity corridors

Old Growth Preservation Areas (MA15)

Alternative 2 includes 660 acres of forest treatments within portions of 11 designated old growth preservation areas (MA15) (Table 59). Forest treatments would result in removal of smaller diameter trees leaving larger diameter trees. This post treatment condition would result in a larger average diameter tree density. The treatments would also increase average tree diameter by reducing inter-tree competition and improving individual tree growth. Table 54 displays the estimated post treatment size class distribution and the percent change from the existing distribution for the project area under Alternative 2. Areas in MA15 are expected to be consistent with this increase in the average diameter tree density.

Treatment within MA15 is primarily in the dry forest PVG (650 acres, with increases in primarily OFMS, with declines in YFMS and SE). The area in OFSS remains unchanged in MA 15 (Table 60; see Figure 3 for descriptions of structural stages). In harvested areas, the canopy would be reduced, favoring those species associated with more open canopies but the prescriptions would generally maintain canopy closure >40 percentwhile also adhering to the direction to maintain old forest characteristics.

Late Seral (Old) Forest

The abundance of OFMS and OFSS habitat would increase after forest treatments. In dry forests, OFMS and OFSS would increase by about 9 percent, and in the moist forests they would increase by about 6 percent. Although these areas of increase may meet the definition of old forest structures, the canopy closure and structural complexity would be less than the existing conditions.

On approximately 860 acres, current OFMS trees ≥ 21 in. dbh may be harvested and the quality of this OFMS habitat would be reduced by the loss of large trees under specified conditions (see Chapter 3, Alternative 2). Additionally, trees ≥ 21 in. dbh may be harvested on 1,455 acres and the harvest prescription would convert the stand from an YFMS or UR to OFMS or OFSS. It is likely that the quality of the old forest habitat created for species needing dense, multi-layerd conditions in these areas in the short-term would be less than if the trees ≥ 21 in. dbh were not removed.

Forest treatments would be expected to increase the average dbh of the stand, thus moving the stand to a larger size class.

Alternative 2 includes a proposed Forest Plan amendment to thin about 30 acres of OFSS conditions to maintain or enhance existing conditions. This treatment would not change the overall LOS structural conditions. The harvest would reduce the tree density resulting in a more open canopied forest. Open-canopied large tree forest is below RV and an increase in this habitat would benefit species associated with this structure, such as the white-headed woodpecker. The landscape is currently above RV in closed-canopied forests.

Larger tree structure with open canopies would increase habitat for species such as the sensitive white-headed woodpecker and Lewis's woodpecker, but would reduce habitat for MIS such as pileated woodpecker and northern goshawk.

Connectivity

Map 6 and Table 61 show forest treatment within connectivity corridors for Alternatives 2 and 3. Alternative 2 would reduce the quality of connectivity corridors on 23 percent of areas designated as connectivity by reducing the canopy closure and structural complexity. The prescriptions in the proposed treatment units within the connectivity corridors have been designed to provide canopy closure at ≥40 percent in the dry forest PVG, and ≥50 percent in the moist forest PVG. Although canopy closure and structural complexity may be reduced, these stands are expected to maintain the function and objectives of connectivity as described in the Eastside Screens.

Alternative 2 would allow for prescribed fire across much of the planning area, and 1,230 acres of treatment in seedling/sapling and pole stands within connectivity corridors. Some snags and logs may be consumed by prescribed fire, while new snags and logs are recruited from fire-killed trees. The burning, and small tree thinning in connective corridors would not have a measurable adverse effect on the quality or function of the corridors.

Table 59. Acres of forest treatments by potential vegetation group (PVG) within MA 15 in Alternative 2

PVG	Forest Treatment Type	Acres
Dry forest	Single tree selection, old growth, low density (STS_OG_Low)	10
	Single tree selection, old growth, moderate density (STS_OG_Mod)	610
Moist forest	Single tree selection, old growth, moderate density (STS_OG_Mod)	40
Total		660

Table 60. Distribution of structural stages in old growth preservation areas (MA15) currently and by alternative for the LJCRP area

	Structural Stage[1]	% Existing and Alternatives 1 and 3	% Alternative 2
Dry forest	OFMS	49	55
	OFSS	0	0
	YFMS	8	3
	UR	21	0
	SE	22	16
	SI	0	0
Moist forest	OFMS	52	51
	OFSS	1	1
	YFMS	6	6
	UR	26	29
	SE	16	13

1 - See Figure 3 for a description of structural stages.

Table 61. Forest treatment acres within connectivity corridors by alternative for the LJCRP

Area of Connectivity	Total Connectivity Corridor (Acres)	Alternative 1 % Connectivity Harvested	Alternative 2 % Connectivity harvested	Alternative 3 % Connectivity harvested
Dry forest PVG	9,700	0	20	10
Moist forest PVG	2,500	0	3	2
Total	12,200	0	20	10

Landbird and Migratory Bird Habitat

Effects assume that Project Design Criteria and mitigation measures in Appendix J would be implemented. Several measures include protections for large snags, trees and downed wood during harvest and prescribed fire activities. In particular, Wild10 states: Prescribed burning during active nesting

period (e.g. May 20 or post leaf-out) for nesting landbirds will be coordinated with district or forest biologist.

See also ‘effects common to all action alternatives’.

Effects from this project to migratory birds would be variable depending on the species. Alternative 2 would have more acres treated with harvest and prescribed fire than Alternative 3. Therefore, canopy cover would be reduced, more large trees would be harvested, snag habitat would be reduced, and riparian areas would be altered (see Wildlife specialist’s report for more information). A Forest Plan amendment is proposed in Alternative 2 to harvest some trees ≥ 21in. dbh (grand fir and Douglas fir) on approximately 5,000 acres (see Chapter 3, Forest Plan Amendments – Alternative 2). Several of the migratory birds of conservation concern are associated with large tree and snag habitat including brown creepers, Williamson’s sapscucker, and pileated woodpecker. Harvest of these large tree structures may adversely affect some of these species. However, for those species more highly associated with ponderosa pine (e.g. white-headed woodpecker, flammulated owl), the harvest of these shade tolerant trees within close proximity of the ponderosa pine would protect their longevity and would benefit the wildlife species associated with large pine. The abundance of large ponderosa pines within the LJCRP area is currently below RV.

Road densities would be reduced more in Alternative 2 than Alternatives 1 and 3, which would likely benefit all of these migratory birds. Road-associated factors that adversely affect some species of migratory and resident birds include: snag and down log reduction, habitat loss and fragmentation, negative edge effects, harassment or disturbance, vehicle collisions, displacement or avoidance, and chronic negative interactions with humans (Gaines et al. 2003). Also see “effects common to all action alternatives”.

Threatened, Endangered, and USFS Region 6 Sensitive Wildlife Species

Potential habitat changes due to Alternative 2 for most threatened, endangered or sensitive species were covered under ‘Effects common to all action alternatives’. Discussion of the potential effect to habitats for the Columbia spotted frog, and Lewis’s woodpecker, and white-headed woodpecker are discussed below.

Treatment within the Category 1 RHCA along Swamp Creek would have the potential to occur within habitat for Columbia spotted frogs, although the effects would likely be minimal since best management practices and other design criteria (Appendix J) would be in place to protect riparian habitats. The 25-ft. no cut buffer would largely provide complete protection to this aquatic species generally found very close to perennial streams or ponds. Alternative 2 proposes vegetation treatment of 31 acres along Swamp Creek, a Category 1 RHCA. Treatments may impact individuals or habitat (MIIH) but are not expected to lead to a population decline of the species.

Vegetation treatments proposed under Alternatives 2 and 3 may produce source habitat for the Lewis’s woodpecker since this species is associated with large tree, open-canopied, dry pine habitats. Although snags are not proposed for harvest, some snags would be lost due to safety concerns and logging systems. Habitat abundance is expected to increase by less than 100 acres. Decreased miles of open roads with Alternative 2 may decrease loss of snags due to wood cutting and hazard tree removal. Although snag densities may be reduced, the increase in source habitat following vegetation treatments under Alternatives 2 and 3 would have a beneficial impact (BI) on the Lewis’ woodpecker, with Alternative 2 likely having a greater benefit than Alternative 3 due to the increase in road closures.

Vegetation treatments are likely to increase habitat for white-headed woodpeckers, as this species is associated with dry forests with large tree structure and with open canopies (<40 percent). Treatments in

Alternative 2 propose to increase habitat through reducing canopy closure in larger tree dry forest areas. Source habitat would be predicted to increase from about 900 acres to about 5,800 acres.

Large snag density would likely be reduced in and adjacent to harvest units due to safety concerns and logging systems, although mitigation measures would be in place to protect large pine trees and snags, and nesting trees (Appendix J). Implementation of Alternative 2 would also reduce open road densities by about 70 miles as compared to existing condition. Reduced abundance of open roads would increase the potential for increased snag abundance and development. Assuming that Project Design Criteria and mitigation measures in Appendix J would be implemented, the large increase in source habitat following vegetation treatments would likely lead to a beneficial impact (BI) for the white headed woodpecker.

The Social Environment

Socioeconomics

Actitvities under Alternative 2, such as timber harvest and restoration (Table 49) over the 10 year span of the LJCRP would have economic consequences depicted below.

Financial Efficiency

Table 62 summarizes the financial efficiency for Alternative 2. The Present Net Value (PNV) indicates the financial efficiency of the timber sale and restoration activities, including all costs (that are not included in the stumpage rate) and revenues associated with the activities and required design criteria (Appendix J). Restoration activities examined under Alternative 2 include (among others) resiliency treatments, prescribed fire, and planting (assuming all group selections may potentially be planted, although in practice natural regeneration would be used wherever possible). A 4 percentdiscount rate was used over a period of 10 years (2014–2023), the estimated time required for full implementation of the project.

Alternative 2 is not financially efficient for the timber harvest and required design criteria, as well as for all restoration activities noted above, as indicated by the negative PNV (-$5.9 million). This is of concern to community members that indicated it is important to have product pay for the project and be financially efficient. However, since the PNV does not include non-market values, such as ecosystem services, nor future fire management costs, the benefits are likely an underestimate. The estimated costs of treatment are the highest under Alternative 2, since the restoration treatments are the most intensive. However, the expected non-market values derived from Alternative 2 would likely be greater than Alternatives 1 and 3.

Indirect effects on financial efficiency could occur as a result Alternative 2; however, estimates of these changes are not available. It is anticipated that fuels treatments under Alternative 2 would contribute to fuels conditions that would have more resistance to wildland fire. This would tend to decrease wildland fire related costs such as property loss, lost revenues and suppression costs.

Table 62. Present net value for AAlternative 2.

Proposed Action Alternative	Present Value of Benefits	Present Value of Costs
BENEFITS		
Revenue from commercial timber volume	$1,940,126	
COSTS		
Non-Mechanical		$4,576,354
Mechanical		$1,192,525

Proposed Action Alternative	Present Value of Benefits	Present Value of Costs
Commercial timber harvest		$2,088,231
Sum of discounted benefits and costs	$1,940,126	$7,857,110
Present Net Value	$(5,916,984)	

Economic Impacts

Alternative 2 results in restoration activities with commercial timber production of 10,400 ccf (1 ccf is 100 cubic feet) per year for 10 years; mechanical, pre-commercial, stand treatment on 820 acres per year; 404 acres of restoration treatment by hand labor; and a variety of road projects. Implementation of Alternative 2 is projected to support 55 jobs (Table 63) and $2.9 million in labor income in Wallowa and Union counties annually over 10 years. Those impacts in the local area include the jobs supported directly by completion of restoration treatments and processing of the commercial timber and the indirect and induced jobs related to those activities.

The implementation of Alternative 2 would yield employment changes in many economic sectors within Wallowa and Union counties. The greatest number of jobs supported would accrue to the Manufacturing and Agriculture and Forestry sectors. Other sectors affected by the LJCRP include Retail Trade, Construction, Professional Services, and Health Care.

Table 63. Projected employment by major industry for the proposed alternative

Industrial sector	Jobs supported
Manufacturing	19
Agriculture and forestry	16
Professional, scientific, and technical services	2
Retail trade	2
Health care and social assistance	2
Accommodations and food services	2
Construction	2
Other industrial sectors (8)	10
Total	55

Economic impacts would also result from revenue sharing with local governments. However, payments to counties might vary depending on the mechanism used for the commercial timber sales. The commercial timber volume sold in this project could be sold as traditional timber sales or using stewardship authorities. In traditional timber sales, the Forest Service returns approximately 25 percent of the revenues back to states, which is then distributed to the counties. The returned revenues are used to fund roads and schools. In selling commercial timber using stewardship authorities, all of the revenue from the project remains with the selling National Forest (rather than going to the treasury or the counties) to be reinvested in other forest restoration projects. If the Forest implements traditional timber sales, the revenue distributed to counties would be the greatest under Alternative 2 because this alternative has the greatest amount of harvest compared to Alternatives 1 and 3.

Social Impacts

In addition to effects on the local economy, activities under the LJCRP have the potential to affect the livelihood, cultural values, and natural resource values of people in the analysis area. The social consequences are measured qualitatively, with a particular focus on access, recreation uses, environmental justice and non-market values.

Livelihood

The jobs and income that Alternative 2 is expected to support, as detailed above under the economic impacts section, would likely improve the livelihood of area residents. These jobs and income are expected to be generated over the next ten years. The increase in jobs and labor income in the analysis area from Alternative 2 would likely increase the tax base, public services, funding for schools, capital maintenance projects, and reduce poverty. Since the increase in jobs and income is greater under Alternative 2, the expected increase in the public services would also be greater than Alternatives 1 and 3.

The tax rates on timber harvested during 2014 under the Forest Products Harvest Tax (FPHT) is $3.53 per thousand board feet (MBF). The receipts from this tax program are dedicated to the partial funding of state-run programs that promote forest research, fire prevention and fire suppression, forest practices act administration, and improve public understanding of Oregon's forest resources (Oregon 2014). However, the funding for schools and other public services are more likely to come from personal income taxes (from 5 to 9.9 percent of taxable income) and property taxes. With increases in labor income, as detailed in the economic impacts section above, the state tax base and therefore public services could also increase.

Additionally, with more jobs and income in the area under Alternative 2, there may be more opportunities for younger generations. In turn, youth may choose to stay in the area and improve the age diversity. With a more balanced age composition, the economy would be more sustainable in the long-term.

The impacts to the tourism industry from changes to recreation uses (detailed under Cultural Values below) would likely be positive and the greatest under Alternative 2 because it proposes the greatest amount of restoration treatments. The short-term impacts to the tourism industry may be greater and negative but with the overall health of the forest improved, the long-term impacts would be beneficial and greater than impacts under Alternatives 1 and 3.

Commenters raised the issue of access to public lands. Alternative 2 would have 170 miles of open USFS roads and would therefore have a greater adverse impact on access to WWNF land compared to Alternative 3, which would result in 230 miles of open USFS roads. Since many community members value access to public lands, Alternative 2 would adversely affect this value. In addition to closure of roads, public access could be impacted by short-term increases in traffic but these effects would be intermittent during restoration. The potential increase in traffic is based on treatments in association with the timber sale. Under Alternative 2, there are more treated acres, and therefore greater short-term effects to access..

Cultural Values

As discussed in the Affected Environment section (Chapter 2), residents in the LJCRP area value the land for recreation uses, such as hunting, fishing, gathering forest products, wildlife viewing and scenery, among others. See the Tribal report for effects to subsistence uses. These recreation uses are also linked to access, as discussed in the previous section. With more roads closed and decommissioned, this limits access to public lands for motorized recreational purposes (although cross country travel by OHV is not being regulated under the decision for LJCRP). Since Alternative 2 decommissions and closes more miles of roads than Alternative 3, the effects to motorized recreational access would be greater than the effects

under Alternative 3. Under Alternative 2, there could also be intermittent disruption of access to the LJCRP area for treatments and therefore potential disturbance during any recreational use season. This effect is greater under Alternative 2 than Alternative 3 since there would be more acres treated.

Under Alternative 2, the beneficial effects to recreation uses for gathering special forest products and hunting are greater in the long term since there would be more restoration treatments and a corresponding lower risk of wildfire. As noted in the wildlife section, prescribed fire in Alternatives 2 and 3 would generally benefit elk habitat through forage enhancement. With improved ecosystem services from restoration, this would likely positively impact fish and wildlife habitat, water and air quality, and plant diversity for recreation uses by people in the LJCRP area. As detailed in the aquatics section, there is a low likelihood that the proposed treatment activities would result in measureable increases in fine sediment in fish bearing streams in the analysis area that would degrade habitat for redband trout and Snake River steelhead. Alternative 2 may result in a short-term increase in fine sediment resulting from prescribed fire activities. In the long-term, Alternative 2 would improve vegetative conditions and maintain the natural fire regime in the project area, which would have beneficial impacts to redband trout and their habitat and potentially provide greater opportunities for recreational fishing. However, under Alternatives 1 and 3, adverse recreation effects could be greater as the risk of uncharacteristic wildfire is expected to be greater without any or less restoration treatment. For more information on the effects to the specific resources, see the other specialist reports (Aquatics, Wildlife, and Botany).

Vegetation management is needed to return these landscapes to a more natural appearance and higher scenic quality for recreation (also see Scenery section, below). More natural, park-like stands, which are substantially less abundant across the landscape than historically, have little likelihood of returning without mechanical restoration treatments to facilitate the reintroduction of fire. Alternative 2 meets the purpose and need to a much greater extent than Alternatives 1 and 3.

In the short-term, while prescribed fire treatments take place, smoke could affect the ability to recreate and enjoy the scenery in the LJCRP area. With more acres to be treated under Alternative 2, the short-term impacts are higher than the other alternatives. However, the Forest Service is not planning to burn during peak visitor season (summer months) so the impacts are expected to be minimal to the majority of recreationists. The exception to this would be effects to hunting activities. Hunting season may overlap with the burning season, so impacts to hunting activities may be greater under Alternative 2.

Biological Values

Commenters revealed that they value air and water quality, wildlife, and old growth trees. Due to increased restoration under Alternative 2, improved ecosystem services and decreased risk of wildfire, these biological values would likely be improved in the LJCRP area. The value for old growth trees is preserved under all alternatives because there is no old tree harvest proposed. Since it is impossible to increase the amount of old growth trees directly, the value is maintaining the integrity of old growth in the community, and protecting it from severe, stand replacement fire. People would benefit from knowing that the trees exist and are continuing to provide biological services to the forest ecosystem. For more information on the effects to the specific biological resources, see the other specialist reports (Aquatics, Wildlife, and Botany).

Timber Market and Forest Products

Alternative 2 would add timber to the regional supply and is expected to have beneficial impacts on the current timber market. Timber mills might increase their employment in response to increased supply from the LJCRP. American Forest Resources Council (American Forest Resource Council (AFRC) and Associated Oregon Loggers 2014) estimated that the ten mills in the area are operating at an average of 39 percent capacity and therefore have the capacity to process sawtimber in Alternative 2. Contacts from the

local logging industry believe that the demand for timber products in the region is expected to increase as the products are shipped around the world. Under Alternative 2, this distance and relevant transportation costs could decline as the industry receives more wood from the LJCRP area.

Non-Market Values

Under Alternative 2, forest health is expected to improve the most compared to the other alternatives. Alternative 2 would also decrease the likelihood of crown fire relative to existing conditions more than the other alternatives. Over time, forest restoration treatments would decrease fuel load and decrease potential smoke emissions from both planned and unplanned ignitions. The proposed activities under this alternative would protect ecosystem services and other social values, such as recreation opportunities and subsistence uses. Therefore, ecosystem functionality is expected to improve and contribute to community members' non-market values the most. For more details on other social values, see the Social Impacts section above.

Environmental Justice

While minority and low-income populations exist in the area, Alternative 2 is not expected to have disproportionately high and adverse human health or environmental effects on these communities. The environmental justice communities expected to be impacted the most are within the Nez Perce tribe. Since this community uses the LJCRP area for cultural and religious practices as well as for subsistence uses, they are more vulnerable to changes in the area's natural resources due to the LJCRP. In the long-term, Alternative 2 is expected to improve natural resource conditions. However, in the short-term, the natural resource uses would be affected the most under Alternative 2 since it involves the greatest amount of treatment. These effects are addressed in greater detail in the Tribal and Heritage report.

The low income populations in the LJCRP analysis area could be affected by the access to recreation opportunities and resource use. Under Alternative 2, 170 miles of USFS would be open, compared to 230 miles of open USFS roads under Alternative 3. If the low-income populations have to travel greater distances to access recreation, they could incur extra costs since it is more expensive to reach the forest in indirect ways. However, the decommissioning and closing of roads is not expected to have significant and disproportionate effects on these communities.

Through public meetings, community members and representatives expressed that they expect the LJCRP to improve current environmental justice conditions, specifically related to low-income populations and children. With increased job opportunities for parents, they would be able to provide better opportunities for their children and the expected increase in the tax base under Alternative 2 would presumably provide more support for schools. An increase in the tax base could also potentially increase social services for low-income populations and help alleviate poverty.

Heritage

Eligible and unevaluated sites are known to be located in, or near treatment unit boundaries. Potential effects would be mitigated via site visits and site protection design features that would be implemented prior to ground disturbance (Appendix J, Heritage 2, 3, and 10).

The greatest risk to heritage resources is ground disturbing activities associated with mechanical treatments. Alternative 2 tractor treatments include 39 percent of the total harvest units, or 29-73 percent of the analyzed percent of total harvest treatment acres. In comparision, Alternative 3 tractor treatments include 46 percent of the total harvest units, or 34-84 percent of the analyzed percent of total harvest treatment acres (see Table 50).

In general, Alternative 2 would treat 11 percent less acres than Alternative 3, while staying mostly within the Alternative 3 analyzed percent of total harvest treatment acres. Therefore, potenial effects to heritage reources would be essentially the same.

Mechanical treatments involve ground based, sky line and helicopter logging systems that include skidding, yarding, and construction of temporary roads and landings. Impacts to undiscovered sites could include rutting, erosion, dislocation, or breakage of artifacts and features, and destruction of sites and site stratigraphy.

Harvesting trees greater than 21 in. dbh within IRAs and PWAs has the potential to impact historic values such as cambium peeled trees and dendroglyphs. Management objectives for IRAs suggest that it is likely that they may contain more historic tree stands relative to general forest. In addition, IRAs and PWAs may be more likely to contain buried sites with high archaeological integrity due to less past management and ground disturbance.

For either Alternative 2 or 3, large scale prescribed fire treatments would be implemented over 30 years' time. Prescribed fire has the potential to affect fire sensitive cultural sites, and ground disturbance associated with fire lines may occur. Initial reduction of heavy fuels may lead to an increase in site visibility, public visitation, and possible vandalism. These issues would be reduced through management actions that include project specific data recovery as well as long-term monitoring. Initial entry prescribed burns would be periodically revisited and burned to reduce natural fuel accumulation, and archaeological site monitoring would be part of that process.

These potential effects would be addressed through site avoidance and monitoring strategies by implementing the site protection measures listed in the "Pacific Northwest Region Programmatic Agreement between the R6 Forest Service and the Oregon State Historic Preservation Office" (2004).

Low intensity prescribed fire could benefit heritage resources as it would reduce current fuel loads, which would then assist in preventing extensive heat damage during wildfires. There would be less need for fire suppression activities, consequently reducing the threat of ground-disturbing activities like bulldozer fire line construction and include a reduction of unnatural fuel loading in and around heritage site where high ground temperatures adversely affect archaeological values. In addition, uncharacteristic fire behavior should also be reduced resulting in less overall risk to heritage sites.

Tribal

The Nez Perce Tribe Executive Committee (comment letter, February 11, 2015) disagreed with the cumulative, indirect and direct effect analysis regarding wildfire effects to natural and cultural resource site integrity and archaeological research values. Stating "Overall, the DEIS asserts that large-scale, catastrophic, stand replacing, intense, or uncharacteristic fires are the greatest threat to all resources, including all cultural and heritage resources. As a result, any measures expected to reduce the threat of these fires is predetermined to be beneficial. Cultural Resource Program staff agrees that large scale fires threaten many resources, but many resources, especially precontact archaeological sites and traditional cultural properties, have burned many times in the past, and yet remain deeply significant to the Tribe and Tribal members". Nevertheless, cultural resources that are deeply significant to the Nez Perce Tribe, and that are highly valued by the general public, will be protected through the implementation of mitigation measures and project design criteria.

Impacts on Hunting, Fishing and Gathering and Resource Risks of Accelerated Restoration

The Tribe's position is that the risk to treaty resources and their habitats resulting from an accelerated pace and scale of restoration is high; especially where treatments involve mechanical operations used for

timber harvest. In addition, decommissioning and closing a total of 163 miles of road is viewed negatively by those tribal members who believe decommissioning may restrict access to treaty resources. However, some tribal members view decommissioning and closing roads positively if they restore resource values, such as water quality.

Conflict remains regarding attitudes concerning needs for the conservation of treaty resources. Effects from accelerated restoration on hunting, fishing and gathering, as encompassed by the activities proposed in Alternative 2, would be beneficial as treatments are expected to promote landscape resiliency and move treaty resource conditions closer to RV.

Concern for Value of Landscape over Economic Values

The Tribe's position is that economic values often drive forest management projects, including the LJCRP, at the expense of landscape resource values. The estimated economic net value from timber harvest for Alternative 2 is -$5.9 million, demonstrating that positive economic net value is not a motivation for this alternative to be the preferred alternative.

Based on the estimation that Alternative 2 is projected to support 55 jobs and $2.9 million in labor income in Wallowa and Union counties annually over 10 years, the economic worth of Alternative 2 on Wallowa County communities would be positive. However, economic benefits to Nez Perce tribal members would likely be neutral as most tribal members live outside Wallowa County (see Socioeconomic report).

Maintain Old Growth Legacy Trees and Conserve Inventoried Roadless Areas

Vegetation treatments proposed in Alternative 2 in designated old growth (MA15) and IRAs would likely be considered an adverse effect to the tribe. While there may potentially be unanticipated adverse effects of mechanical thinning in old growth and roadless areas, there is conversely the risk of losing old trees to uncharacteristic fire if these treatments are not done. These treatments assume that mechanical disturbance of these systems for the purposes of restoring the RV in structure and composition would result in greater beneficial than adverse effects.

Short term impacts to the forest setting would be evident. However, long term benefits from maintenance of all old trees, and increasing stand resilience may be realized as a beneficial effect.

Impacts to Traditional Plant Resources

Eight of the twelve traditional plants (see Tribal Relations specialist's report) are either fire dependent, respond well to low intensity fire, and/or are at low risk from fire due to location in rocky habitats or seasonal timing of the establishment of the tap root.

Proposed prescribed burning, thinning of hazardous fuels and/or meadow or riparian encroachment, where ecologically appropriate, would reduce fuel loads, increase understory productivity and diversity of many traditional plants, and allow fire to perform its natural ecological role. In addition, about 530 acres of savanna and grassland habitat would be restored, benefiting plants including Indian Hemp, Balsam Root, Lily, Camas, Bitter root and various Lomatiums, including "cous".

Indirectly, since most of these plants are early to mid-successional and/or shade-intolerant, Alternative 2 would improve plant habitat by opening stands and removing fuels. Yew and currant (*Ribes* spp.) are affected negatively by canopy opening but could be protected through the development of design criteria (See Botany specialist's report).

Over the long term, Alternative 2 is expected to have a beneficial effect to traditional plants and their habitats. This positive response would not be realized if plant structures, seeds, and habitats are put at risk

from severe or intense fire. Ability to withstand or benefit from fire depends on the species-specific response, fire intensity, burning season, and environmental factors.

Most of the plants have probably not benefited as a result of past actions that removed large overstory trees from the stand and promoted growth of numerous small trees and accumulation of litter and woody fuels. While Alternative 2 alone cannot entirely correct the current condition, it is expected to improve habitat for understory plants while Alternative 1 poses greater risk to plant habitat.

Traditional Cultural Properties, Sacred Sites, and other Traditional Use Areas

In the long term, compared to Alternative 1, Alternatives 2 or Alternative 3 would pose similar potential to protect traditional use area values from stand replacing fire and other unplanned disturbance. In the short term, Alternatives 2 or 3 would pose a similar level of risk for short term direct mechanical effects on use areas, settings, and traditional cultural properties.

Implementation of design criteria (Appendix J, Tribal #4) would be used to mitigate adverse effects.

Recreation

See effects common the all action alternatives.

Approximately 17 more miles of road would be closed in Alternative 2 as compared to Alternative 1. Road closures proposed in Alternative 2 would increase the recreation opportunities that are free of motor-vehicle disturbance of noise and vehicle interactions for hikers, mountain bikers, and stock users. Whereas, additional road closures would decrease vehicle access to some dispersed campsites, wildlife viewing sites, and firewood opportunities. Additionally, further road closures would decrease access to some dispersed campsites, wildlife viewing sites, and firewood opportunities. Road closures would have mixed effects on activities such as mushroom pickers, as some prefer areas without the interference of roads while others prefer the convenience of roads nearby.

Scenery

Scenery effects are presented by viewshed. Overall, Alternative 2 would move stands toward desired future conditions, and reduce the risk of uncharacteristic fire, while keeping effects to scenic integrity at a high level. Alternative 2 would treat 22 percent of the project area (39 percent of forested acres), which would improve scenic stability from low (dry forest PVG) or moderate (moist forest PVG) to high stability, largely by reducing the risk of uncharacteristic disturbance. The appearance of the stands would be improved by making them appear healthier. This treatment would create stumps, and slash, and soil disturbance would be visible from foreground views. These effects would be minor within the first one to two years. As regrowth of shrubs and grasses occur these effects would be significantly reduced. This treatment would not create openings that area visible from middleground or background distances. The effects of this prescription would not reduce the scenic integrity of the viewshed as they are expected to be negligible within 2-3 years. These prescriptions would improve the scenic character by moving stands toward the historic range of variability. More open stands of species compositions that are more fire resistant would improve the scenic stability. The treatments that reduce ladder fuels indirectly reduce flame lengths when a fire does occur. These treatments would indirectly affect the size and severity of fire events thus reducing the effects to scenery resources. It is expected that it would be much more likely that effects of fires in this area would remain within the size and severity characteristic to the historical range.

Alternative 2 would reduce the high amount of open road densities by closing some open roads and decommissioning 25 miles of road. Road maintenance would bring existing roads to a minimum maintenance standard. Numerous closed roads would be temporarily opened for commercial material

access and removal and re-closed after harvest operations are complete. Also see effects common to all action alternatives.

Oregon State Highway 3, Joseph Canyon Overlook

The immediate foreground (up to 300 ft distance zone) and foreground (up to ½ mile distance zone) of the Oregon Highway 3 travel route is highly sensitive for any new visual impacts, maintaining large trees along the travel route, and the foreground, middleground, and background visible from the Joseph Creek Overlook. Alternative 2 would increase visibility into stands along the eastside of Oregon Highway 3 in limited cases through single tree selection, savanna treatments, and stand improvement by removing trees in the foreground, enhancing large tree character, opening up the mid canopy, and creating greater foreground diversity. The landscape slopes down from Highway 3 to the east, so visibility of treatment units would be limited to the immediate foreground, if at all. The commercial thinning treatments would leave the pine and larch species that have the desired large tree character, and greater fire resiliency. This effort would improve the scenic character and the scenic stability of the area. Landscape character changes would be seen as thinned out stands of trees and a more open forested canopy character. Alternative 2 would improve species composition, stand density, and reduce ladder fuels and canopy closure.

One forest restoration stand (#193) is partially in the background view of Highway 3 (50 acres within the visual quality objective of retention). Restoration treatments include low intensity single tree selection and intermediate treatment, and would not change the density class of the stands. These treatments would not be visibly evident from the Joseph Canyon Overlook.

No roads would be decommissioned in foreground, middleground, or background visible from Oregon Highway 3 or the Joseph Canyon Overlook.

Joseph Canyon Wild and Scenic River Corridor

The Joseph Creek Wild and Scenic River (WSR) corridor is highly sensitive for any new visual impacts. The visual quality objective of the river corridor is Preservation. No treatments would occur in the river corridor, except the use of planned and/or unplanned fire, consistent with natural fire frequency and intensity. One forest restoration stand (#193) is partially in the middleground view of the WSR (50 acres) with a visual quality objective of retention. These restoration treatments include low intensity single tree selection and intermediate treatment, and would not change the density class of the stands. These treatments would not be visibly evident from the WSR, or the Swamp Creek or Joseph Creek trails.

In the middleground view, with a visual quality objective of Partial Retention (in the Table Rock area), there would be 684 acres of restoration treatments. Sixty percent (403 acres) of these treatments would be intermediate, non-commercial (stand improvement), or savanna treatments, and 40 percent (281 acres) would be single tree selection treatments. All of these treatments would maintain structural diversity and the natural mosaic landscape character, and appear unaltered to slightly altered in the short-term, and unaltered in the long-term when viewed from the WSR. The single tree selection treatments would leave the pine and larch species that have the desired large tree character, and greater fire resiliency. This effort would improve the scenic character and the scenic stability of the area. Landscape character changes would be seen as thinned out stands of trees and a more open forested canopy character. Alternative 2 would improve species composition, stand density, and reduce ladder fuels and canopy closure.

Table Mountain

Table Mountain has been identified as a valued place by local residents to view scenery. Alternative 2 would increase visibility into stands along FS Road 4650, and 4650120 through 4650170 through single tree selection, intermediate, savanna, and stand improvement by removing trees in the foreground and

middleground, enhancing large tree character, opening up the mid canopy, and creating greater foreground diversity. Sixty percent (403 acres) of these treatments would be intermediate, non-commercial (stand improvement), or savanna treatments, and 40 percent (281 acres) would be single tree selection treatments. Over the long-term, all of these treatments would maintain structural diversity and the natural landscape mosaic, improve the scenic character and the scenic stability of the area, and appear slightly altered in the short-term when viewed in the middleground.

One forest restoration stand(#193) is partially in the background view of Highway 3 (50 acres within the visual quality objective of retention). Restoration treatments include low intensity single tree selection and intermediate treatment, and would not change the density class of the stands. These treatments would not be visibly evident from the Joseph Canyon Overlook.

No roads would be decommissioned in foreground, middleground, or background visible from Table Mountain. There would not be any new roads that would result in introducing new linear corridors in the viewshed.

Forest Road 46, Cold Spring Ridge/Forest Road 4680

Forest Road 46 is the main travel way through the project area, from Oregon Highway 3 to Cold Spring Ridge within HCNRA. It has a visual quality objective of Partial Retention in the foreground, and generally Modification in the middleground. All treatments proposed in the foreground, middleground and background along this travelway (single tree selection, group selection, intermediate, savanna, and stand improvement) would meet Partial Retention visual quality objectives. One small portion of the middleground on the western side of Cold Spring Ridge, within the Inventoried Roadless Area has a visual quality objective of Partial Retention in the middleground. In Alternative 2, only stand improvement treatments would occur in this area, and would only slightly alter the appearance in the short-term. Over the longer-term, scenic integrity and stability would be improved throughout this viewshed.

There would be decommissioned roads located off Forest Road 46 in the foreground and middleground of this viewshed (FS Roads 4600425, 447, 555, 570, 572, 574, 575, and 578). Decommissioning roads would improve scenic integrity by restoring the landscape back to a more natural appearing character by reducing linear corridors and allowing vegetation to become reestablished. There would not be any new roads that would result in introducing new linear corridors in the landscape.

It is expected that Alternative 2 would not reduce the scenic integrity and retain the existing visual quality objective standards established in the LRMP, CMP (HCNRA) and the Imnaha Wild and Scenic River Management Plan.

Inventoried Roadless Areas

Inventoried Roadless Areas are managed under requirements in the Roadless Area Conservation Rule as described on pages 36 to 38 in the Affected Environment (Chapter 2) of this FEIS. The following requirements for managing within IRAs and effects to these resources are disclosed in this analysis.

- The purpose is to maintain or restore the characteristics of ecosystem composition or structure, such as to reduce the risk of uncharacteristic wildfire effects, within the range of variability that would be expected to occur under natural disturbance regimes of the current climatic period. 36 CFR 294.13 (b)(1)(ii).
- The timber is generally small diameter. 36 CFR 294.13 (b)(1).

- Timber cutting, sale, and/or removal are needed to maintain or improve one or more of the roadless area characteristics. 36 CFR 294.13 (b)(1).
- The cutting, sale, or removal of timber is incidental to the implementation of a management activity not otherwise prohibited. 36 CFR 294.13 (b)(2). This criterion would only be applied to cutting and removal of roadside danger trees.
- The cutting and sale of timber is expected to be infrequent. 36 CFR 294.13 (b).

To address the extent of the effects, acres will be used. Table 64 summarizes the acres treated in each IRA. There would be no temporary road construction proposed within the IRAs under Alternative 2. Alternative 2 is the only action alternative that proposes the cutting, sale, or removal of timber. The existing system roads would be used to facilitate harvest, yarding and haul. Therefore, no criterion is needed to address this concern.

Table 64. Acres of harvest and stand improvement treatment by IRA in aAlternative 2.

IRA Name	Acres of harvest in proposed action	Acres of stand improvement (SI) proposed action	Acres prescribed fire proposed action (high priority)
Joseph Canyon	900	200	8,700
Wildhorse	2,500	2,000	9,800
Cook Ridge	40	170	400
Mountain Sheep	0	0	70

Maintaining or Restoring the Characteristics of Ecosystem Structure

The purpose for treatment of IRAs in this project is: “To maintain or restore the characteristics of ecosystem composition or structure, such as to reduce the risk of uncharacteristic wildfire effects, within the range of variability that would be expected to occur under natural disturbance regimes of the current climatic period.” The current condition of the project area described in the FEIS applies to the IRAs identified for treatment activities. Fire suppression and grazing management outside and within the IRAs have resulted in increased density of younger fire intolerant species (such as grand fir) and an associated increase in fuel loading and in particular an increase in ladder fuels. Old fire resistant trees are likely to continue to decline in many of the dry and mixed conifer stands found in these IRAs due to increased competition especially during times of extended or early onset drought. These structure, density, composition, pattern, and disturbance regime changes increase the potential risk for uncharacteristic wildfire or insect/disease mortality with increased severity and effect on the integrity of the IRAs.

Figure 8 shows active restoration opportunities within and outside IRAs in the LJCRP area. There would be a direct effect to the forested vegetation structure within the LJCRP and IRA boundaries where harvest, SI, or prescribed fire treatment may occur. Tables 51-53 in the FEIS show the change in cover type, structure, and density that contribute to restoration of ecological structure and process due to treatment. These tables show that post treatment the LJCRP and IRA move closer to their RVs in these attributes. As forested structure moves toward RV, fire regimes behave more similar to historic characteristics in severity, pattern, and size. Harvest treatments proposed within the IRAs are generally small diameter

leaving the most fire adapted trees on the landscape to facilitate restoration of ecosystem structure through introduction of fire.

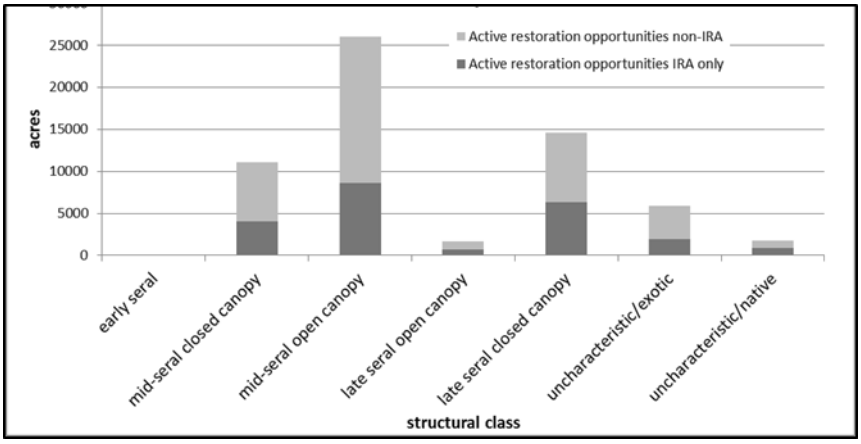


Figure 8. Active restoration opportunities by seral stage for the LJCRP within and outside of IRAs. The restoration need represents the degree of departure between historic and desired structure where active restoration can improve conditions (as opposed to passive restoration, or growth).

The LJCRP desired landscape condition is informed by reference conditions and historic variability in structure, composition, density, pattern, and disturbance regime. Treatments are designed to move these attributes closer to reference conditions to provide resiliency to stands and the broader landscape. The activities proposed in Alternative 2 would bring the landscape character closer to reference conditions and therefore would have a beneficial impact on the Joseph Canyon IRA's ability to represent reference landscapes within the LJCRP analysis area and Blue Mountains.

Conclusion: the treatments proposed in the LJCRP within IRAs serve to both maintain and restore characteristics of ecosystem structure and process. As the landscape moves closer to RV and reference conditions, it is better able to self-regulate with natural disturbance processes and regimes under the current climatic conditions.

Cutting, Sale, or Removal of Timber is Infrequent

The purpose of this project is to enable the dominant forest regulatory process (fire) to function naturally while enhancing and maintaining roadless area characteristics. Cutting, sale, or removal of timber last occurred in Wildhorse and Joseph Canyon IRAs about three decades ago following the Teepee Butte fire in 1988. About 30 years have passed since this action and with no foreseeable project that would remove timber; this action would be considered infrequent on this landscape. Proactive restoration could facilitate natural regulation of forest structure, reducing future needs for mechanical treatments in these areas, and reduce the incidence of uncharacteristic fires and the need for salvage treatments.

Generally Small Diameter Timber Assessment

The spatial boundary for this analysis is the IRA boundaries where activities are proposed within the LJCRP. Approximately 200 plots were established in treatment units distributed amongst these three IRAs to determine pre and post treatment average diameter (see map of plot locations in project record). Utilizing this inventory cut and leave trees were assigned according to prescription to evaluate whether or not the average stand diameter increased. An increase in average diameter indicates that the trees removed were generally small diameter relative to the remaining trees in the stand. Figure 9 illustrates the

relationship between cut and leave tree diameter distribution and the resultant average stand diameter post treatment. The average diameter of the treatment stands within all IRAs increased from 11.5 inches at breast height to 17.5 inches at breast height. The average diameter of the cut trees would be 9.4 inches. This indicates that trees removed as a result of Alternative 2 treatments would be of generally small diameter and compliant with the Roadless Area Conservation Rule. The IRA/PWA report in the project record discloses the unit ID numbers, treatment prescription, and acres affected within the IRAs.

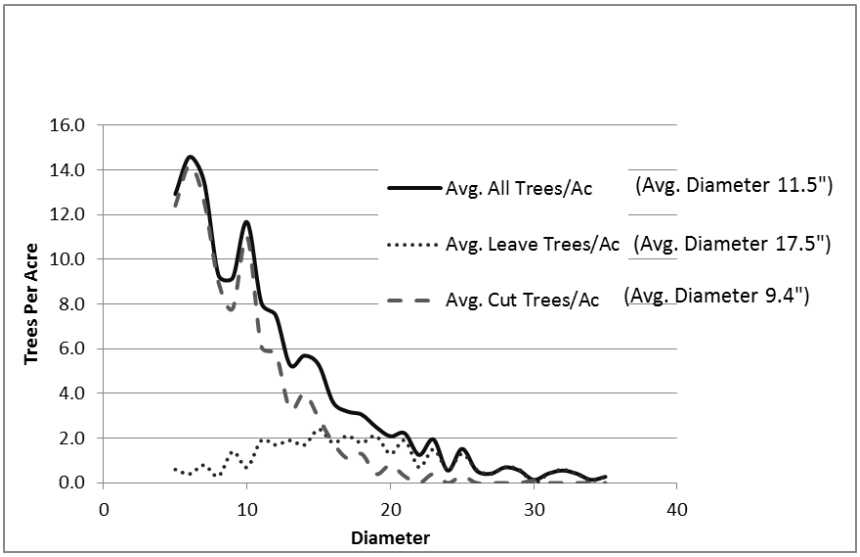


Figure 9: LJCRP inventory of cut and leave trees under Alternative 2 within the Joseph Canyon, Wildhorse, and Cook Ridge IRAs.

Maintain or Improve Roadless Area Characteristics

Treatments within IRAs are designed to more closely represent historic stand structures and disturbance regimes, reduce adverse fire effects, and/or increase the ability and decision space to manage characteristic fire or reduce the adverse effects of an uncharacteristic fire that threaten roadless area characteristics. Treatment areas provide a larger range of options for fire managers to assess fire's effect to IRA characteristics in terms of suppression tactics or managing unplanned ignitions to maintain or improve roadless area characteristics. The impacts of large fires with uncharacteristic severity, intensity, or extent have the potential to negatively impact roadless characteristics because the effects create conditions outside reference landscape conditions. Reducing the potential for these events through silvicultural treatments designed to create historic stand structure and disturbance patterns would help maintain the presence of these characteristics.

The only activity proposed within the Mountain Sheep IRA is prescribed fire and effects to this IRA are disclosed in the effects common to all alternatives section of this FEIS.

<u>High Quality or Undeveloped Soil, Air and Water Quality:</u> There would be minimal affect to soil, water, and air that would be detrimental to their quality. Effects to soils would be within the parameters prescribed in the Forest Plan standards and guides. The limitation of road building (there would be no roads built to facilitate implementation of Alternative 2 in the IRA) and extensive ground based harvest would maintain the quality of soil and water resources. Conservative riparian protections are prescribed in the IRAs that restrict the removal of large diameter vegetation in the RHCAs. Project design criteria and

Best Management practices ensure that these activities would not be detrimental to soil or water quality. Effects to Air Quality are disclosed in the effects common to all action alternatives.

Sources of public drinking water: See effects common to all action alternatives.

Diversity of plant and animal communities: See effects common to all action alternatives.

Habitat for Threatened, Endangered, proposed, candidate, and sensitive species and for those species dependent upon large, undisturbed areas of land: See effects common to all action alternatives.

Primitive, semi-primitive, non-motorized and semi-primitive motorized classes of dispersed recreation: Recreation opportunities, including cross-country hiking, motorcycle riding, mountain biking, horseback riding, and hunting, may be interrupted by the sights, sounds and smells of activities. Hunters and dispersed hunting camps may be displaced while activities are taking place. The sense of solitude at campsites located near treatment areas may also be reduced while project activities are taking place. In the long term treatment areas would again be available although the primitive setting some recreationists seek would be reduced to varying degrees on the treated acres. The vast majority of these IRAs would continue to offer the current level of recreation opportunities in natural settings.

Naturally Appearing Landscapes with High Scenic Quality: Evidence of activity would be apparent to varying degrees in treatment areas. The natural appearance of the landscape would be reduced following treatment activities in areas where past harvest has not occurred. Stumps, skid trails and slash would be evident where harvest and fuels reduction occur. Tree density would be reduced, which would result in more open stands compared with neighboring untreated areas. The stands would not likely be opened to the point that the skyline of the forest canopy appears highly manipulated to the casual observer. The commercial thinning treatments would favor pine and larch species that have the desired large tree character, and greater fire resiliency. This effort would improve the scenic quality and the scenic stability of the area. Landscape character changes would be seen as thinned stands of trees and a more open forested canopy character emblematic of natural processes and stand development for this IRA. Alternative 2 would improve species composition, stand density, and reduce ladder fuels and canopy closure to more closely resemble the historic (native) range of variability for these structure attributes and restore the native fire regime pattern to increase the degree this area appears ecologically natural, thereby maintaining and improving this IRA landscape.

The Joseph Canyon IRA has the highest visual sensitivity in the project area. Oregon State Highway 3 borders the west side, and the Wild &Scenic River is the most sensitive visual quality area in the IRA. On the west side of the Joseph Canyon IRA, the immediate foreground (up to 300’ distance zone) and foreground (up to ½ mile distance zone) of the Oregon Highway 3 travel route is highly sensitive for any new visual impacts, maintaining large trees along the travel route, and the foreground, middleground, and background visible from the Joseph Creek Overlook. Alternative 2 would increase visibility into stands along the eastside of Highway 3 in limited cases through single tree selection, savanna treatments, and stand improvement by removing trees density. The landscape slopes down from Highway 3 to the east, so visibility of treatment units would be limited to the immediate foreground, if at all. The commercial thinning treatments would leave the pine and larch species that have the desired large tree character, and greater fire resiliency. This effort would improve the scenic character and the scenic stability of the area. Landscape character changes would be seen as thinned out stands of trees and a more open forested canopy character. Alternative 2 would improve species composition, stand density, and reduce ladder fuels and canopy closure, thereby maintaining and improving this IRA characteristic.

The Wildhorse IRA is less visually sensitive than the Joseph Canyon IRA. Parts of the IRA are visible from FS Road 46. Forest Road 46 is the main travelway through the project area. It has a visual quality objective of Partial Retention in the foreground, and generally Modification in the middleground. All

treatments proposed in the foreground, middleground and background along this travelway (single tree selection, group selection, intermediate, savanna, and stand improvement) would meet Partial Retention visual quality objectives. One small portion of the middleground on the western side of Cold Spring Ridge, within the Inventoried Roadless Area has a visual quality objective of Partial Retention in the middleground. In Alternative 2, only stand improvement treatments would occur in this area, and would only slightly alter the appearance in the short-term. Over the longer-term, scenic integrity and stability would be improved throughout this viewshed.

There would be one decommissioned road located off Forest Road 46 in the foreground and middleground of this viewshed adjacent to the IRA (FS Road 570). Decomissioning this road would improve scenic integrity by restoring the landscape back to a more natural appearing character by reducing linear corridors and allowing vegetation to become reestablished. There would not be any new roads that would result in introducing new linear corridors in the landscape.

In the short term, it is expected that Alternative 2 would not reduce the scenic integrity and retain the existing visual quality objective standards established in the Forest Plan, CMP (HCNRA) and the Imnaha Wild and Scenic River Management Plan. In the long term (20+ years) these features are expected to improve as natural processes began to operate with characteristic influence on vegetation and associated scenic quality.

Reference Landscapes

Joseph Canyon IRA – Reseaerch Natural Areas

Two proposed research natural areas (RNAs) occur within the boundaries of the Joseph Canyon IRA (Haystack Rock and Horse Pasture Ridge). Horse Pasture Ridge proposed area would contribute to the national network of RNAs by providing an example of Idaho fescue-prairie junegrass and Idaho fescue – bluebunch wheatgrass plant associations in ridge top communities. The Haystack Rock proposed area would contribute to the national network of RNAs by providing an example of Idaho fescue-bluebunch wheatgrass-arrowleaf balsamroot and bluebunch wheatgrass-Sandberg’s bluegrass-narrow-leaved skullcap plant associations.

There are no known significant mineral resources within the RNAs. Recreation use is light, consists of big game hunting, and is expected to continue. Loss of timber utilization is minimal because the area contains few trees. Grazing is incidental to none since they are located on the steep rocky slopes above Joseph Canyon. There are no threatened or endangered plants or animals known in the area, and there are no system roads or trails nor a need for system roads or trails in either proposed RNA.

No activity is proposed within the RNAs and therefore there would be no effect in providing the opportunity to be utilized as reference landscapes; this IRA characteristic would be maintained.

Joseph Canyon IRA – Outside Reseaerch Natural Areas

The Joseph Canyon IRA has evidence of harvest on approximately 41 percent of the forested acres and due to post fire salvage in the late 1980s. Therefore the opportunity to utilize this IRA as a “barometer to measure the effects of development on other parts of the landscape (36 CFR Part 294, page 3245)” is limited due to the nature and location of past harvest and current management (e.g. grazing and fire suppression). Alternative 2 proposes to harvest approximately 877 acres of which about 200 acres share a footprint with past harvest leaving approximately 677 acres (<3 percent) of the IRA newly harvested. Approximately 231 acres of stand improvement treatment would occur with about 182 acres in past harvest areas. About 50 new acres (<1 percent) of stand improvement would occur within the Joseph Canyon IRA.

Wildhorse IRA

The Wildhorse IRA has evidence of harvest on approximately 28 percent of the forested acres due to uncharacteristically severe fire and the post fire salvage in the late 1980s. Therefore the opportunity to utilize this IRA as a "barometer to measure the effects of development on other parts of the landscape (36 CFR Part 294, page 3245)" is limited due to the nature and location of past harvest and current management (e.g. grazing and fire suppression). Alternative 2 proposes to harvest approximately 2,500 acres of which about 350 acres share a footprint with past harvest leaving approximately 2,200 acres (11 percent) of the IRA newly harvested. Approximately 2,000 acres of stand improvement treatment would occur with about 1,200 acres in past harvest areas. About 800 new acres (<4 percent) of stand improvement would occur within the Wildhorse IRA.

Cook Ridge IRA

The Cook Ridge IRA has evidence of harvest on approximately 14 percent of the forested acres due to uncharacteristically severe fire and the post fire salvage in the late 1980s. Therefore the opportunity to utilize this IRA as a "barometer to measure the effects of development on other parts of the landscape (36 CFR Part 294, page 3245)" is reduced due to the nature and location of past harvest and current management (e.g. grazing and fire suppression). Alternative 2 proposes to harvest approximately 40 acres, of which about 20 acres share a footprint with past harvest leaving approximately 30 acres (<<1 percentt) of the IRA newly harvested. Approximately 200 acres of stand improvement treatment would occur with about 144 acres in past harvest areas. About 20 new acres (<<1 percent) of stand improvement would occur within the Cook Ridge IRA.

Also see disclosure of effects common to all action alternatives.

Traditional cultural properties and sacred sites: See effects common to all action alternatives.

Other locally identified unique characteristics: Joseph Canyon is popular with tourists, largely due to its proximity to State Highway 3, deep canyons, local history, and scenic viewpoints. Alternative 2 would improve the scenic quality and the scenic stability of this area. Landscape character changes would be seen as open stands of trees and a more open forested canopy character emblematic of natural processes and stand development for this IRA. There would be minimal effect to this roadless characteristic given the topographic nature of the Joseph Canyon IRA and location of the viewpoints due to inclusion of project design criteria related to visual and scenic quality (Appendix J). Therefore, this IRA characteristic would be maintained.

There are no "locally identified unique characteristics" available in the Wildhorse IRA, therefore there would be no effect to this Roadless Characteristic under any alternative.

Potential Wilderness Areas

Potential Wilderness Areas are identified through an inventory process outlined in the IRA/PWA report in the project record. Indicators for effects to potential wilderness characteristic include roadless characteristics outlined in the RACR and the change in the number of acres meeting PWA inventory criteria.

Potential Wilderness Area Roadless Characteristics

Approximately 1 percentof Joseph PWA and 13 percent of Wildhorse PWA would be directly affected through the harvest and removal of trees and stand improvement. These acres are confined to the outer edges of the PWA, on flatter areas above topographic breaks, generally adjacent to roads, private land and areas with evidence of past human activity. The majority of PWA acres (90 percent for Alternative 2) would remain undisturbed and retain the existing degree of roadless characteristics. Due to the degree of

overlap with the Joseph Canyon and Wildhorse IRAs the description of effects to roadless characteristics are applicable to the Joseph and Wildhorse PWAs.

Remainder of acres meeting PWA Inventory Criteria

Under Alternative 2 proposed project activities would have a direct effect on 70 acres of the 6,500 acre Joseph PWA (approximately 1 percent of the PWA) and about 1,600 acres of the 15,400 acre Wildhorse PWA (approximately 14 percent of the PWA).

There would be no direct, indirect, or cumulative effects to the Cook Mountain PWA from harvest or stand improvement treatments. There would be approximately 70 acres of high priority prescribed fire treatment. Effects are disclosed effects common to action alternatives. Table 65 shows the acres of PWA within the LJCRP boundary that are affected by harvest or SI treatments and the acres that would continue to meet PWA criteria after implementation identified in Alternative 2.

Table 65. Affected acres in potential Wilderness areas.

Potential Wilderness Areas	Acres within Lower Joseph Project Area	Alternative 2 Proposed Acres		Remaining Area Meeting PWA Criteria*
		Harvest	SI	
Joseph	6,500	70	0	6,400
Wildhorse	15,400	1,600	370	13,800
Cook Mountain	350	0	0	350
Total	22,250	1,670	370	20,550

*Acre estimates are for areas within the LJCRP boundary only; PWAs extend outside this boundary but would not be affected by actions under Alternative 2.

Harvest treatments generally involve implementation of the Individuals, Clumps, Openings (ICO) method of harvest creating heterogeneity in these areas. Stumps and skid roads would remain visible for a longer period than those associated with SI. Harvest would result in reducing the area meeting PWA criteria per FSH 1909.12, Chapter 71.

No temporary roads would be constructed in PWAs under any alternative; therefore, there would be no effect due to temporary road construction to areas meeting PWA criteria.

Other Undeveloped Lands

Harvest would occur on approximately 5,600 acres (1,200 in IRA and 4,400 outside IRA) of other undeveloped lands under Alternative 2. Stand improvement would occur on approximately 700 acres (400 in IRA and 300 outside IRA) of other undeveloped lands under Alternative 2. Under Alternative 2, about 16,400 acres would be identified as high priority for fire treatment, which could be accomplished via prescribed or unplanned fire. Effects in this section pertain only to acres occurring outside IRA because effects to the IRA characteristics are addressed in the IRA sections of this FEIS.

Social Values (apparent naturalness, degree of solitude, sense of remoteness)

Proposed harvest and stand improvement activity in other undeveloped lands would create stumps, which would reduce the size of the undeveloped areas. The lands where harvest occurs would appear managed and developed. This effect would be less noticeable and for a shorter duration in stand improvement treatments due to the general small size of material treated. Prescribed fire in general would maintain the

character of natural disturbance; therefore, it is assumed there would be minimum effect due to managing fire in these areas.

The sights, sounds, and changes in vegetation from activities and use would further decrease the apparent naturalness and sense of solitude within harvest units and along roads during logging operations. All treated stands would remain forested and skid trails, stumps, and landings would be evident. Impacts to social integrity and sense of naturalness would likely be evident until stumps, skid trails, or temporary roads are no longer substantially recognizable (approximately 75 – 100 years, maybe less considering the character of younger trees, dependent upon deterioration of stumps due to decay or fire). The sounds of machinery from activity would reduce the sense of naturalness and solitude during implementation but would not persist in the long term. Other impacts, such as tree marking paint and logging slash would be visible in the short term (5 to 10 years). Impacts such as skid trails and tree stumps would be evident for a longer period. The increased number of stumps and reduced stand density would likely be the most apparent visual change resulting from implementation.

Change in acres of other undeveloped lands

The character and intrinsic value of other undeveloped lands outside of treatment units under Alternative 2 would retain those characteristics (physical, biological, and social values) as described in the affected environment. They would remain free of developments such as skid trails, temporary roads, or harvest created stumps.

All 5,600 acres of other undeveloped lands identified for harvest or 700 acres of stand improvement would continue to not meet PWA inventory criteria. Table 66 is a summary of changes in acres for other undeveloped land in Alternative 2.

Table 66. Change in acres of other undeveloped land in Alternative 2.

	Acres of Other Undeveloped Land	Acres affected by Harvest or SI	Acres Remaining	Percent Change
IRA	16,200	1,600	14,600	-10%
Non-IRA	24,100	4,700	19,400	-20%

Areas Identified as Unroaded by Oregon Wild

Direct effects are those that would occur immediately following activity at the stand scale, while indirect effects are those that would occur in the future both at the stand and areas identified as unroaded by Oregon Wild at the project scale.

The effects to the 44,100 acres of areas identified as unroaded by Oregon Wild that intersect Forest Service IRAs are similar to that disclosed in the IRA section. Likewise the effects to the 21,800 acres of areas identified as unroaded by Oregon Wild that intersect areas that meet PWA criteria are disclosed in the PWA section. An additional 30,100 acres intersect the Forest Service's identification of other undeveloped land and the effects to those areas are disclosed in the Other Undeveloped Land section. Table 67 shows the acres of harvest and stand improvement within the areas identified as unroaded by Oregon Wild. The change in acres for the remaining 6,900 acres of OW is also shown in this table. After consideration of past harvest and the Forest Service's road influence area there are only about 80 acres (less than one percent) of areas identified as unroaded by Oregon Wild dispersed in very small polygons of what could be considered outside the effects disclosed in other sections of this document. Areas that contain past harvest or system roads would not be considered for PWA and would remain unavailable for

the duration of the LJCRP. See Map B-1 in the IRA/PWA report in the project record showing the relationship between areas identified as unroaded by Oregon Wild, treatments, and other land designations addressed in this FEIS.

Table 67. Acres of harvest and stand improvement within unroaded areas identified by Oregon Wild

Oregon Wild's Unroaded Area Name	Acres outside of IRA, PWA, and other undeveloped land	Acres outside (IRA, PWA other undeveloped land) intersecting past harvest (1974 – 2009) FACTS Database	Acres outside (IRA, PWA, other undeveloped land and past harvest)intersecting 300' road influence zone	Acres outside treated with Harvest/SI – Alternative 2	
				Harvest	SI
Joseph Canyon	4,700	3,800	800	1,500	500
Cottonwood Creek – Broady Creek	1,500	850	650	380	200
Sumac Creek	200	10	190	50	0
Yew Wood Springs	300	130	170	160	0
Boner Gulch	200	30	170	50	0
Total	6,900	4,820	1,980	2,140	700

Cumulative Effects

Physical Environment

Climate

Alternative 2 would bring the LJCRP area closer to reference conditions in vegetation and disturbance regime in comparison to Alternatives 1 or 3, creating a more resilient and sustainable condition in the face of climate change. See Cumulative Effects Common to All Action Alternatives - Climate, for more information.

Soils

If Alternative 2 is implemented, there is a greater potential to create Detrimental Soils Conditions through active vegetation management activities compared to Alternatives 1 or 3. Alternative 2 proposes approximately 1,500 more acres of ground-based harvest, 900 more acres of skyline and 3,000 more acres of helicopter harvest. Implementation of these additional proposed activities would also facilitate the remediation of legacy impacts and would also most effectively reduce the landscape's susceptibility for an uncharacteristic disturbance. See the discussion under Cumulative Effects Common to All Action Alternatives – Soils, for background information.

Water Quality

With the implementation of Alternative 2, there would be a higher potential for erosion and subsequent sediment delivery from the proposed management activities. Additionally, under Alternative 2, 31 acres of

Category 1 (Swamp Creek), and 1,800 acres of Category 4 RHCAs would be thinned with equipment that may deliver additional sediment to streams. Sediment contributions from RHCA thinning, as prescribed, are unlikely to be detectable beyond the site scale (see Physical Environment supporting documentation). Alternative 2 would also be more effective at reducing the risk of uncharacteristic disturbances, in comparison to Alternatives 1 or 3, thus having the potential to mitigate future sediment inputs from high intensity wildfires. See Cumulative Effects Common to All Action Alternatives – Water Quality, for additional information.

Air Quality

See Cumulative Effects Common to All Action Alternatives

Biological Environment

Vegetation and Disturbance

Alternative 2 restoration treatments would contribute approximately 22,000 acres toward moving forest composition, structure, density toward desired conditions or enhancing forest pattern or size class distribution or improving trends in insect and disease susceptibility.

Cumulative Effects of Amending the Forest Plan (Eastside Screens)

Proposed amendment to cut trees greater than or equal to 21" diameter at breast height

Alternative 2 is the only LJCRP alternative that proposes a Forest Plan amendment to enable the cutting of trees ≥21 in. dbh (see chapter 3 for an explanation of the conditions under which this could occur). Analysis of past Forest Plan amendments relative to the Eastside Screens (Appendix B, amendment numbers 26, 38, and 40), and scenario modeling specific to both the LJCRP area and the WWNF as a whole were done to assess the effects of Alternative 2 on the number of large trees across the landscape. Alternative 2 proposes harvest on 5,000 acres where trees ≥21 in dbh could be cut (Map 14). Based on estimates from stand surveys measured within the LJCRP area, about 15 percent of existing trees ≥21 in dbh within treatment units would be cut under Alternative 2. Previous amendments to the WWNF Forest Plan since 1991 that allowed the cutting of trees ≥21 in dbh encompassed approximately 395 acres (Tremble Aspen Restoration Project – 56 acres; Starkey Research, Restoration and Fuels Reduction Project - 194 acres; Horse Fly Vegetation Management Project – 145 acres). The area that would be affected by this amendment under Alternative 2 in combination with previous projects with similar amendments represents a very small proportion of the Forest (0.3 percent).

For the LJCRP area, a scenario model was run for 30 years to estimate the projected direct and/or indirect effects of Alternatives 1 or 2 on the average numbers of large trees that would be removed from the landscape due to harvest and natural disturbance. Project scale scenario modeling results showed that under Alternative 2, natural disturbances would remove more large trees from the landscape than harvest (Appendix C). The no action (Alternative 1) scenario, due to continued high fuel loads and uncharacteristic disturbances, would likely remove more large trees in total, than Alternative 2 (or a more intensive scenario that would harvest a higher proportion of large trees than the 15 percent of large trees in treatment units that is expected under Alternative 2; see Appendix C for modeling methods). In general, across the LJCRP area, the Alternative 2 scenario, including both trees lost to harvest and to fire, would likely remove less than half the number of large trees, in total, compared to the no action scenario.

To put the cumulative effects of proposed and past Forest Plan amendments to cut trees ≥21 in dbh (encompassing 0.3 percentof the WWNF) into perspective, similar scenario modeling was done for the WWNF as a whole. This scenario modeling assumed that forest treatment rates similar to the last 15 years would continue, and that trees ≥21 indbh could be cut (at both relatively low and high rates; see Appendix

C for modeling methods). In other words, this scenario assumes not only that the past amendments occurred, but also that a forest-wide Forest Plan amendment to cut large trees would operate across the landscape into the future (30 year scenario). While this analysis is not considered"cumulative effects" (as per 40 CFR 1508.7) because it makes assumptions about future treatments that have not been proposed, results of Forest-scale modeling showed that the likely loss of large trees to natural disturbances would be about 33 times the amount of trees that would likely be lost to forest treatments.

Likely loss of large trees to management in the LJCRP area under Alternative 2 would be a very small portion (about 0.3 percent) of the loss that might occur across the whole Forest in any scenario.

Consequently, the cumulative effects of these amendments is expected to be generally beneficial relative to specifically maintaining large trees on the landscape over the long-term, and restoring forest structure, composition, pattern, and disturbance regimes toward RV.

Proposed amendment for forest vegetation treatments in old forest single story

Of the approximately 9,400 acres of dry and moist, OFSS located on the WWNF (USDA Forest Service 2014b), approximately 306 acres (3 percent) have been treated to date under previous project-specific plan amendments (Medical Springs EA - 45 acres; Horsefly Vegetation Management EA - 29 acres; Snow Basin Vegetation Management EA - 232 acres). This percentage is likely lower since some past treatments on the WWNF had the objective to increase the amount of OFSS; however, no more recent data currently exists on the extent of OFSS structure. Goals of past and proposed treatments in OFSS were to restore stands to their historic structure, enhance the health of the stands, and provide for the habitat needs of old-growth associated wildlife species, in particular those species that rely on OFSS stand structural components. Old forest single story structure is well below the 10 – 65 percent range of variation for moist and dry forests forest-wide. These treatments have and would maintain old growth habitat, as defined by Forest Standards, while maintaining adequate levels of down logs and snags.

Alternative 2 proposes to treat approximately 25 acres of OFSS to restore or maintain OFSS structure, which is currently less than 1 percent of the forested landscape, and substantially below RV (Table 11). The cumulative effects of implementing the plan amendment under Alternative 2 to treat OFSS stands to restore structure and composition, and maintain old forest habitat, in combination with similar past amendments on the WWNF are minor, but positive relative to the extent of the restoration need Forest-wide.

Also see "Alterantives 2 and 3 - Effects of Not Amending the Forest Plan", below.

Threatened, Endangered and USFS Region 6 Sensitive Plants, Rangelands, and Understory Vegetation

While there are no documented sensitive plant species within coniferous forest, sensitive white fleabanes and Wallowa needlegrass grow at the edges of treatment areas that have been entered for management a number of times. Wallowa needlegrass is found in rocky shallow soil (lithosol) areas often with rigid sagebrush and Sandberg's bluegrass. About 22 acres of Wallowa needlegrass (25 percent of the site acres in the LJCRP area) are within 300 feet of units in Alternative 2 that have had multiple entries. Road grading, piling and landings associated with past and proposed future vegetation treatments is the main concern. Only one population is within the Joseph Starvation (1986)/ Starvation (1994) fire perimeter. The Wallowa needlegrass is in the southeastern portion of LJCRP area, south of Red Hill. Dewey (2013) noted that Wallowa needlegrass does not compete well with other grasses. Wildfire likely does not impact Wallowa needlegrass directly, but wildfire suppression and post-fire seeding have the potential to decrease Wallowa needlegrass populations. Suppression efforts can include the use of lithosols for staging areas, safety zones, and firelines, all of which can remove Wallowa needlegrass through crushing,

uprooting, smothering, and removal. Wildfire suppression efforts may also spread non-native annual grasses through ground disturbing activities that create bare soil. Post-fire seeding that is not targeted to specific areas of concern, such as the aerial seeding of non-native forage species after the Joseph/Starvation fire, may have had adverse impacts on native grass species including Wallowa needlegrass.

About 1,100 acres of white fleabane (about 50 percent of the site acres in LJCRP area) are within 300 feet of units in Alternative 2 that have had multiple entries. Road grading, piling and landings associated with past and proposed future vegetation treatments is a concern. The area of primary concern is the Cold Springs Road area. This area has also experienced multiple wildfires (Cache Creek, both Jim Creek, and Teepee Butte fires). Because the white fleabane grows on rocky areas, fire most likely has had, and would have little impact. The R6 sensitive plant Davis fleabane is found in both Joseph Canyon IRA and Wildhorse IRA. It straddles the Cold Springs cutoff road on the northeastern side of the project area on the eastern side of Wildhorse IRA. The Davis fleabane's habitat is open shallow soil to rocky areas in grasslands. The only site for rough rabbit weed in the project area is in the Joseph Canyon IRA. Lithosols in LJCRP seem to be found as dry forest inclusions and are all outside of IRAs in the project area.

The Nez Perce mariposa lily is another sensitive plant species that occupies grasslands, often near forested stringers, and is found in the Joseph Canyon IRA. Alternative 2 would include stand improvement and commercial treatments in IRAs. The main threats to grassland sensitive plants would be from commercial logging activities. Reintroduction of natural fire cycles should benefit all native plants, if project design criteria are followed.

Grazing is an ongoing activity that would occur in addition to Alternative 2 activities, and would contribute to cumulative effects of the LJCRP, although project design criteria are followed, including the following: TESP-2 (no road construction activities, or staging areas (such as landings, parking, piling) on non-forested habitats such as lithosols, grasslands, or meadows); BIO –1 (avoid disturbing natural seeps and springs, wet meadows, moist meadows, this includes removing shrubs and trees); BIOD–2 (leave tree islands in coniferous forest for conservation of native mycorrhizal fungi, yew, wet areas when these features are found or suspected in units. Mycorrhizae, bryophytes, and mushrooms should always be suspected in coniferous forest units); and BIOD–3 (maintain woody debris as per guidance from eastside screens to provide habitat for nonvascular plants and fungi).

Wildlife

The harvest of trees ≥21 in dbhin alternative would have an adverse cumulative effect on goshawk and pileated woodpecker habitat as this is an important habitat component especially for pileated woodpeckers as it potentially transforms to a snag. Large live trees provide an important nesting habitat component for goshawks. Current wood cutting policies and lack of law enforcement may be detriment to future snag habitat in the Lower Joseph project area especially for pileated woodpeckers. Because Alternative 2 proposes to close the most miles of roads, the future potential for loss of snags due to safety and firewood harvest is reduced the most in this alternative. The harvest of trees ≥21 in dbh (Alternative 2) would have an adverse cumulative effect on longer-term marten habitat as this is an important habitat component especially as it creates large down-log habitat (Table 58). Because Alternative 2 proposes to close the most miles of roads, the future potential for loss of snags due to safety and firewood harvest is reduced the most. The proposed projects' reduction in cover is offset in Alternative 2 to some degree by road closures allowing for elk security within the project areas. Open road densities would be reduced in Alternative 2 and generally maintained in Alternative 3. See the discussion under Cumulative Effects Common to All Action Alternatives – Wildlife, for background information.

Aquatic Habitat

See the discussion under Cumulative Effects Common to All Action Alternatives – Aquatic Habitat, for more information.

Social Environment

Recreation / Scenery

See Cumulative Effects Common to All Action Alternatives

Heritage / Tribal

See Cumulative Effects Common to All Action Alternatives. Relatively speaking, Alternatives 2 and 3 would pose a similar cumulative risk to heritage and tribal values over time, as both alternatives are within approximate percent of ground based total harvest treatments percentages (see table 50). Cumulative effects on heritage resources as a result of Alternative 2 would be mitigated via compliance with Section 106 of the National Historic Preservation Act, the 2004 Programmatic Agreement, and implementation of design criteria (Appendix J, PDC's #2, 3, and 10). Also see Alternative 2 effects analyses in the sections for Wildlife, Aquatics, and TES Plants and Understory Vegetation for associated effects to treaty resources and habitats.

Inventoried Roadless Area, Potential Wilderness Areas, and Other Undeveloped Lands, and areas identified as unroaded by Oregon Wild

Potential Wilderness Areas

Since the boundaries of PWAs were delineated based on current system roads and past timber harvest activity there are no past actions that affect these areas. Currently there are no additional present or reasonably foreseeable actions that would remove any portion of these areas from consideration as potential wilderness. Therefore, there are no cumulative effects associated with PWAs.

Cumulative effects from ongoing activities for Alternative 2 are the same as Alternative 1. The smells, sounds and possible sighting of mechanical activities and fuel treatment activities proposed in areas adjacent to PWA under Alternative2 would reduce a sense of solitude and remoteness in the short-term, during project activity. Adjacent activity would not preclude the PWAs from being retained in the PWA inventory.

Implementation of Alternative 2 would result in approximately 70 fewer acres of Joseph PWA and about 1,300 fewer acres of Wildhorse PWA. These acres of PWA would be removed from the PWA inventory because there would be a reduction to their natural appearing landscape and no longer meet PWA inventory criteria found in Forest Service handbook (FSH) 1909.12, Chapter 71. Removal of these acres would represent about a 1 percent and 11percentreduction in acres of PWA respectively. The effects on roadless characteristics would be mostly confined to the treated acres due to the topographic nature and proximity to existing developed character of the PWA. Considering past, present and possible future activities, the majority of the PWAs would retain roadless characteristics. Cumulative effects to roadless area characteristics where this PWA overlaps with the IRA are similar to those documented in the previous section for Inventoried Roadless Areas.

There would be no cumulative effect to Cook Mountain PWA because no activities overlap therefore there would be no direct or indirect effects.

The effect of implementing Alternative 2 is consistent with Forest-wide standards and guidelines and LRMP management area standards and guidelines.

Other Undeveloped Land

The LJCRP boundary provides the geographic extent for the analysis of cumulative effects to other undeveloped land. This boundary is appropriate because it can reasonably be expected that the direct/indirect effects resulting from LJCRP are not expected to interact with any similar effects that might occur elsewhere. The temporal boundary for this cumulative effects analysis is 10 years. The effects to the intrinsic values of these lands would be limited to activities are occurring for the LJCRP.

For other undeveloped land in which the project activities would occur, cumulative effects to the physical (climate, soil, minerals, water quality, air quality) biological (vegetation, disturbance, wildlife, fisheries, botany), and social environments (heritage, recreation, scenery, transportation) are disclosed in other sections and will not be reiterated here. Cumulative effects for other undeveloped land within IRAs are described in that section. Cumulative effects for other undeveloped lands outside the IRAs would be similar to those disclosed in the IRA section of this document.

Cattle grazing, dispersed camping, and road use would present a minor cumulative impact to apparent naturalness, solitude, and remoteness. Overall cumulative impacts to characteristics associated with other undeveloped lands would be minor in proportion to the anticipated direct and indirect effects.

Areas Identified as Unroaded by Oregon Wild (OW)

Because OW areas contain similar intrinsic social values as IRA, PWA, or Other Undeveloped Land the cumulative effect to OW would not differ from previously disclosed effects for those sections. Only an additional 80 acres of land exist outside of past harvest, forest road influence zones, IRAs, PWAs, and other undeveloped lands therefore cumulative effects are adequately addressed within other sections of the FEIS overlapping OW.

Socioeconomics

Access

Effects to access to WWNF land was an issue brought up through public comments and meetings. The attitude toward the LJCRP from a subsection of the community is generally negative because, although it may not contain significant access restrictions, the LJCRP is seen as an addition to the previous restrictions put in place and is viewed as a trend toward limiting access to public lands. Travel management planning on the WWNF is on-going and this could change cross-country travel and the existing network of roads on the Forest. If some roads on the WWNF are closed in the future for cross-country travel, commenters expressed that the value of maintained roads would increase. Under the Proposed Action alternative, the cumulative effects on access to NFS lands are greater than the effects from Alternative 3 since 170 miles of USFS roads would be open.

Treatment and Restoration

The effect of past, present and reasonably foreseeable treatment activities in the project area would improve forest health relative to existing conditions even without the implementation of LJCRP. According to the vegetation report, from 2004 to 2013, approximately 1,300 acres have been commercially harvested in the Lower Joseph area. Under Alternative 2, 16,000 acres are expected to be commercially harvested over the ten year span of the project. Under the Proposed Action alternative, the activity in the forest sector would be higher than the present situation and the associated local economic impact of current and future restoration activities would increase from the present conditions. The estimated employment and income consequences of non-LJCRP treatment activities, therefore, are likely underestimated in the related environmental compliance documents if they depend on present conditions for those analyses.

The LJCRP treatments and other ongoing and foreseeable treatments could increase exposure to smoke emissions, which could cause cumulative effects to health and quality of life for individuals who are sensitive to smoke. According to the vegetation report, from 2004 to 2013, approximately 600 acres have been broadcast burned and 24,000 acres have incurred wildfire in the Lower Joseph area. Under Alternative 2, up to 50,000 acres are expected to be broadcast burned over the ten year span of the project. However, the cumulative effect of these treatments would be to decrease the risk of uncharacteristic wildfire, which would decrease the probability of smoke emissions associated with these events.

Recreation

Other on-going and reasonably foreseeable vegetation treatments in the project area would reduce the opportunities for substitute behavior when the preferred recreation site is unavailable. As a result, individuals may choose to stay home, which would decrease visitor spending and consumer surplus to a greater extent than estimated in the direct and indirect effects analysis. However, the cumulative effects to the social and economic impacts from recreation cannot be precisely described. Based on the available information, the effect to visitor spending and consumer surplus from on-going and reasonably foreseeable actions is not expected to change. Although Alternative 2 would likely have more short-term disturbances to recreation (from smoke and limited access), the long term effects to recreation would be improved viewsheds and opportunities to recreate in a healthy forest with reduced risk of wildfire.

Unavoidable Adverse Effects

See “Unavoidable adverse effects” under the section “Effects common to the action alternatives”.

Alternative 2 would affect potential wilderness characteristics on approximately 70 acres of Joseph PWA and approximately 1,600 acres of Wildhorse PWA. Treatment would create recognizable stumps and evidence of harvest that would remain substantially noticeable for several decades until they are consumed by fire or succumb to decay. Until these improvements are no longer substantially recognizable and meet inventory criteria in 1909.12 Chapter 70 these acres would not be available for recommended as wilderness under Forest Plan Revision processes.

Irreversible/Irretrievable Commitments of Resources

See “Irreversible/Irretrievable commitments of resources” under “Effects common to the action alternatives.

Alternative 3: Direct, Indirect, and Cumulative Effects

The Physical Environment

Soils

Surface Erosion

The potential for surface erosion as a direct result of the proposed management activities in Alternative 3 would be lower than in Alternative 2 because there would be fewer stands treated and therefore fewer disturbances. Additionally, fewer roads would be decommissioned under Alternative 3 so there would be a lower potential for surface erosion from this disturbance. However, indirectly, there is greater potential for long term surface erosion and sediment production under Alternative 3 because fewer are being conditions and the proposed treatments would be less effective at moving the landscape toward a more resilient condition. Alternative 2 and 3 have the same proposed temporary road system (12.6 miles).

Road traffic would likely increase under Alternative 3 but would not be measurably different from Alternative 2.

Sediment from Log Haul

See ”Effects common to all action alternatives”.

Mass Wasting

See “Effects common to all action alternatives”.

Soil Productivity

There is the potential for Alternative 3 to produce fewer detrimental soil conditions (DSC) than Alternative 2 but the activities that contribute most to DSCs (ground based harvest and temporary road building) are the same between both alternatives. Alternatively, there would be more units evaluated for DSCs in Alternative 2 and thus more opportunity for appropriate remediation as described in the Project Design Criteria (Soils-7, Soils-8). See “Effects common to all action alternatives”.

Air Quality

See “Effects common to all action alternatives”.

The Biological Environment

Vegetation and Disturbance Regimes

Table 68 lists the cutting treatments proposed under Alternative 3, approximate acres for each treatment and the percent of the total treatment acres each treatment type represents. A total of 12,800 acres of cutting treatments are proposed. Moderate and high intensity single tree selection treatment types account for 62 percent of the treatment acres and stand improvement (non-sawlog) treatments add another 20 percent. Under this alternative, approximately 23 percent of the forested acres within the project area would have a cutting treatment.

Compared to the modified proposed action (Alternative 2), Alternative 3 proposes 2,840 fewer acres of stand improvement, 6,000 fewer acres of STS/GS/IT treatments, 270 fewer acres of savanna treatments, and 0 acres of meadow restoration.

Within the 880 acres of units with a group selection treatment type, there may be a need to plant approximately 200 acres to ensure the prescribed post treatment stocking and species mix is attained.

Logging Systems

Logging systems were estimated by the interdisciplinary team using a combination of slope, distance to specified roads, and limited use of temporary roads to access the proposed harvest units. The associated acres by estimated logging system are listed in Table 69. Map 25 shows the estimated logging system by unit and logging system type. The final logging system selection by stand would be completed during implementation, considering the final decision and site specific constraints and opportunities.

During FEIS analyses, the Regional logging engineer field verified an 11 percent sample of treatment stands, and found the original estimates to differ from the field verification by -9 percent, 85 percent, and -26 percent for ground based, line, and helicopter system, respectively (see the project record for more information). Consequently, the analysis of effects for all resources took a conservative approach and considered the potential range in acres by logging system represented by -26 to +85 percent of the original estimated acres. Further, individual resource effects were assessed by stand relative to the

potential for implementation of more impactful logging system(s) than the original estimated system (e.g., if a ground based system were implemented instead of an estimated helicopter or skyline system), and no specific resource concerns were identified. In general, as a result of project design criteria, best management practices, and Forest Plan standards and guidelines applied at the stand level by resource, implementation of logging systems within the ranges specified in Table 50 would result in no differences in effects. Specific design features and best management practices for each logging system are listed in Appendix J.

Table 68. Alternative 3 – Acres by cutting treatment type in the Lower Joseph Creek Restoration Project area

Cutting Treatment Type	Approximate Acres (Change from Alt. 2)	Percent of Forested Area Treated
Stand Improvement	3,000 (-2,400)	5%
Single Tree Selection – High Intensity	3,700 (-1,100)	7%
Single Tree Selection – Moderate Intensity	4,400 (-1,400)	8%
Single Tree Selection – Low Intensity	820 (-380)	1%
Single Tree Selection in MA15 – Moderate Intensity	0 (-650)	0%
Single Tree Selection in MA15 – Low Intensity	0 (-10)	0%
Group Selection – High Intensity	380 (-1,420)	1%
Group Selection –Moderate Intensity	470 (-120)	1%
Group Selection – Low Intensity	30 (-10)	<1%
Intermediate Treatment – High Intensity	70 (-50)	<1%
Intermediate Treatment – Mod Intensity	50 (-70)	<1%
Intermediate Treatment – Low Intensity	80 (-10)	<1%
Savanna*	290 (-240)	1%
Meadow Restoration* (Swamp Creek)	0 (-31)	0%
Cutting Treatment Total (Forested Acres)	**13,340 (13,050)**	**24%**
Forested Acres – No Cutting Treatment	**42,250**	**(76%)**
Total Forested Acres	**55,300**	**(100%)**

*Savanna and meadow restoration treatments are in areas that do not meet the definition of forested.

Table 69. Alternative 3 - Acres by logging system

Logging System	Approximate Acres	Percent of Total Harvest Treatment Acres	Analyzed Range in Approximate Acres (-26 to +85% of the original estimate)	Analyzed Range in Approximate Percent of Total Harvest Treatment Acres
Ground Based (Tractor)	4,700	46%	3,500-8,700	34-84%
Line	3,600	35%	2,700-6,700	26-65%
Helicopter	2,000	19%	1,500-3,700	15-36%
Total Harvest Acres:	10,300	100%		

Forest Cover Type

Cover type percent by potential vegetation group and percent change from existing due to Alternative 3 treatments are listed in Table 70. The prevalent effect in terms of movement toward RV would be in the ponderosa pine cover type. There would be a seven percent increase in the dry PVG and another one percent increase in the moist PVG. There would also be notable changes to the Douglas-fir cover type with a six percent reduction in the dry PVG and a one percent reduction in the moist PVG. Overall, Alternative 3 would move all cover types in both PVGs closer to RV with the exception of lodgepole pine in the moist PVG.

Table 70. Alternative 3 – Post treatment distribution of forest cover types in the Lower Joseph Creek Restoration Project area

Potential Vegetation Group	Cover Type	Acres	Percentage of Potential Vegetation Group (Percent Change from Existing)	Range of variation (%) (Powell 2010)
Dry upland forest (UF)	Ponderosa pine	14,700	35% (+7)	50-80
	Douglas-fir	19,200	45% (-6)	5-20
	Western larch	610	1% (+<1)	1-10
	Lodgepole pine	200	<1% (-<1)	0
	Grand fir	7,300	17% (-1)	1-10
	Engelmann spruce	0	0%	0
	Unknown	260	1%	
Dry UF Total		42,300	100%	
Moist upland forest (UF)	Ponderosa pine	1,600	12% (+1)	5-15
	Douglas-fir	5,700	44% (-1)	15-30
	Western larch	730	6% (+2)	10-30
	Lodgepole pine	180	1% (-<1)	25-45
	Grand fir	4,600	36% (-<1)	15-30
	Engelmann spruce	90	1% (-<1)	1-10
	Unknown	40	<1%	
Moist UF Total		13,000	100%	
Grand Total		55,300		

Forest Structural Stages

Table 71 summarizes the forest structural stage percent by potential vegetation group and percent change from existing due to Alternative 3 treatments. Highest movement toward RV would be in the OFSS structural stage with a five percent increase in the dry PVG and two percent increase in moist. The SE stage would experience movement away from RV in both PVGs. Overall, Alternative 3 would result in a similar pattern in relation to RV as compared to Alternative 2 at slightly lesser amount due to less acres treated.

Table 71. Alternative 3 – Post treatment distribution of forest structural stages in the Lower Joseph Creek Restoration Project area

Potential Vegetation Group	Structural Stage	Acres		Percentage of Potential Vegetation Group (Percent Change from Existing)		Range of variation (%) (Powell 2010)
Dry UF	OFSS	2,000		5% (+5)		40-60
	OFMS	8,300		20% (-<1)		5-15
	YFMS	3,000	19,000	7% (-1)	45% (0)	5-10
	UR	16,000		38% (+1)		
	SE	5,700		13% (-5)		10-20
	SI	7,100		17% (+<1)		15-25
	Unknown	180		<1%		
Dry UF Total		42,300		100%		
Moist UF	OFSS	210		2% (+2)		10-20
	OFMS	4,200		32% (+2)		15-20
	YFMS	1,800	4500	14% (-1)	35% (-1)	10-20
	UR	2,700		21% (+1)		
	SE	1,900		15% (-3)		20-30
	SI	2,100		16% (+<1)		20-30
	Unknown	20		<1%		
Moist UF Total		13,000		100%		
Grand Total		55,300				

Tree Density Class

Table 72 displays the density class percent by potential vegetation group and percent change from existing due to Alternative 3 treatments. Overall, Alternative 3 would move or maintain all density classes within RV for both PVGs with the exception of dry high, which would remain outside RV.

Table 72. Alternative 3 – Post treatment distribution of tree density classes in the Lower Joseph Creek Restoration Project area

Potential Vegetation Group	Tree Density Class	Acres	Percentage of Potential Vegetation Group (Percent Change from Existing)	Range of variation (%) (Powell 2010)
Dry UF	Dry High	10,100	24% (-9)	5-15
	Dry Mod	10,100	24% (-8)	15-30
	Dry Low	21,900	52% (+18)	40-85
	Unknown	180	<1%	
Dry UF Total		42,300	100%	

Potential Vegetation Group	Tree Density Class	Acres	Percentage of Potential Vegetation Group (Percent Change from Existing)	Range of variation (%) (Powell 2010)
Moist UF	Moist High	3,800	29% (-16)	15-30
	Moist Mod	4,900	37% (+9)	25-60
	Moist Low	4,200	32% (+7)	20-40
	Unknown	50	2%	
Moist UF Total		13,00	100%	
Grand Total		55,300		

Pattern

Alternative 3 would treat 13,050 acres using the Individuals, Clumps and Openings (ICO) approach to restoring forest spatial pattern.

Size Class Distribution

Similar to Alternative 2, thinning treatments would result in an immediate increase in average tree diameter by favoring dominant and codominant trees. The treatments would also increase average tree diameter in the short term by reducing inter-tree competition and improving individual tree growth.

Table 73 displays the estimated post treatment size class distribution and the percent change from the existing distribution. For both the dry and moist PVGs, tree size class would be trending toward larger tree size classes with a five and six percent increase respectively in the >20 size class.

Table 73. Alternative 3 - Tree size class distribution in the Lower Joseph Creek Restoration Project area

Potential Vegetation Group	Tree Size Class (diameter range in inches)	Acres	Percentage of Potential Vegetation Group (Percent Change from Existing)
Dry upland forest (UF)	<5	6,600	16% (-1)
	5-10	1,300	3% (+1)
	10-15	13,000	31% (-7)
	15-20	12,300	29% (-1)
	>20	8,900	21% (+5)
	Unknown	180	<1%
Dry UF Total		42,300	100%
Moist upland forest (UF)	<5	1,900	15% (-1)
	5-10	900	7% (+1)
	10-15	2,900	22% (-5)
	15-20	3,500	26% (+2)
	>20	3,700	29% (+6)
	Unknown	70	<1%
Moist UF Total		13,000	100%
Grand Total		55,300	

Disturbance and Fire Regimes

The effects of harvest, SI, and prescribed fire are described in “Effects common to all action alternatives”, above. The action alternatives vary in effect based solely on intensity of treatment represented by the number of acres. Alternative 3 includes fewer acres of harvest and SI thereby improving forest structure, density, and composition and associated fire regime characteristics to a lesser degree than under Alternative 2.

Prescribed Fire

Alternative 3 has less area identified as a high priority for prescribed fire (46,500 acres) than Alternative 2 (48,600 acres), primarily due to the relatively lower forest area treated mechanically, and thus needing activity fuels treatment. Alternative 3 has similar beneficial impact on fire regime departure and landscape resiliency by burning approximately four to six percent of the landscape per year compared to Alternative 2 (modeled results, see Appendix C). Where Alternative 3 departs from Alternative 2 in that benefit occurs during high fire years where approximately 15– 25 percent is predicted to burn. This is outside the reference fire regime and expected natural burn pattern insofar as the area moving toward fire as a natural disturbance process. During high fire years, even with treating approximately four to six percent/year with prescribed fire, Alternative 3 further departs from reference and desired landscape conditions and is relatively similar to conditions under Alternative. 1.

Activity Fuels

There would be less activity fuels created with the implementation of Alternative 3 as compared to Alternative 2. The treatment of activity fuels in “Effects common to all action alternatives” remains the same. Disposition of activity fuels is a key part in ensuring that fire severity does not increase due to the additional accumulation of fuels as a result of silvicultural activity. There is no increased impact to fire risk under Alternative 3 when compared to Alternative 2.

Fire Management Decision Space

Alternative 3 creates limited decision space to manage wildland fire (planned and unplanned ignitions). State-and-transition simulation modeling (Appendix C) indicates that during a high fire year in the LJCRP area the amount of the landscape that burns is greater than the historical fire regime extent (6-15 percent//year). Although there is no difference between expected acres burned with planned and unplanned ignitions, (4 – 6 percent) depending on the year, there is limited benefit to managing unplanned ignitions under Alternative 3 due to not actively managing IRA, PWA, Designated Old Growth, and RHCAs. This creates an environment similar to the no action in terms of ecological and social risk of having unwanted fire effects such as uncharacteristically severe fire or fire affecting a large portion of the area (particularly within or adjacent to IRA, PWA, Designated Old Growth, and RHCAs) in a given year such as to impact the character of forest succession and fire regime. Alternative 3 has limited effect to areas around and within IRA, PWA, Designated Old Growth, and RHCAs on the ability of wildland fire to become a restorative process at an ecologically appropriate scale and severity without active management in those areas.

Insects and Disease Susceptibility

Table 74 lists the estimated, Alternative 3 post treatment susceptibility ratings for the six insect and disease agents associated with the PVGs and cover types within the LJCRP area. The ratings and trends are similar to Alternative 2 with the following exceptions.

Dry and Moist PVG

- Douglas fir mistletoe would be outside RV for the low and high ratings and within RV for the moderate rating. The low is the same as existing with the moderate rating higher than existing and the high rating lower than existing.

Table 74. Alternative 3 – Post treatment insect and disease susceptibility in the Lower Joseph Creek Restoration Project area

Potential Vegetation Group	Agent	Susceptibility Rating - % of Forested Area					
		Low		Moderate		High	
		Post Trt.	RV Range	Post Trt.	RV Range	Post Trt.	RV Range
Dry upland forest (UF)	Defoliators	29%+	40-85%	40%+	15-30%	31%-	5-15%
	Douglas-fir Beetle	15%=	35-75%	50%+	15-30%	35%-	10-25%
	Fir Engraver	40%=	45-90%	45%=	10-25%	14%=	5-10%
	Bark Beetles in P Pine	22%-	5-10%	58%+	15-30%	19%-	40-90%
	Douglas-fir Dwarf Mistletoe	14%=	25-55%	40%+	15-40%	46%-	20-35%
	Root Diseases	31%=	30-60%	51%+	25-50%	18%-	5-25%
Moist upland forest (UF)	Defoliators	9%+	5-10%	28%-	20-30%	62%-	35-90%
	Douglas-fir Beetle	5%=	30-60%	27%+	20-40%	67%-	10-30%
	Fir Engraver	20%+	30-70%	35%+	20-35%	45%-	10-20%
	Bark Beetles in P Pine	30%-	40-70%	61%+	15-35%	10%-	5-25%
	Douglas-fir Dwarf Mistletoe	11%=	30-65%	34%+	20-45%	55%-	10-20%
	Root Diseases	17%+	5-15%	55%+	20-50%	27%-	35-75%

+ increase from current; - decrease from current; = same as current.

Dwarf Mistletoe and the Degree of Mistletoe Infestation - Design criteria are the same as for Alternative 2, but Alternative 3 would result in a reduced mistletoe infection on fewer acres of cutting treatment (12,493 acres versus 21,378 acres for Alterative 2). This includes 189 acres of cutting treatment in moderate to heavily mistletoe infected stands (versus 336 acres under Alternative 2).

Timber Resource

There would be approximately 10,300 acres of harvest treatment (acres treated that remove timber volume) and there would be approximately 6,600,000 cubic feet of timber volume removed as a result of restoration treatments. This would be a direct beneficial output of Alternative 3, but lower than Alternative 2.

Threatened, Endangered, and USFS Region 6 Sensitive Plants, Rangelands, and Understory Vegetation

Rangelands

Treatments in Alternative 3 would have the most impact where post treatment takes density to less than 40 percent cover. Moist upland forest treatments where density would be reduced to less than 40 percent canopy cover would occur on less than one percent of the LJCRP area. Using a conservative estimate of 10 percent increase in forage for dry upland forest stands that are taken to low density, about 5-8 percent of the project area would show increased forage production in Alternative 3. Allotments that would have over 1,000 acres treated to less than 40% canopy closure would be Cougar Creek and Swamp Creek. Allotments that would have 500-1,000 acres treated to less than 40 percent canopy closure would be Davis Creek, Hunting Camp, and Table Mountain. The amount of forage depends on many factors, such as annual variations in precipitation, heat, soil, and competing vegetation. Project design criteria Range-1 (coordinating timber sale operations with the timber sale administrator) would help avoid impacts to ongoing grazing operations. PDCs Range-2, 3 and 4 would help protect fences and keep livestock in planned locations.

Noxious Weeds and other Non-native Invasive Plants

Alternative 3 is similar to Alternative 2 in treatments, but would not treat areas in designated old growth (MA15) or in IRAs, resulting in less acres of commercial harvest and thinning. There would be less chance of spreading invasive plants and noxious weeds through logging and associated activities than Alternatives 1 and 2. Very few road segments would be closed in Alternative 3. The overall difference in risk of spread of noxious weeds by alternatives in miles is small. The length of external haul routes is common to both action alternatives.

Threatened, Endangered, and USFS Region 6 Sensitive Plants

Coniferous Forest

Sensitive plants found in coniferous forest are discussed in detail under effects common to all action alternatives.

Grasslands

Sensitive plants found in grasslands are discussed in detail in Alternative 2. Alternative 3 effects would be similar, although slightly less acreage adjacent to grasslands is proposed, because there are no treatments proposed in Old Growth Preservation Areas (MA15), IRAs, or PWAs.

Lithosols/ Shallow Soils

Alternative 3 would have the substantial activities near lithosol habitat, but less so than Alternative 2. WWNF Forest Plan, as well as HCNRA CMP standards and guides would be followed for the white fleabanes. WWNF Forest Plan standards and guidelines would be followed for Wallowa needlegrass. Project design criteria described in the discussion of direct and indirect effects for Alternative 2 would be identical for Alternative 3.

Moist Meadows, Wet Meadows, Riparian Areas, Springs and Seeps

Compared to Alternative 2, suspected TES plant species found in moist meadows, wet meadows, riparian areas or springs and seeps would be more protected in Alternative 3, where riparian areas and other moist to wet habitats are protected by PACFISH buffers. Along Category 1 and 2 streams, a minimum 100 foot buffer would be maintained.

Aquatic Habitat

Although difficult to quantify, the effects to aquatic habitat from fine sediment may be less than those described in Alternative 2 because of the exclusion of tree removal in the RHCAs under Alternative 3. However, modeling indicates a negligible difference in sediment delivery to streams between the action alternatives when Best Management Practices and Project Design Features are implemented. In addition there would be no commercial harvest in Category 4 RHCAs. Thus the overall short-term increase in erosion rates in the analysis area is likely to be less than Alternative 2 (see the Physical Environment supporting documentation).

For Alternative 3, commercial thinning activities would not occur in RHCAs adjacent to Category 1 and Category 2 streams or Category 4. Restricting these activities to areas outside of RHCAs of Category 1 and 2 streams would prevent adverse impacts to existing stream shading along streams in the analysis area. The RHCA widths adjacent to Category 1 streams (300 ft on either side) and Category 2 streams (200 ft on either side) are sufficient to prevent removal of trees that provide stream shading. Therefore, no measurable increases in stream temperatures would result from proposed thinning activities.

Burning activities under Alternative 3 would be less than Alternative 2 based on acres treated. With a reduction in activity fuels treatments the possibility of impacting large shade producing trees would be reduced thereby reducing the effects of the alternative on water temperature.

Threatened and Endangered Aquatic Species

Alternative 3 of the LJCRP may affect Snake River steelhead or its designated critical habitat and is likely to adversely affect the species and its designated critical habitat. Impacts to Snake River steelhead may occur as a result of short-term immeasurable increases in fine sediment (see effects to aquatic habitat section). This short term increase in fine sediment relative to the existing fine sediment levels would be immeasurable and be a result of the aquatic organism passage replacement.

Management Indicator Species – Aquatic Species

Alternative 3 of the LJCRP may impact individual redband trout and their habitat (MIIH), but would not likely contribute toward federal listing or loss of viability to the population or species. Impacts to redband trout may occur as a result of short-term immeasurable increases in fine sediment and water temperature (see effects to aquatic habitat section).

Alternative 3 of the LJCRP may impact individual Snake River steelhead and their habitat (MIIH), but would not likely contribute toward loss of viability to the population or species. Impacts to Snake River steelhead may occur as a result of short-term immeasurable increases in fine sediment and water temperature (see effects to aquatic habitat section).

Current levels of fine sediment in the majority of streams in the analysis area are below the 20 percent threshold used to indicate adverse impacts to salmonids. In these areas short-term potential increases in fine sediment from proposed prescribed burning and thinning activities are unlikely to result in measurable increases in fine sediment in streams in the analysis area.

Impacts from activities proposed under Alternative 3 are unlikely to result in degradation of habitat for Snake River steelhead and redband trout. Anticipated immeasurable increases in both fine sediment and water temperature are within habitat tolerances for steelhead and redband trout.

Cumulatively, aquatic habitat should improve over time in the analysis area. Fine sediment levels should decrease through time as a result of improved road closures and decommissioning activities. Alternative 3 would likely not result in a short-term slowing of recovery of aquatic habitat in the analysis area.

In the long-term, Alternative 3 would improve vegetative conditions and maintain the natural fire regime in the project area which would have beneficial impacts to Snake River steelhead and redband trout and their habitat

Alternative 3 of the LJCRP may impact individual western ridge mussels and their habitat (MIIH), but would not likely contribute toward federal listing or loss of viability to the population or species. Impacts to western ridge mussels may occur as a result of short-term immeasurable increases in fine sediment and water temperature (see effects to aquatic habitat section).

Current levels of fine sediment in the majority of streams in the analysis area are below the 20% threshold used to indicate adverse impacts to salmonids and likely the western ridge mussel. In these areas short-term potential increases in fine sediment from proposed prescribed burning and thinning activities are unlikely to result in measurable increases in fine sediment in streams in the analysis area.

Impacts from activities proposed under Alternative 3 are unlikely to result in degradation of habitat for western ridge mussels. Anticipated immeasurable increases in both fine sediment and water temperature are within habitat tolerances for western ridge mussels.

In the long-term, Alternative 3 would improve vegetative conditions and maintain the natural fire regime in the project area which would have beneficial impacts to western ridge mussels and their habitat.

Wildlife

Primary Cavity Excavators

Effects assume project design criteria Wild1-14 (Appendix J) would be implemented. These include protection measures for large trees, large snags, downed logs during harvest and burning activities.

See ‘effects to all action alternatives.

Although removal of snag habitat (≥ 12 in dbh) is not prescribed, it is expected that population decreases in MIS for dead and defective wood habitat would be expected to occur. While additive cumulative effects may be anticipated, projects are consistent with LRMP objectives.

The vegetation treatments proposed would adversely impact current and future dead and defective wood habitat. Harvest treatment is proposed on about 23 percent (13,290 acres) of the forested landscape. It can be assumed that within treatment areas there would be a reduction in snags and logs due to skid trails, landings, safety reasons and prescribed burning. Proposed activities (tree harvest and prescribed burning) are expected to help create habitat for PCEs using open forests (e.g. white-headed woodpeckers) and reduce habitat for those PCEs using dense forests (e.g. pileated woodpeckers).

Because Alternative 3 does not remove trees ≥ 21 in dbh and harvest occurs on fewer acres, the loss of current and future snag and down-log habitat is less than in Alternative 2.

The closure of roads would positively affect the abundance of snag and down wood habitat. However, this alternative maintains the most open miles of roads, which would be open to the public. Thus, there would be the greatest potential for continued loss of snags across the landscape due to safety and firewood harvesters.

Pileated Woodpecker

Effects assume project design criteria Wild-1-14, and Wild-26-27 (Appendix J) would be implemented. These include protection measures for large trees, large snags, and downed logs during harvest and

burning activities. Snags ≥ 12 in dbh would only be removed due to safety considerations. Harvest of large trees is allowed only in Alternative 2 and on approximately 5,000 acres, excluding areas within MA15s, PFA's, and cool-moist large tree – closed canopied forests. Wild29, 30, and 31 describe conservation measures to protect pileated woodpecker nests.

Also see "effects common to all action alternatives".

Quantity of source habitat declines the most in Alternative 3; however source habitat abundance would remain within the RV (Table 34). Although the overall area with harvesting in Alternative 3 is less than in Alternative 2, the resulting amount of source habitat for pileated woodpeckers, appears to be lower. In Alternative 3 more acres of vegetation that is currently in the size class of medium (15-20 in), and post-harvest the mean diameter of the stand actually increases and moves the stand in to the next size class (>20 indbh), while also maintaining >40 percent canopy closure.

Quality of habitat for pileated woodpeckers would decline through the loss of canopy closure, and loss of large snags. Although snags are not prescribed to be removed, snag densities would decline due to safety, skid trails, and landings. Alternative 3 proposes fewer acres than Alternative 2 of overall harvest (12,220) thus the loss of large snags would be less in this alternative. Additionally, Alternative 3 does not include removal of trees >21 in dbh, which would help to maintain higher quality of habitat on those areas treated that retain sufficient size class and tree canopy to remain source habitat.

The abundance of open roads across the planning area would be reduced by 8 miles. As compared to Alternatives 1 and 3, this reduction in the amount of open roads would have the least impact of any of the alternatives, and minimal change from the existing condition. The potential for removal of snags for firewood and safety would be reduced across the planning area on approximately 8 miles.

Because fewer acres would be harvested (including stand improvement prescriptions) in Alternative 3 than Alternative 2, fewer acres of high priority prescribed fire has been identified. In the east Cascades of Washington, prescribed burning, and prescribed burning and thinning treatments tended to increase snag density in one study, although they were often small-diameter (e.g., 20–39.9 cm dbh) snags (Hessburg et al. 2010). Additionally, other researchers suggest prescribed fires would likely result in loss of snags, particularly in the large (>20 in dbh) size class (Finch et al. 1997, Pilliod et al. 2006). Fire severity during the burn operations contributes largely to the expected impacts to snags and downed wood loss and recruitment.

Though some current source habitat would be harvested, and the quality of the habitat may be reduced, overall source habitat would remain within the RV for this species in this project area. Therefore, Alternative 3 would not contribute to a negative trend in viability on the WWNF for the pileated woodpecker.

Northern Goshawk

Effects assume project design criteria Wild-15-23 would be implemented. These include protection measures for PFAs. Additional protection measures exist to protect large trees, large snags, and down-logs during harvest and burning activities.

Also see "effects common to all action alternatives".

Through harvest, the abundance of source habitat for goshawks would be reduced under Alternative 3 by about 3,100 acres (Table 35). The amount of source habitat would remain within the RV at about 29 percent (1-46 percent). After harvest, approximately 11 percent (2,100 acres) of the source habitat would have had harvest, yet meet the definition of source habitat (canopy closure ≥ 40 percent (dry forest PVG)

or >60% (moist forest PVG) and overall tree size of ≥25” dbh). In Alternative 3, no trees ≥21 indbh would be harvested, which would provide for higher quality habitat within the treated areas relative to Alternative2, since large trees are an important habitat component for goshawks. Source habitat that has been harvested would likely be of lower quality than unharvested areas due to the loss of canopy closure, and loss of large snags and logs due to safety concerns and logging systems.

Although trees with mistletoe are likely to be removed in all harvest units, especially in the prescriptions ‘Intermediate Treatments’ (70 acres within source habitat), the loss of mistletoe may also reduce the quality of source habitat. The removal of trees with dwarf mistletoe brooms may be detrimental to northern goshawk and other species that nest in mistletoe brooms (Bull 1997).
As compared to Alternatives 1 or 2, this alternative proposed the fewest road closures from the existing condition. A total of about 8 miles of road are proposed to be closed or decommissioned relative to the existing condition, offering the least benefit to goshawks, as human disturbance has been documented to adversely affect this species.

The amount of source habitat remains with the RV (1-46 percent of potential).

Alternative 3 would impact goshawk habitat in the project area. Though some current source habitat would be harvested, and the quality of the habitat may be reduced, overall source habitat would remain within the RV for this species in the project area. Protection measures would be in place to conserve PFAs, large trees, large snags and downed logs during harvest and prescribed fire activities. Therefore, Alternative 3 would not contribute to a negative trend in viability on the WWNF for northern goshawks.

American Marten

Effects assume project design criteria Wild-1-14, and Wild-24 (Appendix J) would be implemented. These include protection measures for large trees, large snags, and downed logs during harvest and burning activities. Wild-24 states: Because marten habitat is at the lower end of the RV, any harvesting within marten habitat (moist, large tree, closed canopy forests) is designed to maintain old forest characteristics. Canopy closure would remain ≥60 percent, and no harvest of trees ≥21 indbh in marten habitat. Snags and large down wood that American marten need for denning, rest areas, and hunting would be maintained. Large broken top and potentially hollow grand fir would be maintained for denning habitat.

Also see “effects common to all action alternatives”.

Under Alternative 3, proposed commercial harvest in moist forests would be 2,700 acres, of which 730 acres is within what currently qualifies as marten source habitat (moist, large tree, closed canopy forests; Table 36). These 730 acres represents about 33 percent of the current source habitat for marten in the project area. The prescription on these 730 acres is a combination of group selection, moderate density (110 acres), single tree selection, high density (120 acres), and single tree selection, moderate density (500 acres). The design criteria for these prescriptions is to maintain >60 percentcanopy closure, and multi-story conditions; no trees ≥ 21 in dbh would be harvested. It is assumed that post-harvest these stands would be maintained as source habitat. It is likely that in the short-term they may meet minimum qualifications as source habitat but the quality of the habitat may be reduced due to reduced complexity and tree density, and potential loss of snags and logs due to logging operations and safety.

As discussed in the PCE section above, densities of large snags (>20 inches dbh) in moist forest are below reference conditions in the snag density classes that provide habitat for American marten. Snag habitat is likely to be an important habitat feature for marten in these habitat types. Harvesting on 2,700 acres would add to a reduction in snag habitat, further declining habitat quality for marten in this area. However, in Alternative 3 there would be no removal of trees ≥21” indbh, which should be beneficial in

long-term recruitment of snag habitat, as these trees would be available as potential snags and down wood.

In Alternative 3, 110 acres of the marten habitat that would be commercially harvested is in the prescription 'GS_Mod' (group selection – moderate). Group selections can include openings that are 1/2-4 acres. As described above, martens respond negatively to low levels of habitat fragmentation (Hargis et al. 1999). Openings as large as four acres may reduce the quality of the habitat for marten. In the longer-term, as trees continue to grow, American marten would continue to use these harvested areas for some or all of their life history functions. Vegetation treatments in both action alternatives are assumed to modify fire behavior and reduce the effects of an uncharacteristic stand replacement event, thereby potentially retaining source habitat in the long-term.

Open roads can contribute to a loss of quality of habitat through loss of snags and down wood due to firewood harvest and safety, and can reduce habitat quality (Godbout and Ouellet 2008). The closure or decommissioning of eight miles of road above existing condition should have minimal effect on marten, as human disturbance has been documented to adversely affect this species. This alternative maintains the most miles of open road as compared to Alternative 1 or 2.

The overall direct, indirect and cumulative effects of Alternative 3 would result in a small negative trend in habitat quality. The loss of habitat quality would be insignificant at the scale of the Forest and would likely be short-term. Alternative 3 is consistent with the LRMP, and thus continued viability of the American marten is expected on the WWNF.

Rocky Mountain Elk

Effects assume project design criteria Wild-34 – Wild-37 (Appendix J) would be implemented. These protection measures serve to reduce human disturbance during winter and calving season. Additionally Wild-34 provides guidance on retaining hiding cover patches in areas where harvest activities occur.

Table 37 summarizes Forest Plan standards for road density by management area, and alternative. Similar to Alternative 2, the Forest Plan standards for HEI and percent cover in MA1 areas would be met. The HEI standard of $\geq$ 0.5 on MA1 is met in both the Lower and Upper Joseph watersheds. The percent cover on the summer ranges remains above 30 percent. The reduced cover may increase forage quantity and quality especially in the spring. The reduced harvest in Alternative 3 relative to Alternative 2 provides for more cover across the planning area than in Alternative 2.

Alternative 3 changes about 5,300 acres of cover to forage across the entire planning area (about 35 percent fewer acres than Alternative 2). Both harvest treatments and prescribed burning may also contribute an increase in forage quantity and quality, especially in the spring. Vegetation treatments have been designed to improve the overall landscape structure toward RV and become more resilient to natural disturbance patterns, and should benefit elk foraging opportunities.

Alternative 3 proposes a slight reduction in miles of open road as compared to the existing condition. This alternative maintains the nearly 70 more miles of open road than Alternative 2, the other action alternative. In five of the ten subwatersheds, open road densities in MA1 remain above 3.0 miles/miles2, above the LRMP standard of 2.5 miles/square mile (Table 38). Additionally, one other watershed remains at 2.8 miles/square mile. Higher road densities have adverse effects on habitat effectiveness for elk by reducing effectiveness of cover and increasing disturbance. Higher open road densities on NFS lands have added to the issue of elk relocating on adjacent private lands with fewer open roads. Currently there is a large segment of the elk in the Chesnimnus wildlife unit residing nearly year-round on private lands

adjacent to NFS lands. By only minimally reducing road densities in this Alternative, it is likely elk distribution on private lands would remain an issue in this wildlife unit.

Additionally of concern within the analysis area is the unregulated OHV and full-sized vehicle use of closed roads, which has been shown to adversely affect elk and elk habitat.

Depending on the implementation schedule over space and time, this project would temporarily increase road density in the analysis area by constructing 12.6 miles of temporary roads and at times opening closed roads for administrative use. Combined with the loss of cover to harvest, there would likely be a short-term negative impact to habitat effectiveness for elk in some areas at some times.

Together with the loss of cover and higher road densities particularly in the Davis, Lower Swamp Creek subwatersheds, elk distribution and habitat effectiveness may be adversely affected.

Old Growth Management Areas, Late-old Forest Habitat, and Connectivity Corridors

Old Growth Preservation Areas (MA15)

Harvest is not prescribed in MA15 areas in Alternative 3. Changes in structural stage would only occur as a result of natural disturbance processes and continuing fire suppression (Table 60).

Late seral (old) Forest

The amount of OFMS and OFSS in dry and most forests increases by about 5 percent and 4 percent, respectively (Table 71). Although these areas of increase may meet the definition of old forest structures, the canopy closure and structural complexity would be less than the existing conditions.

Larger tree structure with open canopies would increase habitat for species such as the Sensitive white-headed woodpecker and Lewis's woodpecker, but would reduce habitat for MIS such as pileated woodpecker and Northern goshawk.

Alternative 3 includes a proposed Forest Plan amendment to thin 20 acres in old forest single story conditions to maintain or enhance existing conditions. This treatment would not change the overall LOS structural conditions. The harvest would reduce the tree density resulting in a more open canopied forest. Open-canopied large tree forest is below RV within the project area, and an increase in this habitat would benefit species associated with this structure such as the white-headed woodpecker. The landscape is currently above RV in closed-canopied forests.

Connectivity

Table 61 summarizes commercial forest vegetation treatments within connectivity corridors for Alternative 3. Alternative 3 would reduce the quality of connectivity corridors on about14 percent of the areas identified for connectivity. Harvest would reduce the canopy closure and structural complexity. The prescriptions in the proposed treatment units within the connectivity corridors have been designed to provide canopy closure at $\geq$ 40 percent in the dry forest PVG, and $\geq$50 percent in the moist forest PVG. Although canopy closure and structural complexity may be reduced, these stands are expected to maintain the function and objectives of connectivity as described in the Eastside Screens.

Alternative 3 would allow for prescribed fire across much of the planning area, and 530 acres of treatment in seedling/sapling and pole stands within connectivity corridors. Some snags and logs may be consumed by prescribed fire, while new snags and logs are recruited from fire-killed trees. The burning, and small tree thinning in connective corridors would not have a measurable adverse effect on the quality or function of the corridors.

Landbird and Migratory Bird Habitat

Effects assume that Project Design Criteria and mitigation measures in Appendix J would be implemented. Several mitigation measures include protections for large snags, trees and down-wood during harvest and prescribed burning activities. In particular, Wild12 states: To reduce the potential for impacts to nesting landbirds, prescribed burning activities projected to occur on or after May 20, and/or past the onset of vegetation leaf-out, would be reviewed by a district or forest wildlife biologist. The biologist would then provide recommendations concerning prescribed burning after May 20 and/or past the onset of vegetation leaf-out

Effects from this project to migratory birds would be variable depending on the species (see Wildlife specialist's report). Alternative 3 would harvest fewer acres than Alternative 2. Therefore, canopy cover and snags would be reduced on fewer acres. Additionally, riparian areas would not be directly altered, nor would trees $\geq$ 21in dbh be removed.

Higher road densities in Alternative 3 compared to Alternatives 1 or 2 would likely be more adverse for all of these migratory birds. Road-associated factors that adversely affect some species of migratory and resident birds include: snag and log reduction, habitat loss and fragmentation, negative edge effects, harassment or disturbance, collisions, displacement or avoidance, and chronic negative interactions with humans (Gaines et al. 2003). Also see "Effects common to all action alternatives".

Threatened, Endangered, and USFS Region 6 Sensitive Wildlife Species

Potential habitat changes due to Alternative 3 for most threatened, endangered or USFS R6 sensitive species were covered under 'effects common to all action alternatives'. The potential effect to habitats for the Columbia spotted frog, and Lewis's woodpecker, and white-headed woodpecker are discussed below.

No treatment within any category 1 RHCA s, which may represent source habitat for spotted frogs, is proposed in Alternative 3. Therefore, there would be No Impact (NI) to the Columbia spotted frog from treatments prescribed in this alternative.

Vegetation treatments under Alternative 3 may produce source habitat for the Lewis's woodpecker since this species is associated with large tree, open-canopied, xeric-pine habitats. Although snags are not proposed for harvest, some snags would be lost due to safety concerns and logging systems. Habitat abundance is expected to increase by less than 100 acres. Decreases in miles of open roads with Alternative 3 are minimal which would have minimal effects on the continued loss of larger snags due to fire wood cutting. Although snag densities may be reduced, the increase in source habitat following vegetation treatments in Alternative 3 would have a Beneficial Impact (BI) on the Lewis' woodpecker.

Vegetation treatments in Alternative 3 are likely to increase habitat for white-headed woodpeckers since this species is associated with dry forests with large tree structure with open canopies (<40 percent). Treatments in Alternative 3 propose to increase habitat through reducing canopy closure in larger tree dry forest areas. Source habitat is predicted to increase from about 900 acres to about 4,300 acres.

Large snag density would likely be reduced in and adjacent to harvest units due to safety and logging logistics; however, mitigation measures are in place to protect large pine trees and snags, and nesting trees (Appendix J). Assuming that Project Design Criteria and mitigation measures in Appendix J would be implemented, the large increase in source habitat following vegetation treatments would likely lead to a Beneficial Impact (BI) for the white headed woodpecker.

The Social Environment

Socioeconomics

Activities under Alternative 3, such as timber harvest and restoration, would have the economic consequences described below.

Financial Efficiency

Table 75 summarizes the financial efficiency for Alternative 3. The PNV indicates the financial efficiency of the timber sale and restoration activities, including all costs (that are not included in the stumpage rate) and revenues associated with the activities and required design criteria (information obtained from the timber specialist assigned to the project). Restoration activities examined under this alternative include (among others) resiliency treatments, prescribed fire, and planting. A four percent discount rate was used over a period of 10 years (2014–2023), the estimated time required for full implementation of the project.

Alternative 3 is not financially efficient for the timber harvest and required design criteria, as well as for all restoration activities noted above, as indicated by the negative PNV, -$5.1 million. However, since the PNV does not include non-market values, such as ecosystem services as discussed above, the benefits are likely underestimated. The estimated costs of treatment under Alternative 3 are less than Alternative 2 since the restoration treatments are less intensive. Therefore, the expected non-market values derived from Alternative 3 would likely be less than Alternative 2 and greater than Alternative 1.

Indirect effects on financial efficiency could occur as a result of Alternative 3; however, estimates of these changes are not available. It is anticipated that fuels treatments under this alternative would contribute to fuels conditions that would have more resistance to wildland fire. This would tend to decrease wildland fire related costs such as property loss, lost revenues and suppression costs.

Table 75. Present net value for Alternative 3.

Alternative 3	Present Value of Benefits	Present Value of Costs
BENEFITS		
Revenue from commercial timber volume	$1,231,234	
COSTS		
Non-Mechanical		$4,168,676
Mechanical		$852,394
Commercial timber harvest		$1,369,119
Sum of discounted benefits and costs	$1,231,234	$6,390,190
Present Net Value	$(5,158,956)	

Economic Impacts

Alternative 3 would result in restoration activities with commercial timber production of 6,600 ccf per year for 10 years; mechanical, pre-commercial stand treatment on 584 acres per year; 142 acres of restoration treatment by hand labor; and some temporary road construction and road maintenance. Implementation of Alternative 3 is projected to support 34 jobs (Table 76) and $1.9 million in labor income in Wallowa and Union counties annually over 10 years. Those impacts in the local area include the jobs supported directly by completion of restoration treatments and processing of the commercial timber and the indirect and induced jobs related to those activities. The economic effect resulting from

restoration activities would be less under Alternative 3 than under Alternative 2. The implementation of Alternative 3 would also yield employment changes in many economic sectors within Wallowa and Union counties. The greatest number of jobs supported would accrue to the Manufacturing and Agriculture and Forestry sectors. Other sectors affected by the LJCRP include Retail Trade, Construction, Professional Services, and Health Care.

Table 76. Projected employment by major industry for Alternative 3

Industrial sector	Jobs supported
Manufacturing	12
Agriculture and forestry	11
Professional, scientific, and technical services	2
Retail trade	2
Health care and social assistance	1
Accommodations and food services	1
Construction	1
Other industrial sectors (8)	4
Total	34

Economic impacts would also result from revenue sharing with local governments. However, payments to counties might vary depending on the mechanism used for the commercial timber sales. The commercial timber volume sold in this project could be sold as traditional timber sales or using stewardship authorities. In traditional timber sales, the Forest Service returns approximately 25 percent of the revenues back to states, which is then distributed to the counties. The returned revenues are used to fund roads and schools. In selling commercial timber using stewardship authorities, all of the revenue from the project remains with the selling National Forest (rather than going to the treasury or the counties) to be reinvested in other forest restoration projects. If the Forest implements traditional timber sales, the revenue distributed to counties would be less under Alternative 3 compared to the proposed alternative but more than the no action alternative because Alternative 3 has less timber harvest than the proposed action alternative.

Social Impacts

In addition to effects on the local economy, activities under Alternative 3 have the potential to affect the livelihood, cultural values, and natural resource values of people in the analysis area. The social consequences are measured qualitatively, with a particular focus on access, recreation uses, environmental justice and non-market values.

Livelihood

The jobs and income, as detailed above under the economic impacts section, that Alternative 3 are expected to generate would likely improve the livelihood of area residents more than alternative 1 but less than Alternative 2. These jobs and income are expected to be generated over the next ten years, the life of the project. The increase in jobs and labor income in the analysis area from Alternative 3 would likely increase the tax base, public services, funding for schools, capital maintenance projects, and reduce poverty. Since the increase in jobs and income is less under Alternative 3 than Alternative 2, the expected increase in the public services would be less than under Alternative 2.

The tax rates on timber harvested during 2014 under the Forest Products Harvest Tax (FPHT) is $3.53 per thousand board feet (MBF). The receipts from this tax program are dedicated to the partial funding of state-run programs that promote forest research, fire prevention and fire suppression, forest practices act administration, and improve public understanding of Oregon's forest resources (Oregon 2014). However, the funding for schools and other public services are more likely to come from personal income taxes (from 5 to 9.9 percent of taxable income) and property taxes. With increases in labor income, as detailed in the economic impacts section above, the state tax base and therefore public services could also increase.

Additionally, with more jobs and income in the area under Alternative 3 relative to Alternative 1, there likely would be more opportunities for younger generations. In turn, youth may choose to stay in the area and improve the age diversity. With a more balanced age composition, the economy would be more sustainable in the long-term.

The long-term impacts to the tourism industry from changes to recreation uses (detailed under Cultural Values below) would likely be positive but less than the impacts from the proposed action alternative because Alternative 3 proposes less restoration treatment. The short-term impacts to the tourism industry would likely be negative but less than impacts from the proposed action.

Alternative 3 would have 230 miles of open USFS roads, and close or decommission minimal miles of road, and would therefore have less of an impact on motorized access to WWNF public lands compared to the other alternatives. Many community members value access to public lands, but Alternative 3 would not change this value. Public access could be impacted by short-term increases in traffic but these effects would be intermittent during restoration. The potential increase in traffic is based on treatments in association with the timber sale. Under Alternative 3, there are less treated acres than Alternative 2, and therefore less short-term effects to traffic.

Cultural Values

As discussed in the Affected Environment section above, residents in the LJCRP area value the land mostly for recreation uses, such as hunting, fishing, gathering forest products, wildlife viewing and scenery, among others. See the Tribal report for effects to subsistence uses. These recreation uses are also linked to access, as discussed in the previous section. With more roads decommissioned, this limits access to public lands for recreation purposes. Since Alternative 3 has no new decommissioned or closed roads, there would be no change of effects relative to the existing condition; therefore the effects would be less than effects to access under Alternative 2. However, under Alternative 3, there could be intermittent disruption of access to the LJCRP area for treatments and therefore disturbance during hunting season. This effect is lower under Alternative 3 than Alternative 2 since there are fewer acres likely to be treated.

Under Alternative 3, there could be greater detrimental effects to recreation uses for fishing, gathering special forest products, and hunting in the long term than Alternative 2 since there would be less restoration treatments and a corresponding higher risk of wildfire. As noted in the Wildlife section, prescribed burning in Alternatives 2 and 3 would generally benefit elk habitat through forage enhancement. With fewer improvements to ecosystem services from restoration, this would likely have greater impacts on fish and wildlife habitat, water and air quality and plant diversity for recreation uses by people in the analysis area. Effects to the fine sediment aquatic habitat and water temperature under Alternative 3 would be less compared to Alternative 2 because of a reduction in commercial thinning acres, burning activities, road reconstruction, and temporary road construction. Therefore, effects to recreational fishing are lower under Alternative 3 since the activities proposed are unlikely to result in degradation of habitat for redband trout. Under Alternatives 1 and 3, adverse recreation effects could be greater as the risk of fire is expected to be greater without any or less restoration treatment. For more

information on the effects to the specific resources, see the other specialist reports (Aquatics, Wildlife, and Botany).

Vegetation management is needed to return these landscapes to a more natural appearance and higher scenic quality for recreation. More natural, park-like stands, which are substantially less abundant across the landscape than historically, have little likelihood of returning without mechanical restoration treatments to facilitate the reintroduction of fire. Alternative 3 meets the purpose and need to a much lesser extent than Alternative 2.

In the short-term, while prescribed burning treatments take place, smoke could affect the ability to recreate and enjoy the scenery in the LJCRP area. With fewer acres to be treated under Alternative 3, the short-term impacts are less than Alternative 2. However, the Forest Service is not planning to burn during peak visitor season so the impacts are expected to be minimal.

Biological Values

Commenters revealed that they value air and water quality, wildlife, and old growth trees, among others. Due to restoration under Alternative 3, improvements to ecosystem services and decreased risk of wildfire are less than under Alternative 2. These biological values would likely be improved more than under Alternative 1 but less than under Alternative 2 in the long term with less restoration treatments. However, the value for old growth trees is preserved under all alternatives because there is no old tree harvest. Rather than positively impacting this value (it is impossible to increase the amount of old growth trees in the short-term), by not harvesting old growth trees, the value is maintaining its integrity in the community. People would benefit from knowing that the trees exist and are continuing to provide biological services to the forest ecosystem. These non-market values are not included in the quantitative analysis yet have a strong hold in the local communities. For more information on the effects to the specific biological resources, see the other specialist reports (Aquatics, Wildlife, and Botany).

Timber Market and Forest Products

Alternative 3 would add timber to the regional supply and is expected to have beneficial impacts on the current timber market, though less than the Proposed Action. The timber mills in the area could increase their production within their current mill capacities. The American Forest Resource Council (AFRC) and Associated Oregon Loggers (2014) estimated that the ten mills in the area are operating at an average of 39 percent capacity.

Contacts from the local logging industry believe that the demand for timber products in the region is expected to increase as the products are shipped around the world. Under Alternative 3, this distance and relevant transportation costs could decline as the industry receives more wood from the LJCRP.

Non-Market Values

Under Alternative 3, forest health is expected to improve more than Alternative 1 but less than Alternative 2. Alternative 3 would decrease the likelihood of crown fire relative to existing conditions more than Alternative 1, but less than Alternative 2. Over time, forest restoration treatments would decrease fuel load and decrease potential smoke emissions from both planned and unplanned ignitions. The proposed activities under this alternative would protect ecosystem services and other social values, such as recreation opportunities and subsistence uses. Therefore, ecosystem functionality is expected to improve and contribute to community members' non-market values more than Alternative 1, but less than Alternative 2. For more details on other social values, see the Social Impacts section above.

Environmental Justice

While minority and low-income populations exist in the area, Alternative 3 is not expected to have disproportionately high and adverse human health or environmental effects on these communities. The environmental justice communities expected to be impacted the most are within the Nez Perce tribe. Since this community uses the LJCRP area for cultural and religious practices as well as for subsistence uses, they are more vulnerable to changes in the area's natural resources due to the LJCRP. In the long-term, Alternative 3 is expected to improve natural resource conditions less than Alternative 2. However, in the short-term, the natural resource uses would be affected less under Alternative 3 than Alternative 2 since it involves less treatment. These effects are addressed in the Tribal and Heritage report.

The low income populations in the LJCRP analysis area could be affected by the access to recreation opportunities and resource use. Under Alternative 3, 230 miles of USFS roads would be open, compared to the 170 miles of open USFS roads under the Proposed Action. However, since few roads would be decommissioned under this alternative there are no disproportionate effects on these communities.

Through public meetings, community members and representatives expressed that they expect the LJCRP to improve current environmental justice conditions, specifically related to low-income and children populations. With increased job opportunities for parents, they would be able to provide better opportunities for their children and the expected increase in the tax base under the proposed action alternative would presumably provide more support for schools. An increase in the tax base could also potentially increase social services for low-income populations and help alleviate poverty.

Heritage

Like Alternative 2, eligible and potentially eligible sites are located in, or near unit boundaries. Potential effects would be mitigated via site visits and site protection design features that would be implemented prior to ground disturbance (Appendix J, Heritage 2, 3, and 10). The greatest risk to heritage resources for Alternative 3 involves activities associated with ground based tractor treatments. Alternatve 3 includes 46 percent of the total harvesr units, or 34-84 percent of the analyzed percent of total harvest treatment acres (see Table 68) . For comparision, Alternative 2 tractor treatments include 39 percent of the total harvest units, or 29-73 percent of the analyzed percent of total harvest treatment acres (see Table 50). In general, Alternative 3 would treat less acres than Alternative 2 while staying mostly within the Alternative 2 analyzed percent of total harvest treatment acres. Therefore, potenial effects to heritage reources would be the same.

Mechanical treatment types are the same as Alternative 2; involving ground, sky line and helicopter logging systems that include skidding, construction of temporary roads and landings. Again, Impacts to undiscovered sites could include rutting, erosion, dislocation, or breakage of artifacts and features, and destruction of sites and site stratigraphy.

This alternative provides the greatest degree of public road access involving increased levels of off road uses and dispersed camping increasing the risk of damage to the integrity of heritage resources. Road activities causing rutting and erosion may expose artifacts making them more vulnerable to looting and breakage.

Prescribed fire effects would be the same as Alternative 2.

No treatments in IRAs, RHCA and MA15 may mean less overall potential effects to historic Cambium Peeled trees and dendroglyphs.

Tribal

Impacts on Hunting, Fishing and Gathering and Resource Risks of Accelerated Restoration

Generally, effects would be the same as Alternative 2, involving more acres of potential treatment. In addition, there would be less road decommissioning and closures, with an emphasis on maintaining current public road access levels. The effects of less road decommissioning and closures, along with emphasis on public road access, would be a beneficial effect for some tribal members who value greater access. Tribal members, concerned more about road impacts to resource values, would likely view Alternative 3 as having a greater adverse effect than Alternative 2.

Concern for Value of Landscape over Economic Values

Generally, the effects would be the same as Alternative 2, but the estimated economic net value from timber harvest for Alternative 3 would be -$5.1 million, compared to -$5.9 million for Alternative 2. This demonstrates that positive economic net value is not a motivation for this alternative.

Maintain Old Growth Legacy Trees and Conservation of Inventoried Roadless Areas

Alternative 3 would not allow harvest in MA15 stands or IRAs, and does not remove trees greater than 21 inches in diameter. Based on meetings with tribal staff (See Tribal Consultation and Coordination Record, Appendix G; and DEIS comments in the project record) effects of Alternative 3 on tribal values and concerns are expected to be positive. However, in the long term, threats to old growth and IRA values would likely increase without landscape treatments designed to create resilient landscapes and biological and structural diversity.

Resource Risks of Accelerated Restoration

Generally, the effects of Alternative 3 would be the same as Alternative 2 regarding tribal concerns but potential effects are commensurate with the smaller extent of proposed vegetation treatments. Effects to tribal values in the long term may be more adverse due to reduction of restoration acres treated; including no treatment of threatened old growth and IRAs.

Impacts to Traditional Plant Resources

Generally, the effects of Alternative 3 would be the same as Alternative 2, but less acres of plant habitat would be restored, possibly resulting in declining plant diversity and resiliency over time.

Traditional Cultural Properties, Sacred Sites, and other Traditional Use Areas, may be at risk from implementation of the LJCRP

Generally, the effects of Alternative 3 would be the same as Alternative 2, but at a lesser scale of risk.

Recreation

See effects common to all action alternatives.

Alternative 3 would close approximately three more miles of open road as compared to the existing condition, which would likely lead to no significant difference in recreational use compared to current conditions.

Scenery

The overall effects of Alternative 3 would be similar to Alternative 2. Alternative 3 would move stands toward desired future conditions, and reduce the risk of uncharacteristic fire, but to a lesser degree than

Alternative 2. Effects to scenic integrity would be kept to a minimum, meeting all LRMP, HCNRA CMP, and Joseph Creek Wild and Scenic River Management Plan standards.

Alternative 3 would treat 13 percent of the project area (23% of forested acres) to improve species composition, stand density, and reduce ladder fuels and canopy closure. These treatments would improve scenic stability from low (dry forest PVG) or moderate (moist forest PVG) to high, but to a lesser degree than Alternative 2. The following discussion discloses effects of Alternative 3 by viewshed.

Oregon State Highway 3, Joseph Canyon Overlook

The direct effects of Alternative 3 in this viewshed are the same as Alternative 2, except no forest treatments would occur in RHCAs, and no trees greater than 21 in dbh would be cut. Alternative 3 would improve species composition, stand density, and reduce ladder fuels and canopy closure to a slightly lesser degree than Alternative 2.

The one stand (#193) partially in the background view of Highway 3 would not have a single tree selection harvest, but the intermediate treatment would occur on approximately 10 acres. This treatment would not change the density class of the stand, and would not be visibly evident from the Joseph Canyon Overlook.

Joseph Canyon Wild and Scenic River Corridor

The direct effects of Alternative 3 would be the same as Alternative 2, except no forest treatments would occur in RHCAs, and no trees greater than 21 in dbh would be cut. There would be 10 fewer acres treated in the middleground view (visual quality objective of Partial Retention in the Table Rock area) than Alternative 2. This effort would improve the scenic character and the scenic stability of the area to generally the same degree as Alternative 2.

Table Mountain

The effects of Alternative 3 would generally be the same as Alternative 2, except no forest treatments would occur in RHCAs, and no trees greater than 21 in dbhwould be cut. There would be 10 fewer acres treated in this area than Alternative 2, and there would be a slightly lower reduction in risk of uncharacteristic fire where more trees are left on the landscape due to the 21 in dbh cutting limit. The scenic character and the scenic stability of the area would be improved to a slightly lower level in this viewshed than Alternative 2.

Forest Road 46, Cold Spring Ridge/Forest Road 4680

The direct effects of Alternative 3 would be the same as Alternative 2, except no forest treatments would occur in MA15, IRAs, or RHCAs, no trees greater than 21 in dbhwould be cut, and FS Road 4600570 would not be decommissioned. These differences would result in very little difference in effect on visual quality, except in the case of scenic stability. Leaving more trees on the landscape, and not breaking up the horizontal homogeneity and ladder fuels of the IRAs, MA15, and RHCA areas would result in higher risk of uncharacteristic stand replacement fire compared to Alternative 2, but lower risk relative to Alternative 1.

It is expected that Alternative 3 would not reduce the scenic integrity and thus retain the existing visual quality objective standards established in the LRMP, CMP (HCNRA) and the Joseph Creek Wild and Scenic River Management Plan.

Inventoried Roadless Areas and Potential Wilderness Areas

Alternative 3 direct and indirect effects are the same as those disclosed for Alternative 1 as no treatment is proposed in PWA or IRA.

Other Undeveloped Land

See effects analysis for Alternative 2 with the following change in acres affected for Alternative 3. The description of effects are similar to Alternative 2, however, the intensity (number of acres affected) is slightly less because less harvest and SI would occur in Alternative 3. Harvest would occur on approximately 3,500 acres of other undeveloped lands (all outside of IRA) under Alternative 3. Stand improvement would occur on approximately 400 acres of other undeveloped lands under Alternative 3. About 16,000 acres would be identified as high priority for fire treatment, which could be accomplished via prescribed or unplanned fire.

Areas Identified as Unroaded by Oregon Wild

See effects analysis for Alternative 2 with the following change in acres affected for Alternative 3 (Table 77). The description of effects are similar to Alternative 2, however, the intensity (number of acres affected) is slightly less because less harvest and SI would occur in Alternative 3.

Table 77. Acres of harvest and stand improvement within OW outside of PWA, IRA and Other Undeveloped Land under Alternative 3.

Oregon Wild Unroaded Area Name	Acres outside IRA, PWA, and other undeveloped lands treated with Harvest/SI Alternative 3	
	Harvest	SI
Joseph Canyon	1,200	500
Cottonwood Creek – Broady Creek	300	200
Sumac Creek	40	0
Yew Wood Springs	140	0
Boner Gulch	40	0
Total	1,720	700

Cumulative Effects

Alternative 3 restoration treatments would contribute an additional 13,290 acres to moving forest composition, structure, density toward desired conditions or enhancing forest pattern or size class distribution or improving trends in insect and disease susceptibility.

Physical Environment

Climate

Treatments in Alternative 3 would move the project area closer to the reference condition in vegetation and disturbance regime, creating a more resilient and sustainable condition in the face of climate change when compared to Alternative 1, but to a lesser degree than Alternative 2 (also see Cumulative Effects Common to All Action Alternatives, above).

Soils

If Alternative 3 is implemented, there is a greater potential to create DSCs through active vegetation management activities compared to Alternative 1 and lower potential compared to Alternative 2. Alternative 3 proposes approximately 1,500 fewer acres of ground-based harvest, 900 fewer acres of skyline and 3,000 fewer acres of helicopter harvest. There would be fewer opportunities to remediate legacy impacts but fewer new impacts to soils productivity would occur in comparison to Alternative 2. Alternative 3 would reduce the landscape's susceptibility for an uncharacteristic disturbance but perhaps not as effectively as Alternative 2. See the discussion under Cumulative Effects Common to All Action Alternatives – Soils, for background information.

Water Quality

With the implementation of Alternative 3, there is a lower potential for erosion and subsequent sediment delivery compared to Alternative 2. Additionally, under Alternative 3, there would be no thinning within the RHCAs with equipment that may deliver additional sediment to streams. Our analysis indicates that sediment contributions from RHCA thinning, as prescribed, are unlikely to be detectable beyond the site scale (see Physical Environment Supporting Documentation). Alternative 3 would also be more effective at reducing the risk of uncharacteristic disturbances and potential future sediment inputs from high intensity wildfires, in comparison to Alternative 1 but less effective than Alternative 2. See Cumulative Effects Common to All Action Alternatives – Water Quality, for additional information.

Air Quality

See Cumulative Effects Common to All Action Alternatives

Biological Environment

Vegetation

Alternative 3 restoration treatments would contribute approximately 12,500 acres to moving forest composition, structure, density toward desired conditions or enhancing forest pattern or size class distribution or improving trends in insect and disease susceptibility. This is less than that proposed in Alternative 2 and is therefore less effective at moving LJCRP Analysis Area to the desired condition for vegetation.

Disturbance

Past management actions and wildfires cumulatively affect fire managements' ability to confidently return fire as an ecological process. Utilizing areas of reduced fire behavior, typically identified by past treatment and wildfire, can often decrease the risk (safety, social and ecological) of allowing an unplanned ignition to perform an ecologically important role and restore a natural disturbance regime. These past actions alongside treatments identified in Alternative 3 would facilitate somewhat limited acceptance of characteristic wildland fire and its ecological role in restoring disturbance processes in the LJCRP area. This is due in part to the large areas of untreated and ecologically important land that would continue to depart from historic disturbance severity and behavior. Adverse effects to these areas may not be socially or ecologically desirable given the expected effects of wildfire therefore the decision space is narrowed when fire occurs within or around these specific areas.

Cumulative Effects of Amending the Forest Plan (Eastside Screens)

Proposed Amendment for Forest Vegetation Treatments in Old Forest Single Story

Alternative 3 proposes to harvest approximately 20 acres in OFSS to restore or maintain OFSS structure, which is currently less than 1 percent of the forested landscape, and substantially below RV (Table 11).

See “cumulative effects of amending the Forest Plan (Eastside Screens) for Alternative 2. The cumulative effects of implementing the plan amendment under Alternative 3 to treat OFMS and OFSS stands to restore RV, in combination with similar past amendments on the WWNF are similar to those for Alternative 2, and minor relative to the extent of the restoration need Forest-wide.

Also see “Alternatives 2 and 3- Effects of Not Amending the Forest Plan”, below.

Threatened, Endangered, and USFS Region 6 Sensitive Plants, and Understory Vegetation

With respect to cumulative effects on TES plants and understory vegetation, Alternative 3 has a lower potential than Alternative 2 to directly contribute to the previous impacts since there would be no treatments MA15, IRAs, RHCAs or PWAs. See the discussion under Cumulative Effects Common to All Action Alternatives for additional information.

Wildlife

Alternative 3 provides additional large tree structure by retaining all trees greater than 21in dbh. Open road densities would be reduced in Alternative 2 and generally maintained in Alternative 3. Although Alternative 3 proposes fewer acres harvested, it also proposes few road closures above the existing condition. See the discussion under Cumulative Effects Common to All Action Alternatives – Wildlife, for more information.

Aquatic Habitat

Under Alternative 3 there would be no thinning treatments of RHCAs. This would result in a reduction of a very negligible amount of sediment being delivered to stream channels and downstream fish bearing streams. This would result in a slightly less cumulative effect than Alternative 2. For all other effects see the discussion under Cumulative Effects Common to All Action Alternatives – Aquatic Habitat, for more information..

Social Environment

Recreation / Scenery

See Cumulative Effects Common to All Action Alternatives

Heritage / Tribal

See Cumulative Effects Common to All Action Alternatives. Relatively speaking, Alternative 3 may pose a lower cumulative risk to heritage values over time compared to Alternative 2 as it proposes about half of the area of mechanical treatments. However, the cumulative effects on heritage resources as a result of Alternative 3 would be managed for no effect based on mitigation and design criteria (Appendix J, PDC’s # 2,3,and 10) and compliance with Section 106 of the National Historic Preservation Act (1966) and Programmatic Agreement (2004).

See the biological sections of effects analyses for Wildlife, Aquatics and TES Plants and Understory Vegetation for cumulative effects associated with treaty resources and values.

Inventoried Roadless Area, Potential Wilderness Areas, and Other Undeveloped Lands, and areas identified as unroaded by Oregon Wild

Cumulative effects for PWAs and IRAs would be the same as disclosed in Alternative 1. There would be no cumulative effects because no activities would overlap in time or space and no direct or indirect effects would occur under this alternative.

Cumulative effects to other undeveloped lands and OW would be the same as disclosed in Alternative 2. The description of effects are similar to Alternative 2, however, the intensity (number of acres affected) is slightly less because less harvest would occur in Alternative 3.

Socioeconomics

Access

Effects to access to WWNF land was an issue brought up through public comments and meetings. The attitude toward the LJCRP from a subsection of the community is generally negative because, although it may not contain significant motorized access restrictions, the LJCRP is seen as an addition to the previous restrictions put in place and is viewed as a trend toward limiting access to public lands. Travel management planning on the WWNF is on-going and this could change cross-country travel and the existing network of roads on the Forest. If some roads on the WWNF are closed to motorized access in the future for cross-country travel, commenters expressed that the value of maintained roads would increase. Under Alternative 3, the cumulative effects on motorized access to Forest Service lands are less than the effects from Alternative 2 since 230 miles are open Forest Service roads compared to 170 miles open under Alternative 2.

Treatment and Restoration

The effect of past, present and reasonably foreseeable treatment activities in the project area would improve forest health relative to existing conditions even without the implementation of LJCRP. According to the vegetation report, from 2004 to 2013, approximately 1,300 acres have been commercially harvested in the Lower Joseph area. Under Alternative 3, 10,000 acres are expected to be commercially harvested over the ten year span of the project. Under Alternative 3, the activity in the forest sector would be higher than present and the associated local economic impact of current and future restoration activities would increase from the present conditions. The estimated employment and income consequences of non-LJCRP treatment activities, therefore, are likely underestimated in the related environmental compliance documents if they depend on present conditions for those analyses.

The LJCRP treatments and other ongoing and foreseeable treatments could increase exposure to smoke emissions, which could cause cumulative effects to health and quality of life for individuals who are sensitive to smoke. According to the vegetation report, from 2004 to 2013, approximately 600 acres have been broadcast burned and 24,000 acres have incurred wildfire in the Lower Joseph area. Under Alternative 3, up to 50,000 acres are expected to be broadcast burned over the ten year span of the project. However, the cumulative effect of these treatments would be to decrease the risk of uncharacteristic wildfire, which would decrease the probability of smoke emissions associated with these events.

Recreation

Other on-going and reasonably foreseeable vegetation treatments in the project area would reduce the opportunities for substitute behavior when the preferred recreation site is unavailable. As a result, individuals may choose to stay home, which would decrease visitor spending and consumer surplus to a greater extent than estimated in the direct and indirect effects analysis. However, the cumulative effects to the social and economic impacts from recreation cannot be precisely described. Based on the available information, the effect to visitor spending and consumer surplus from on-going and reasonably foreseeable actions is not expected to change. Although Alternative 3 would likely have less short-term disturbances to recreation (from smoke and limited access) than the Proposed Action, the long term effects to recreation would be also be less improved viewsheds and opportunities to recreate in a healthy forest with reduced risk of wildfire.

Unavoidable Adverse Effects

See “Unavoidable adverse effects” under the section “Effects common to the action alternatives”.

Irreversible/Irretrievable Commitments of Resources

See “Irreversible/Irretrievable commitments of resources” under “Effects common to the action alternatives.

Alternatives 2 and 3 – Effects of Not Amending the Forest Plan

The following is a description of how the Forest Plan amendments under this EIS would modify Forest Plan standards and guidelines and what the effects to the vegetation resource would be if the amendment did not occur.

Alternative 2 - Wildlife Standard (The Eastside Screens – Regional Forester’s Amendment # 2 for the Wallowa-Whitman Land and Resource Management Plan (Forest Plan).

The amendment would authorize: a) Some of the large, but young, Douglas-fir, and grand fir trees that are ≥ 21 in dbh, but less than 150 years in age (at breast height), would be removed from any of the structural stages being treated, except for units classified as the old forest single stratum structural stage (OFSS; this stage is called “single stratum with large trees” in the Screens); b) Thinning treatments would occur in OFSS.

If the amendment did not occur:

a) Restoration treatments would be limited to a maximum of 21 in dbh thereby reducing the ability to restore forest structure and composition toward reference conditions (RV), particularly to increase the abundance of shade-intolerant tree species (ponderosa pine and western larch), reduce the risk of uncharacteristically severe fire and insect and disease outbreaks, and increase resiliency to natural disturbance and climate change. Scenario modeling specific to the LJCRP and the WWNF as a whole showed that more large trees would be lost to fire, insects and disease under a no action alternative than the combined loss to cutting and natural disturbances under Alternative 2 (see Appendix C for more information). While this analysis could not tease out the comparative of effects of implementing Alternative 2 treatments with a diameter cap of 21 in dbh, they do reveal the effects of leaving greater tree densities on the landscape relative to the RV.

b) Restoration treatments would not occur in the OFSS structural stage thereby negating the ability ensure maintenance and persistence of the large tree component into the future (in terms of improved tree vigor and resistance to western pine beetle attack and future wildfire risk or resiliency to climate change); contribute to species composition objectives for the LJCRP; contribute to density objectives for the LJCRP.

Alternative 3 - - Wildlife Standard (The Eastside Screens – Regional Forester’s Amendment # 2 for the Wallowa-Whitman Land and Resource Management Plan (Forest Plan)). The amendment would authorize: a) Thinning treatments would occur in OFSS.

If the amendment did not occur:

a) Restoration treatments would not occur in the OFSS structural stage thereby negating the ability ensure maintenance and persistence of the large tree component into the future (in terms of improved tree vigor and resistance to western pine beetle attack and future wildfire risk or resiliency to climate change);

contribute to species composition objectives for the LJCRP; contribute to density objectives for the LJCRP.

Other Required Disclosures

NEPA at 40 CFR 1502.25(a) directs “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with …other environmental review laws and executive orders.”

This page intentionally left blank

CHAPTER 5 Preparers and Contributors

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and other organization and individuals during the development of this environmental impact statement:

U.S. Forest Service Blue Mountains Restoration Strategy Interdisciplinary Team

Member	Title	Responsible Sections
Paul Boehne	Fisheries Biologist	Aquatics, Transportation
Michael Brown	Physical Scientist	Soils, Watershed, Minerals, Lands, GIS
Linda Dillavou (now retired)	Support Assistant	Administrative support.
Jenifer Ferriel	Ecologist/Botanist	Ecology, Range, Native and Invasive Plants
Amy Gowan	Social Scientist	Tribal, Socioeconomics, Heritage
Miles Hemstrom	Scientist, Institute for Natural Resources	Ecological Modeling
Jodi Kramer (now retired)	Public Affairs Officer, Wallowa-Whitman National Forest	External Communication
Kristen Loughery (TEAMS)	Economist	Socioeconomics
John Manderscheid	Civil Engineering Technician	Travel Access
Brenda McCants	Support Services	Administrative support
Neil McCusker	Silviculturist	Silviculture, Climate Change
Lonnie Ruchert	Civil Engineering Technician	Travel Access
Glen Sachet	Public Affairs Specialist, R6	Communications
Ayn Shlisky (no longer with FS)	Team Lead	Team Management, Environmental Coordination
Brian Spradlin (no longer with FS)	Disturbance Ecologist	Fire Ecology, Fuels, Air, Wilderness, IRAs, Environmental Coordination
Kris Stein	District Ranger	Oversight, Direction
Barb Wales	Wildlife Biologist	Wildlife, Recreation, Transportation
Eric White	Research Associate (Ecosystem Workforce Program, Univ. of Oregon	Socioeconomics
Darcy Weseman	Public Affairs/Writer-Editor	Writer-editor/Public Engagement
Chris Zanger (no longer with TNC)	Forest Analyst (The Nature Conservancy)	Fire Modeling

Federal, State, and Local Agencies

National Marine Fisheries Service, Northwest Region, US Fish and Wildlife Service

Tribes

Nez Perce Tribe

This page intentionally left blank

Agencies, Organizations, and Persons to whom Copies of the Statement were Sent

Distribution of the Environmental Impact Statement

This environmental impact statement has been distributed to individuals who specifically requested a copy of the document (and those who submitted substantive comments on the draft environmental impact statement). In addition, copies have been sent to the following Federal agencies, federally recognized tribes, State and local governments, and organizations representing a wide range of views.

Agencies

Advisory Council on Historic Preservation
Chief of Naval Operations, Energy and Environmental Readiness Division
Department of Environmental Quality
Department of Geology and Minerals Industries
Department of the Interior, Office of Envrionmental Policy & Compliance
Department of Land Conservation and Development
Division of State Lands
Environmental Protection Agency, Region 10
FAA, Northwest Mountain Region
Federal Highway Administration
National Marine Fisheries Service, Habitat Conservation Division
Natural Resources Conservation Service
NOAA Office of Policy and Strategic Planning
Northwest Power Planning Council
Oregon Department of Fish and Wildlife
Oregon Department of Forestry
Oregon Parks and Recreation Department
Oregon State Economist
Oregon State Water Resources Department
U.S. Army Corps of Engineers, Northwest Division
U.S. Coast Guard
U.S. Department of Energy, Office of NEPA Policy and Compliance
USDA APHIS PPD/EAD
USDA National Agricultural Library
USDI Office of Environmental Policy and Compliance

Organizations

AFRC
Associated Oregon Loggers, Inc.
Blue Mountains Biodiversity Project
Boise Cascade

Hells Canyon Preservation Council
Oregon Wild
Union County
Wallowa County Board of Commissioners
WildEarth Guardians

Individuals

Shawn Mork
Dick Artley
J. Lantini
Vincent J. Naughton
David Mildrexler
Roseann Dudrick
Jon Lee
William Gray
Danne Johnson

Tribes

Nez Perce Tribe

Index

Affected Environment, 7
air quality, 260, 588, 591
American marten, 3, 4, 25, 26, 30, 93, 96, 126, 127, 155, 179, 180, 222, 223
aquatic habitat, 37
cambium peeled trees, 43, 190
climate change, 309, 558
climate change scenarios, 36
connectivity, 14, 30, 48, 56, 65, 67, 72, 74, 88, 98, 104, 138, 181, 182, 183, 224, 263, 272, 306, 552, 555, 578, 580
Cook Ridge Roadless Area, 49
Davis fleabane, 24, 144, 540
Disturbance regimes, 10, 69, 90
Douglas-fir, 1, 6, 11, 15, 16, 19, 20, 26, 31, 39, 49, 50, 68, 71, 74, 89, 90, 107, 166, 169, 170, 212, 213, 217, 237, 265, 320, 331, 339, 555, 556
dry upland forest, 6, 11, 12, 13, 14, 15, 31, 79, 117, 142, 262
Dry upland forests, 10
endangered species, 263, 267
environmental justice, 186, 189, 227, 230
financial efficiency, 185, 226
fisheries, 261, 371, 589, 591
forage production, 22
Forest structure and composition, 17
green-band mariposa lily, 24
HCNRA, 7, 2, 6, 11, 21, 23, 24, 43, 46, 49, 50, 58, 66, 67, 72, 73, 107, 194, 199, 232, 273, 307, 308, 346, 546
HEI, 7, 27, 28, 156
insects and diseases, 15, 16, 265
inventoried roadless areas, iii, 6, 47, 48, 51, 52, 54, 55, 75, 105, 191, 231
jobs supported, 186, 226
Joseph Canyon Roadless Area, 49
Joseph Canyon Wild and Scenic River, 45, 193, 232
livelihood, 102, 186, 187, 227
management indicator species, 2, 25, 26, 55, 56, 275, 278
migratory bird, 33, 99, 130, 155, 156, 183, 225, 310
Moist upland forest, 8, 12, 14, 16, 19, 20, 21, 166, 167, 169, 213, 215, 217
Mountain Sheep Roadless Area, 50
National Historic Preservation Act, 308
Nez Perce tribe, iv, 2, 4, 7, 105, 144, 189, 230
Nez Perce Tribe, 308, 309, 369
non-native invasive plant, 23
Northern goshawk, 26, 95, 129, 153, 180
old growth, 277, 315, 316
PACFISH, 37, 73, 111, 113, 132, 134, 159, 173, 175, 283, 314, 315, 556, 560, 562, 566, 601

pileated woodpecker, 25, 30, 93, 94, 127, 154, 178, 220, 314
Ponderosa pine, 6, 19, 20, 146, 166, 213, 556, 592
Potential Wilderness Areas, 50, 61, 83, 107, 108, 144, 160, 200, 201, 207, 233, 235
Precious Lands Management Area, 42
prescribed burning, 303, 311, 589
primary cavity excavators, 26, 93, 125, 177, 220
Public Involvement, 54, 59, 378
range vegetation, 22
recreation, 6, 29, 40, 43, 45, 46, 48, 52, 64, 75, 76, 102, 106, 134, 135, 136, 139, 140, 141, 155, 159, 160, 186, 187, 188, 189, 192, 198, 208, 209, 227, 228, 229, 230, 236, 261, 265, 268, 280, 282, 285, 287, 288, 289, 292, 293, 307, 308, 558, 582, 591
redband trout, 3, 92, 159, 175, 177, 188, 219, 220, 228, 289
Research Natural Areas, 43, 58, 59, 66, 67, 72, 73, 75, 79, 107, 141, 289, 307, 308, 377
resiliency, 6, 2, 6, 54, 68, 72, 74, 117, 138, 144, 156, 185, 191, 193, 196, 198, 216, 226, 231, 237, 297, 580
riparian management objectives, 8, 37, 87
Rocky Mountain elk, 26, 28, 156
rough rabbitweed, 24, 144
scablands, 40
Snake River daisy, 24
Snake River steelhead, 3, 4, 92, 157, 159, 161, 175, 176, 177, 219, 220
soil productivity, 39
Spalding's catchfly, 24, 313
stream temperature, 38, 63, 173, 174
Table Mountain, 46, 193, 194, 232
temporary roads, 65, 84, 108, 110, 112, 114, 141, 147, 175, 181, 190, 201, 202, 224, 230, 291, 543, 570, 572, 576, 577, 579, 588, 597, 604
TES plants, 21, 23, 24
timber production, 2, 186, 226, 276, 301
timber volume, 226
traditional plants, 41, 105, 191
Tribal relations, 41
Understory vegetation, 21, 119
Wallowa County, iii, 2, 5, 22, 30, 40, 41, 43, 57, 61, 191, 313, 355, 374
Wallowa ricegrass, 144
water quality limited, 38
Wildhorse Roadless Area, 49
wolf, 32

Bibliography

Uncategorized References

2012. LEAGUE OF WILDERNESS DEFENDERS/BLUE MOUNTAINS BIODIVERSITY PROJECT VS. UNITED STATES FOREST SERVICE and KENT CONNAUGHTON. Page 1279 Simon, Michael H. THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF OREGON PORTLAND DIVISION.

Abele, S. C., V. A. Saab, and E. O. Garton. 2004. Lewis's woodpecker (*Melanerpes lewis*): a technical conservation assessment. [Online]. Page Available: http://www.fs.fed.us/r2/projects/scp/assessments/lewisswoodpecker.pdf. USDA Forest Service, Rocky Mountain Region.

Abella, S. R., C. W. Denton, R. W. Steinke, and D. G. Brewer. 2013. Soil development in vegetation patches of Pinus ponderosa forests: Interface with restoration thinning and carbon storage. Forest Ecology and Management **310**:632-642.

Agee, J. K. 2002. Fire as a coarse filter. Reno, Nev.

Agee, J. K., and K. R. Maruoka. 1994. Historical fire regimes of the Blue Mountains. U.S. Department of Agriculture, Forest Service, Blue Mountains Natural Resources Institute, La Grande, OR.

Allen, S. D., D. A. Wickwar, F. P. Clark, R. R. Dow, R. Potts, and S. A. Snyder. 2009. Values, Beliefs, and Attitudes Technical Guide for Forest Service Land and Resource Management, Planning, and Decisionmaking. USDA Forest Service, Pacific Northwest Research Station.

American Forest Resource Council (AFRC), and Associated Oregon Loggers. 2014. Forest Sector Infrastructure in Northeast Oregon's Blue Mountains.

Anacker, B. L., M. Gogol-Prokurat, K. Leidholm, and S. Schoenig. 2013. Climate Change Vulnerability Assessment of Rare Plants in California. Madroño **60**:193-210.

Anderson, P. D., D. J. Larson, and C. S.S. 2007. Riparian buffer and density management influences on microclimate of young headwater forests of western Oregon. Forest Science **53**:254-268.

Anderson, R. 1998. A Preliminary Assessment of bats along Snake River, Hells Canyon National Recreation Area. Page 85 *in* H. C. c. F. N. Bonneville Power Administration, editor.

Archuleta, J. G. 1997. Lakeview #4 Monitoring of Soil Compaction and Severely Burned Soil. Umpqua National Forest, Diamond Lake Ranger District.

Archuleta, J. G. 1999. Bearpaw #17 Post harvest evaluation of ground based equipment. Umpqua National Forest, Diamond Lake Ranger District.

Ashley, P. E., and J. T. Robinson. 1996. Road mortality of amphibians, reptiles, and other wildlife on the Long Point Causeway, Lake Erie, Ontario. Canadian Field-Naturalist **110**:403-412.

Baker, W. L. 1989. A review of models of landscape change. Landscape Ecology **2**:111-133.

Barrett, S., D. Havlina, J. Jones, W. Hann, C. Frame, D. Hamilton, K. Schon, T. Demeo, L. Hutter, and J. Menakis. 2010. Interagency Fire Regime Condition Class Guidebook. Version 3.0. http://www.frcc.gov/.

Bate, L. J., M. J. Wisdom, and B. C. Wales. 2007. Snag densities in relation to human access and associated management factors in forests of Northeastern Oregon, USA. Landscape and Urban Planning **80**:278-291.

Bennett, K. A. 1982. Effects of slash burning on surface soil erosion rates in the Oregon Coast Range., Siuslaw National Forest.

Bestelmeyer, B. T., J. R. Brown, K. M. Havstad, R. Alexander, G. Chavez, and J. E. Herrick. 2003. Development and Use of State-and-Transition Models for Rangelands. Journal of Range Management **56**:114-126.

Bestelmeyer, B. T., G. L. Tugel, G. L. Peacock, D. G. Robinett, P. L. Shaver, J. R. Brown, J. E. Herrick, H. Sanchez, and K. M. Havstad. 2009. State-and-Transition Models for Heterogeneous Landscapes: A Strategy for Development and Application. Rangeland Ecology & Management **62**:1-15.

Bock, C. E. 1970. The ecology and behavior of the Lewis' woodpecker (*Asyndesmus lewis*). University of California Publication of Zoology **92**:1-100.

Boyd, D. K., R. R. Ream, D. H. Pletscher, and M. W. Fairchild. 1994. Prey taken by colonizing wolves and hunters in the Glacier National Park area. The Journal of Wildlife Management **58**:289-295.

Briske, D. D., S. D. Fuhlendorf, and F. E. Smeins. 2005. State-and-Transition Models, Thresholds, and Rangeland Health: A Synthesis of Ecological Concepts and Perspectives. Rangeland Ecology & Management **58**:1-10.

Brooks, P. J. 2009. Rare White Erigeron Identification Project. Interagency Special Status and Sensitive Species website.

Bull, E. L. 2005. Ecology of the Columbia spotted frog in northeastern Oregon. Page 46 p. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

Bull, E. L., and A. K. Blumton. 1999. Effect of Fuels Reduction on American Martens and Their Prey. Page 12. USDA Forest Service, Pacific Northwest Research Station, Portland, OR.

Bull, E. L., and B. E. Carter. 1996. Tailed frogs: distribution, ecology, and association with timber harvest in northeastern Oregon. Page 11 p. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

Bull, E. L., and D. B. Marx. 2002. Influence of fish and habitat on amphibian communities in high elevation lakes in northeastern Oregon. Northwest Science **76**:240-248.

Bull, E. L., S. R. Peterson, and J. W. Thomas. 1986. Resource partitioning among woodpeckers in northeastern Oregon. Page 20. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

Bull, E. L. e. a. 1997. Trees and logs important to wildlife in the Interior Columbia River Basin. USDA Forest Service, Portland, Oregon.

Buonopane, M., G. Snider, B. K. Kerns, and P. S. Doescher. 2013. Complex restoration challenges: weeds, seeds, and roads in a forested Wildland Urban Interface. Forest Ecology and Management **295**:87-96.

Burcsu, T., J. Halofsky, S. Bisrat, T. Christopher, M. K. Creutzburg, E. Henderson, M. Hemstrom, and M. Whitman. In press. Dynamic Vegetation Modeling of Forested, Woodland, Shrubland, and Grassland Vegetation Communities in the Pacific Northwest and Southwest Regions of the United States. In Halofsky, J.e., M.K. Creutzburg, and M.A. Hemstrom. Mid-scale Landscape Assment: Mehods Ussed in the Integrated Landscape Assessment Project.*in* U. F. S. P. R. Lab, editor., Portland, OR.

Burnett, D. J. M. a. K. M. 2007. Effects of forest cover, topography, and sampling extent on the measured density of shallow, translational landslides. Water Resources Research **43**.

Busing, R. T., C. B. Halpern, and T. A. Spies. 1995. Ecology of Pacific Yew (Taxus brevifolia) in Western Oregon and Washington. Conservation Biology **9**:1199-1207.

Cansler, C. A., and D. McKenzie. 2014. Climate, fire size, and biophysical setting control fire severity and spatial pattern in the northern Cascade Range, USA. Ecological Applications **24**:1037-1056.

Caraher, D. L., J. Henshaw, F. Hall, W. H. Knapp, B. P. McCammon, J. Nesbitt, R. J. Pedersen, I. Regenovitch, and C. Tietz. 1992. Restoring ecosystems in the Blue Mountains: a report to the Regional Forester and the Forest Supervisors of the Blue Mountain forests. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, [Portland, OR].

Cassirer, F., and C. R. Groves. 1990. Distribution, habitat use and status of harlequin ducks (Histrionicus histrionicus) in northern Idaho.*in* I. D. o. F. a. Game, editor.

Cederholm, C. J., and L. M. Reid. 1987. Impact of forest management on Coho Salmon (Oncorhynchus kisutch) populations of the Clearwater River, Washington: a project summary. Pages 373-397 *in* E. O. Salo and T. W. Gundy, editors. Streamside management forestry and fishery interactions. Contribution No. 57. University of Washington, Institute of Forest Resources, Seattle, WA.

Chambers, C. L., and M. J. Herder. 2005. Species accounts *Euderma maculatum* spotted bat. Page 5 p. Developed for 2005 Portland Bennial Meeting of the Western Bat Working Group. Western Bat Working Group, Rapid City, SD.

Chan, S., Chan S., D. Larson, and P. D. Anderson. 2004. Microclimate patterns associated with density management and riparian buffers. USDA Forest Service, Pacific Northwest Research Station, Corvallis, OR.

Charles C. Rhoades , D. E. a. D. B. 2011. The influence of wildfire extent and severity on streamwater chemistry, sediment and temperature following the Hayman Fire, Colorado. International Journal of Wildland Fire **20**:430-442.

Christensen, H. H., D. R. Johnson, and M. H. Brooks. 1992. Vandalism: Research, prevention and social policy. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

Cook, R. C., J. G. Cook, D. J. Vales, B. K. Johnson, M. S. M., L. A. Shipley, R. A. Riggs, L. L. Irwin, S. L. Murphie, B. L. Murphie, K. A. Schoenecker, F. Geyer, P. B. Hall, R. D. Spencer, D. A. Immell, D. H. Jackson, B. L. Tiller, P. J. Miller, and L. Schmitz. 2013. Regional and Seasonal Patterns of Nutritional Condition and Reproduction in Elk. Wildlife Monographs **18**:1-44.

Countryman, B., D.K. Swanson, S. Mellmann-Brown. 2012. Rangeland Condition and Trend for the Blue Mountains Forest Plan Revision - Final.*in* B. M. F. P. Revision, editor. Wallowa-Whitman National Forest, Baker City, OR.

Crane, M. F., and W. C. Fischer. 1986. Fire ecology of the forest habitat types of central Idaho. U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, UT.

Crawford, R. C. 1983. Pacific yes community ecologin in north-central Idaho with implications to forest land management. Ph.D., University of Idaho, Moscow.

Danehy, R. J., and B. J. Kirpes. 2000. Relative humidity gradients across riparian areas in eastern Oregon and Washington forests. Northwest Science **74**.

Davis, R., and K. Weever. 2011. Johnson's hairstreak surveys in Oregon and Washington (2010). Page 19 p. Unpublished report prepared for the Interagency Special Status / Sensitive Species Program (ISSSSP). USDA Forest Service and USDI Bureau of Land Management, Portland, OR.

DeBano, L. F. 2000. The role of fire and soil heating on water repellency in wildland environments: a review. Journal of Hydrology **231–232**:195–206.

Dewey, R. 2013. Conservation Assessment For Henderson's Needlegrass (Achnatherum hendersonii) and Wallowa Needlegrass (Achnatherum wallowaense). U.S.D.A. Forest Service Region 6 and U.S.D.I. Bureau of Land Management, Oregon and Washington, ISSSSP website.

Diaz, Nancy; Apostol, Dean. 1992. Forest landscape analysis and design: a process for developing and implementing land management objectives for landscape patterns. R6 ECO-TP-043-92. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region. Dixon, R. D. 1995. Density, nest-site and roost-site characteristics, home-range, habitat-use and behaviour of white-headed woodpeckers: Deschutes and Winema National Forests, Oregon. Page 70 pages Oregon Dept. Fish and Wildlife. Nongame Rep. 93-3-01, Portland.

Dunham, J. B., A. E. Rosenberger, C. H. Luce, and B. E. Rieman. 2007. Influences of wildfire and channel reorganization on spatial and temporal variation in stream temperature and the distribution of fish and amphibians. Ecosystems **10**:325-336.

Finch, D. M., J. L. Ganey, W. Young, R. T. Kimball, and R. Sallabanks. 1997. Effects and interactions of fire, logging, and grazing. .*in* F. S. United States Department of Agriculture, editor.

Foltz, S. 2009. Species fact sheet: intermountain sulphur *Colias occidentalis pseudochristina = Colias christina pseudochristina*. Page 5 p. Unpublished report prepared for the Interagency Special Status/Sensitive Species Program (ISSSSP). Washington Department of Natural Resources, Natural Heritage Program, Portland, OR.

Forbis, T., L. Provencher, L. Frid, and G. Medlyn. 2006. Great Basin Land Management Planning Using Ecological Modeling. Environmental Management **38**:62-83.

Franklin, J. F., K. N. Johnson, D. J. Churchill, K. Hagmann, D. Johnson, and J. Johnston. 2013. Restoration of dry forests in eastern Oregon: A field guide.*in* T. N. Conservancy, editor. The Nature Conservancy, Portland, OR.

Frederick, G. P., and T. L. Moore. 1991. Distribution and habitat of white-headed woodpecker (*Picoides albolarvatus*) in west central Idaho. Page 53 pages. Conservation Data Center, Nongame and Endangered. Wildlife Program, Bureau of Wildlife, Idaho Department of Fish and Game, Boise, ID.

Frenzel, R. W. 2002. Nest sites, nesting success and turnover rates of white-headed woodpeckers on the Deschutes and Winema National Forest, Oregon in 2002. Page 45 pages Oregon Natural Heritage Program. The Nature Conservancy, Portland.

Fritts, S. H., E. E. Bangs, and J. F. Gore. 1994. The relationship of wolf recovery to habitat conservation and biodiversity in the northwestern United States. Landscape and Urban Planning **28**:23-32.

Gaines, W. L., P. H. Singleton, and R. C. Ross. 2003. Assessing the cumulative effects of linear recreation routes on wildlife habitats on the Okanogan and Wenatchee National Forests. Page 79 pages. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

Garrett, K. L., M. G. Raphael, and R. D. Dixon. 1996. White-headed woodpecker (*Picoides albolarvatus*), The Birds of North America Online (A. Poole, Ed.). Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/252. Cornell Lab of Ornithology, Ithaca, NY.

Gast, W. R., Jr., D. W. Scott, C. Schmitt, D. Clemens, S. Howes, C. G. Johnson, Jr., R. Mason, F. Mohr, and R. A. Clapp. 1991. Blue Mountains forest health report: "new perspectives in forest health". U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Malheur, Umatilla and Wallowa-Whitman national forests, Portland, OR.

Gecy, R. A. 2010. Analysis of SNOTEL data for Blue Mountains. Wallowa-Whitman National Forest, Baker City, Oregon.

Gibeau, M. L., and K. Heuer. 1996. Effects of transportation corridors on large carnivores in the Bow River Valley, Alberta. Page unknown *in* G. Z. Evink, D.; Garrett, P. (et al). editor. Highways and movement of wildlife: improving habitat connections and wildlife passageways across transportation corridors. U.S. Department of Transportation, Orlando, FL.

Gillen, R. L., W. C. Krueger, and R. F. Miller. 1984. Cattle Distribution on Mountain Rangeland in Northeastern Oregon. Journal of Range Management **37**:549-553.

Godbout, G., and J.-P. Ouellet. 2008. Habitat selection of American marten in a logged landscape at the southern fringe of the boreal forest. Ecoscience **15**:332-342.

Goodman, L. 2003. 2430/2600 Guidance for Implementing Eastside Screens. Page 1 p. *in* U. F. S. P. Region, editor.

Grigal, D. F. 2000. Effects of extensive forest management on soil productivity. Forest Ecology and Management. Pages 167–185.

Gruver, J. C., and D. A. Keinath. 2006. Townsend's Big-eared Bat (*Corynorhinus townsendii*): a technical conservation assessment. Page 93 pages [Online]. USDA Forest Service, Rocky Mountain Region.

Hall, F. C. 1977. Ecology of natural underburning in the Blue Mountains of Oregon. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, OR.

Hall, F. C. 1998. Pacific Northwest ecoclass codes for seral and potential natural plant communities.*in* U. F. S. P. N. R. Station, editor., Portland, OR.

Halofsky, J. S., J. E. Halofsky, T. Burcsu, and M. A. Hemstrom. 2014. Dry forest resilience varies under simulated climate-management scenarios in a central Oregon, USA landscape. Ecological Applications **24**:1908–1925.

Hann, W. J., J. L. Jones, M. G. Karl, P. F. Hessburg, R. E. Kean, D. G. Long, J. P. Menakis, C. H. McNicoll, S. G. Leonard, R. A. Gravenmier, and B. G. Smith. . 1997. An assessment of ecosystem components in the interior Columbia Basin and portions of the Klamath and Great Basins. Vol. II. Landscape dynamics of the basin. USDA Forest Service.

Hansen, M. J., and A. P. Clevenger. 2005. The influence of disturbance and habitat on the presence of non-native plant species along transport corridors. Biological Conservation **125**:249-259.

Hardy, C. C., K. M. Schmidt, J. P. Menakis, and R. N. Sampson. 2001. Spatial data for national fire planning and fuel management. International Journal of Wildland Fire **10**:353-372.

Hargis, C. D., J. A. Bissonette, and D. L. Turner. 1999. The influence of forest fragmentation and landscape pattern on American martens. Journal of Applied Ecology **36**:157-172.

Harrod , R. J., D. W. Peterson, N. A. Povak, and E. K. Dodson. 2009. Thinning and prescribed fire effects on overstory tree and snag structure in dry coniferous forests of the interior Pacific Northwest. Forest Ecology and Managment **258**:712-721.

Hayes, G. E., and J. B. Buchanan. 2002. Washington State status report for the peregrine falcon. Page 87. Washington Department of Fish and Wildlife, Olympia.

Hays, D. W., and R. L. Milner. 2004. Peregrine falcon, *Falco peregrinus*. Pages 11:11-14 *in* E. Larsen, J. M. Azerrad, and N. Nordstrom, editors. Management Recommendations for Washington's Priority Species, Volume IV: Birds. Washington Department of Fish and Wildlife, Olympia, Washington, USA.

Heath, L. S., J. E. Smith, C. W. Woodall, D. L. Azuma, and K. L. Waddell. 2011. Carbon stocks on forestland of the United States, with emphasis on USDA Forest Service ownership. Ecosphere **2**:Article 6.

Hemstrom, M. A., J. Merzenich, A. Reger, and B. Wales. 2007. Integrated analysis of landscape management scenarios using state and transition models in the upper Grande Ronde River Subbasin, Oregon, USA. Landscape and Urban Planning **80**:198-211.

Hessburg, P. F., R. G. Mitchell, and G. M. Filip. 1994. Historical and current roles of insects and pathogens in eastern Oregon and Washington forested landscapes. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

Hessburg, P. F., N. A. Povak, and S. R.B. 2010. Thinning and prescribed fire effects on snag abundance and spatial pattern in an eastern cascade range dry forest, Washington, USA. Forest Science **56**:74-87.

Hessburg, P. F., B. G. Smith, S. D. Kreiter, C. A. Miller, R. B. Salter, C. H. McNicoll, and W. J. Hann. 1999. Historical and current forest and range landscapes in the Interior Columbia River Basin and portions of the Klamath and Great Basins. Page 60 *in* T. Quigley, M. , editor. Gen. Tech. Report PNW-GTR-458 Interior Columbia Basin Ecosystem Management Project: scientific assessment. . US Department of Agriculture, Forest Service, PNW Research Station Portland, Oregon.

Heyerdahl, E. K. 1997. Spatial and temporal variation in historical fire regimes of the Blue Mountains, Oregon and Washington: the influence of climate. Doctor of Philosophy. University of Washington, Seattle, WA.

Heyerdahl, E. K., and J. K. Agee. 1996. Historical fire regimes of four sites in the Blue Mountains, Oregon and Washington. University of Washington, College of Forest Resources, Seattle, WA.

Hickman, S. 1990. Evidence of edge species attraction to nature trails within deciduous forest. Natural Areas Journal **10**:3-5.

Hollenbeck, J. P., L. J. Bate, V. A. Saab, and J. F. Lehmkuhl. 2013. Snag distributions in relation to human access in ponderosa pine forests. Wildlife Society Bulletin **37**:256-266.

Holling, C. S., and G. K. Meffe. 1996. Command and control and the pathology of natural resource management. Conservation Biology **10**:328-337.

Huff, M. H. e. a. 1995. Historical and Current Forest Landscapes in Eastern Oregon and Washington. Page 50 pp. *in* U. F. Service, editor.

Hustafa, J. 2014. Direct personal communication (phone and in person) with Jenifer Ferriel.

Hutto, R. L. 1995. Composition of bird communities following stand-replacement fires in northern Rocky Mountain conifer forests. Conservation Biology **9**:1041-1058.

IPCC. 2014. Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change., PICC, Geneva, Switzerland.

Isley, A. unpublished data. Revegetation Summary for Joseph Creek Complex Fire 1986. Page 2.

Johnsgard, P. A. 1990. Hawks, eagles, and falcons of North America: biology and natural history. Smithsonian Institution Press, Washington, D.C.

Johnson, B. K., J. W. Kern, M. J. Wisdom, S. L. Findholt, and J. G. Kie. 2000. Resource selection and spatial separation of mule deer and elk during spring. The Journal of Wildlife Management **64**:685-697.

Johnson, C. G., Jr. 1998. Common Plants of the Inland Pacific Northwest. USDA USFS PNW Research Station, Portland, OR.

Johnson, C. G., Jr and D.K. Swanson. . 2005. Bunchgrass plant communities of the Blue and Ochoco Mountains: a guide for managers.

Johnson, C. G., Jr, and D. K. Swanson. 2005. Bunchgrass plant communities of the Blue and Ochoco Mountains: a guide for managers.

Johnson, C. G., Jr,, and S. A. Simon. 1987. Plant Associations of the Wallowa-Snake Province. Page 400 *in* W. W. N. Forest, editor. R6 Ecology Program, Portland, OR.

Johnson, C. G., Jr., and R. R. Clausnitzer. 1992. Plant associations of the Blue and Ochoco Mountains. Page 164 p. *in* USDA Forest Service, editor. R6-ERW-TP-036-92, Pacific Northwest Region, Wallowa-Whitman National Forest.

Johnson, K. A. 2000. Artemisia tridentata subsp. vaseyana. Fire Effects Information System [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.

Kauffman, J., J. Boone, and W. C. Krueger. 1984. Livestock impacts on riparian ecosystems and streamside management implications, a review. Journal of Range Management **37**:430-438.

Keinath, D. A. 2004. Fringed Myotis (*Myotis thysanodes*): a technical conservation assessment Page 63 pages [Online]. USDA Forest Service, Rocky Mountain Region.

Klein, M. L. 1993. Waterbird behavioral responses to human disturbances. Wildlife Society Bulletin **21**:31-39.

Knopf, F. L. 1996. Prairie Legaces- birds. Prairie conservation: preserving North America's most endangered ecosystem:135-148.

Koch, J. B., J. P. Strange, and P. H. Williams. 2012. Bumble Bees of the Western United States. USDA Forest Service and the Pollinator Partnership.

Kolb, Peter F. and Robberecht, Ronald, "Pinus Ponderosa Seedling Establishment and the Influence of Competition with the Bunchgrass Agropyron Spicatum" (1996). Forest Management Faculty Publications. Paper 28.

Kolb, P. F. 1999. Forestland Grazing: Understory forage management. Montana Forest Owners Association Newsletter.Korol, J. J., M. A. Hemstrom, W. J. Hann, and R. A. Gravenmier. 2002. Snags and Down Wood in the Interior Columbia Basin Ecosystem Management Project. Pages 649-663 *in* L. Jr., W. F., P. J. Shea, B. E. Valentine, C. P. Weatherspoon, and T. E. Lisle, editors. Proceedings of the Symposium on the Ecology and Management of Dead Wood in Western

Forests. Pacific Southwest Research Station, Forest Service, U.S. Department ofAgriculture, Reno, NV.

Kozma, J. M. 2011. Composition of forest stands used by white-headed woodpeckers for nesting in Washington. Western North American Naturalist **71**:1-9.

Kunkel, K. E., T. K. Ruth, D. H. Pletscher, and M. G. Hornocker. 1999. Winter prey selection by wolves and cougars in and near Glacier National Park Montana. The Journal of Wildlife Management **63**:901-910.

Kunz, T. H., and R. A. Martin. 1982. Plecotus townsendii. Mammalian Species:1-6.

LaBonte, J. R., D. W. Scott, J. McIver, and J. L. Hayes. 2001. Threatened, endangered, and sensitive insects in eastern Oregon and Washington forests and adjacent lands. Northwest Science **75**:185-198.

Landres, P. B., P. Morgan, and F. J. Swanson. 1999. Overview of the use of natural variability concepts in managing ecological systems. Ecological Applications **9**:1179-1188.

Landsburg, J. D., and A.R. Tiedemann. 2000. "Fire management," in Drinking water from forests and grasslands: A synthesis of the scientific literature. USDA Forest Service, Southern Research Station **GTR-SRS-39**:124-138.

Larsen, E., E. Rodrick, and R. Milner. 1995. Management recommendations for Washington's priority species, Volume I: invertebrates. Page 82 p. Washington Department of Fish and Wildlife, Olympia, Washington.

Lehmkuhl, J. F., P. F. Hessburg, R. L. Everett, M. H. Huff, and R. D. Ottmar. 1994. Historical and current forest landscapes of eastern Oregon and Washington; part I: vegetation pattern and insect and disease hazards. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

Lehnert, M., L. Romin, and J. Bissonette. 1996. Mule deer highway mortality in northeastern Utah: causes, patterns, and a new mitigation technique. Pages 101-107 *in* G. Evink, D. Ziegler, P. Garrett, and e. al), editors. Highways and movement of wildlife: improving habitat connections and wildlife passageways across transportation corridors. U.S. Department of transportation, Orlando, FL.

Linnell, J. D. C., E. S. Jon, R. Andersen, and B. Barnes. 2000. How Vulnerable Are Denning Bears to Disturbance? Wildlife Society Bulletin **28**:400-413.

Long, R. A., Janet L.Rachlow, M. John G.Kie, and Vavra. 2008a. Fuels Reduction in a Western Coniferous Forest: Effects on Quantity and Quality of Forage for Elk. Rangeland Ecology & Management **61**:302-313.

Long, R. A., J. L. Rachlow, and J. G. Kie. 2008a. Effects of Season and Scale on Response of Elk and Mule Deer to Habitat Manipulation. The Journal of Wildlife Management **72**:1133-1142.

Long, R. A., J. L. Rachlow, J. G. Kie, and M. Vavra. 2008b. Fuels Reduction in a Western Coniferous Forest: Effects on Quantity and Quality of Forage for Elk. Rangeland Ecology & Management **61**:302-313.

Mace, R. D., J. S. Waller, and T. L. Manley. 1996. Relationship among grizzly bears, roads and habitat in the Swam Mountains, Montana. Journal of Applied Ecology **33**:1395-1404.

Mace, R. D., J. S. Waller, and T. L. Manley. 1999. Landscape evaluation of grizzly bear habitat in western Montana. Conservation Biology **13**:367-377.

Mantua, N., I. Tohver, and A. Hamlet. 2010. Climate Change Impacts on Streamflow Extremes and Summertime Stream Temperature and Their Possible Consequences for Freshwater Salmon Habitat in Washington State. Climatic Change 102 (1): 187-223. doi: 10.1007/s10584-010-9845-2. **102**:187-223.

Marshall, A. G. 1999. Unusual Gardens: the Nez Perce and Wild Horticulture on the Eastern Columbia Plateau. Northwest Lands, Northwest Peoples: Readings in Environmental History **173-87**.

Maruoka, K. R., and J. K. Agee. 1994. Fire histories: overview of methods and applications. U.S. Department of Agriculture, Forest Service, Blue Mountains Natural Resources Institute, La Grande, OR.

Matthews, P. 2014. personal communication.*in* B. M. R. S. IDT, editor.

Matthews, R. F. 2000. Calamagrostis rubescens. Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, http://www.fs.fed.us/database/feis/.

McIver, J., K. Erickson, and A. Youngblood. 2012. Principal short-term findings of the National Fire and Fire Surrogate study. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

McKenzie, D., Z. e. Gedalof, D. L. Peterson, and P. Mote. 2004. Climatic change, wildfire, and conservation. Conservation Biology **18**:890-902.

Mech, L. D., S. H. Fritts, G. L. Radde, and W. J. Paul. 1988. Wolf distribution and road density in Minnesota. Wildlife Society Bulletin **16**:85-87.

Melillo, J. M., T. C. Richmond, and G. W. Yohe. 2014. Climate Change Impacts in the United States: The Third National Climate Assessment Page 841 *in* U. S. G. C. R. Program, editor.

Mellen-McLean, K., B. G. Marcot, J. L. Ohmann, K. Waddell, S. A. Livingston, E. A. Willhite, B. B. Hostetler, C. Ogden, and T. Dreisbach. 2012. DecAID, the decayed wood advisor for managing snags, partially dead trees, and down wood for biodiversity in forests of Washington and Oregon. Version 2.20. USDA Forest Service, Pacific Northwest Region and Pacific Northwest Research Station; USDI Fish and Wildlife Service, Oregon State Office, Portland, Oregon.

Mercer, D. E., J. M. Pye, J. P. Prestemon, D. T. Butry, and T. P. Holmes. 2000. Economic Effects of Catastrophic Wildfires: Assessing the Effectiveness of Fuel Reduction Programs for Reducing the Economic Impacts of Catastrophic Forest Fire Events.

Merriam, K. E., J. E. KEELEY, and J. L. BEYERS. 2006. Fuel breaks affect non-native species abundance in Californian plant communities. Ecological Applications **16**:515–527.

Miller, J. C., and P. C. Hammond. 2007. Butterflies and moths of Pacific Northwest forests and woodlands: rare, endangered, and management-sensitive species. Page 234 p. Forest Health Technology Enterprise Team, U.S. Department of Agriculture, Forest Service.

Miller, S. G., R. L. Knight, and K. M. Clinton. 1998. Influence of Recreational Trails on Breeding Bird Communities. Ecological Applications **8**:162-169.

Minnesota IMPLAN Group, I. 2014. IMpacts for PLANning (IMPLAN).

Mladenoff, D. J., T. A. Sickley, and A. P. Wydeven. 1999. Predicting gray wolf landscape recolonizaiton: logistic regression models vs. new field data. Ecological Applications **9**:37-44.

Morgan, P., G. H. Aplet, J. B. Haufler, H. C. Humphries, M. M. Moore, and W. D. Wilson. 1994. Historical range of variability: a useful tool for evaluating ecosystem change. Journal of Sustainable Forestry **2**:87-111.

Mote, P. W. 2003. Trends in temperature and precipitation in the Pacific Northwest during the twentieth century. Northwest Science **77**:271-282.

Munger, T. T. 1917. Western yellow pine in Oregon. U.S. Department of Agriculture, Washington, DC.

Murray, M. 2001. Habitat Prediction Mapping for Three Rare Plants on the Wallowa Whitman National Forest: Mirabilis macfarlanei, Silene spaldingii, Spiranthes diluvialis. Challenge Cost-Share Agreement No. 00-CS-11061600-28, Oregon Biodiversity Information Center (formerly Oregon Natural Heritage Program), Portland, OR.

National Oceanic and Atmospheric Administration. 2014. Temperature and precipitation data for the Joseph, Oregon weather station National Climatic Data Center, Asheville, North Carolina.

NatureServe. 2012. NatureServe Explorer: an online encyclopedia of life [web application]; http://www.natureserve.org/explorer. NatureServe, Arlington, Virginia.

Naylor, L. M., M. J. Wisdom, and R. G. Anthony. 2009. Behavioral responses of North American elk to recreational activity. The Journal of Wildlife Management **73**:328-338.

Neary, D. G., K. C. Ryan, and L. F. DeBano, eds. 2005. Wildland fire in ecosystems: effects of fire on soils and water. Page 250 p. *in* R. M. R. S. USDA Forest Service, editor., Ogend, UT.

Nez Perce Tribe. 2013. Nez Perce Tribe Department of Fisheries Resources Management Department Management Plan · 2013-2028. Nez Perce Tribe.

Nielson, M., K. Lohman, and J. Sullivan. 2001. Phylogeography of the tailed frog (*Ascaphus truei*): implications for the biogeography of the Pacific Northwest. Evolution **55**:147-160.

NRAC. 2014. Lower Joseph Creek Watershed Assessment.*in* L. J. C. W. C. P. G. o. t. W. C. N. R. A. Council, editor.

O'Hara, K. L., P. A. Latham, P. Hessburg, and B. G. Smith. 1996. A structural classification for inland northwest forest vegetation. Western Journal of Applied Forestry **11**:97-102.

Ohmann, J. L., and M. J. Gregory. 2002. Predictive mapping of forest composition and structure with direct gradient analysis and nearest neighbor imputation in coastal Oregon. Ecological Applications **17**:18-33.

Oliver, C. D., and B. C. Larson. 1996. Forest stand dynamics. Update edition. John Wiley & Sons, Inc., New York.

Olson, D. L. 2000. Fire in riparian zones: a comparison of historical fire occurrence in riparian and upslope forests in the Blue Mountains and southern Cascades of Oregon. Master of Science. University of Washington, Seattle, WA.

ORBIC, O. B. I. C. 2013. Rare, Threatened, and Endangered Species of Oregon. Institute for Natural Resources, Portland State University, Portland, OR.

Oregon, S. o. 2014. Property Taxes: Timber Taxes, Forest Products Harvest Tax (ORS 321.005-185).

Papouchis, C. M., F. J. Singer, and W. B. Sloan. 2001. Responses of Desert Bighorn Sheep to Increased Human Recreation. The Journal of Wildlife Management **65**:573-582.

Parker, T. J., K. M. Clancy, and R. L. Mathiasen. 2006. Interactions among fire, insects and pathogens in coniferous forests of the interior western United States and Canada. Agricultural and Forest Entomology **8**:167–189.

Pauchard, A., and P. B. Alaback. 2006. Edge type defines alien plant species invasions along Pinus contorta burned, highway and clearcut forest edges. Forest Ecology and Management **223**:327-335.

Petersen, S. L., T. K. Stringham, and B. A. Roundy. 2009. A Process-based Application of State-and-Transition Models: A Case Study of Western Juniper (Juniperus occidentalis) Encroachment. Rangeland Ecology and Management **62**:186-192.

Peterson, D. W., B. K. Kerns, and E. K. Dodson. 2014. Climate Change Effects on Vegetation in the Pacific Northwest: A Review and Synthesis of the Scientific Literature and Simulation Model Projections. Page 198 pp. *in* U. F. Service and P. R. Station, editors.

Philipek, F. M. 1985. Over-Snow Logging: Analysis of impacts to Lithic Scatters. Studies in Cultural Resources Management No. 5. Page 41 *in* U. F. S. R. 6, editor., Portland, OR.

Piaggio, A., and R. E. Sherwin. 2005. Species accounts *Corynorhinus townsendii* Townsend's big-eared bat. Page 5 p. Developed for 2005 Portland Bennial Meeting of the Western Bat Working Group. Western Bat Working Group, Rapid City, SD.

Pierson, E. D., M. C. Wackenhut, J. S. Altenbach, P. Bradley, P. Call, D. L. Genter, C. E. Harris, B. L. Keller, B. Lengus, L. Lewis, B. Luce, K. W. Navo, J. M. Perkins, S. Smith, and L. Welch. 1999. Species conservation assessment and strategy for Townsend's big-eared bat (*Corynorhinus townsendii townsendii* and *Corynorhinus townsendii pallescens*). Page 73 p. Idaho Department of Fish and Game, Boise, Idaho.

Pilliod, D. S., E. L. Bull, J. L. Hayes, and B. C. Wales. 2006. Wildlife and invertebrate response to fuel reduction treatments in dry coniferous forests of the Western United States: a synthesis.

Pilliod, D. S., C. R. Peterson, and P. I. Ritson. 2002. Seasonal migration of Columbia spotted frogs (*Rana luteiventris*) among complementary resources in a high mountain basin. Canadian Journal of Zoology **80**:1849-1862.

Powell, D. C. 2012. Range of variation recommendations for dry, moist, and cold forests. Page 42 *in* F. S. US Department of Agricuture, Pacific Northwest Region, editor. Umatilla National Forest, Pendleton, Oregon.

Powell, D. C., J. Johnson, Charles G., E. A. Crowe, A. Wells, and D. K. Swanson. 2007. Potential Vegetation Hierarchy for the Blue Mountains Section of Northeastern Oregon, Southeastern Washington, and West-Central Idaho. Page 96 *in* U. F. Service and P. N. R. Station, editors.

Provencher, L., K. Blankenship, J. Smith, J. Campbell, and M. Polly. 2009. Comparing Locally Derived and Landfire Geo-Layers in the Great Basin, USA. Fire Ecology **5**:126-132.

Quality, O. D. o. E. 2010. Lower Grande Ronde Subbasins TMDLS. Oregon Department of Environmental Quality, Portland, Oregon.

Quigley, T. M., R. W. Haynes, and R. T. Graham. 1996. Integrated scientific assessment for ecosystem management in the interior Columbia basin and portions of the Klamath and Great basins. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

Ramankutty, N. and J.A. Foley. 2010. ISLSCP II Potential Natural Vegetation Cover. In Hall, Forest G., G. Collatz, B. Meeson, S. Los, E. Brown de Colstoun, and D. Landis (eds.). ISLSCP Initiative II Collection. Data set. Available on-line [http://daac.ornl.gov/] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. doi:10.3334/ORNLDAAC/961

Ramos- Scharrón, C. E., and L.H. MacDonald. 2007. Measurement and prediction of natural and anthropogenic sediment sources, St. John, U.S. Virgin Islands. Catena **71**:250-266.

Raphael, M. G. 1981. Interspecific differences in nesting habitat of sympatric woodpeckers and nuthatches. Pages 142-151 *in* D. E. Capen, editor. The use of multivariate statistics in studies of wildlfie habitat U.S.D.A. for. Serv., Rogky Mtn. Forest and Range Exp. Stn.

Raphael, M. G., M. L. Morrison, and M. P. Yoder-Williams. 1987. Breeding bird populations during twenty-five years of postfire succession in the Sierra Nevada. The Condor **89**:614-626.

Raphael, M. G., and M. White. 1984. Use of snags by cavity-nesting birds in the Sierra Nevada. Wildlife Monographs:3-66.

Reaser, J. K., and D. S. Pilliod. 2005. *Rana luteiventris*, Columbia spotted frog. Pages 559–563 *in* M. J. Lannoo, editor. Amphibian declines: the conservation status of United States species. University of California Press, Berkeley, CA.

Reeves, D., D. Page-Dumroese, and M. Coleman. 2011. Detrimental soil disturbance associated with timber harvest systems on National Forests in the Northern Region. Page 12. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

Reid, L. M., and T. Dunne. 1984. Sediment production from forest road surfaces. Water Resources Research **20**:1753-1761.

Roath, L. R., and W. C. Krueger. 1982. Cattle Grazing and Behavior on a Forested Range. Journal of Range Management **35**:332-338.

Rollins, M. G. 2009. LANDFIRE: a nationally consistent vegetation, wildland fire, and fuel assessment. International Journal of Wildland Fire **18**:235-249.

Rowland, M. M., M. J. Wisdom, B. K. Johnson, and J. G. Kie. 2000. Elk distribution and modeling in relation to roads. The Journal of Wildlife Management **64**:672-684.

Rowland, M. M., M. J. Wisdom, B. K. Johnson, and M. A. Penninger. 2005. Effects of roads on elk: implications for management in forested ecosystems. Pages 42-52. Alliance Communications Group, Lawrence, Kansas, USA.

Saab, V. A., and J. G. Dudley. 1998. Responses of cavity-nesting birds to stand-replacement fire and salvage logging in ponderosa pine/Douglas-fir forests of southwestern Idaho. Page 17 pages. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, UT.

Saab, V. A., and K. T. Vierling. 2001. Reproductive success of Lewis's woodpecker in burned pine and cottonwood riparian forests. The Condor **103**:491-501.

Samson, F. B., F. L. Knopf, C. W. McCarthy, B. R. Noon, W. R. Ostlie, S. M. Rinehart, S. Larson, G. E. Plumb, G. L. Schenbeck, D. N. Svingen, and T. W. Byer. 2003. Planning for population viability on Northern Great Plains National Grasslands. Wildlife Society Bulletin **31**:1-13.

Sauer, J. R., J. E. Hines, J. E. Fallon, K. L. Pardieck, D. J. Ziolkowski Jr., and W. A. Link. 2011. The North American Breeding Bird Survey, Results and Analysis 1966 - 2010. Version 12.07.2011 USGS Patuxent Wildlife Research Center, Laurel, MD.

Schmidt, K. M., J. P. Menakis, C. C. Hardy, W. J. Hann, and D. L. Bunnell. 2002. Development of coarse-scale spatial data for wildland fire and fuel management. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

Schmitt, C. L., and D. C. Powell. 2005. Rating Forest Stands for Insect and Disease Susceptibility: A Simplified Approach. Page 22 pp. *in* U. F. Service, editor., La Grande, OR.

Schmitt, C. L., and L. H. Spiegel. 2008. Johnson's hairstreak butterfly and dwarf mistletoe backgrounder. Page 8 p. unpublished memo to Forest Supervisors. USDA Forest Service Blue Mountains Pest Management Service Center, La Grande, OR.

Scott, D. W., and C. L. Schmitt. 1996. Analysis of insect and disease risks for the Umatilla/Meacham watershed; Umatilla NF. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Blue Mountain Pest Management Zone, Wallowa-Whitman National Forest, Baker City, OR.

seq., U. S. C. a. e. 1966. National Historic Preservation Act, Section 106.*in* GPO, editor.

Service, U. F. 2013. 1500/2360 Programmatic Agreement Among the USDA Forest Service Region 6, the Advisory Council on Historic Preservation and the Oregon State Historic Preservation Office. Page 2 pp. *in* U. F. Service, editor.

Shannon, C. E. 1948. A mathematical theory of communication. The Bell System Technical Journal, 27, 379–423 and 623–656.

Sherwin, R. E., D. Stricklan, and D. S. Rogers. 2000. Roosting Affinities of Townsend's Big-Eared Bat (Corynorhinus townsendii) in Northern Utah. Journal of Mammalogy **81**:939-947.

Siskiyou National Forest. 1997. Soil Disturbances from Helicopter Yarding in the Upper Pistol Timber Sale. Southwestern Oregon.

Skagen, S. K., R. L. Knight, and H. O. Gordon. 1991. Human disturbance of an avian scavenging guild. Ecological Applications **1**:215-225.

Sondenaa, A., and S. Kozusko. 2003. Precious lands wildlife area final mangement plan. PROJECT ID #199608000, Nez Perce Tribe, Lapwai, Idaho.

Stephens, S. L., J. J. Moghaddas, C. Edminster, C. E. Fiedler, S. Haase, M. Harrington, J. E. Keeley, E. E. Knapp, J. D. McIver, K. Metlen, C. N. Skinner, and A. Youngblood. 2009. Fire treatment effects on vegetation structure, fuels, and potential fire severity in western U.S. forests. Ecological Applications **19**:305-320.

Stine, P., P. Hessburg, T. Spies, M. Kramer, C. J. Fettig, A. Hansen, J. Lehmkuhl, K. O'Hara, K. Polivka, P. Singleton, S. Charnley, A. Merschel, and R. White. 2014. The ecology and management of moist mixed-conifer forests in eastern Oregon and Washington: a synthesis of the relevant biophysical

science and implications for future land management. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

Stringham, T. K., W. C. Krueger, and P. L. Shaver. 2003. State and transition modeling: An ecological process approach. Journal of Range Management **56**:106 -113.

Swetnam, T. W., B. E. Wickman, H. G. Paul, and C. Baisan. 1995. Historical patterns of western spruce budworm and Douglas-fir tussock moth outbreaks in the northern Blue Mountains, Oregon, since A.D. 1700. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

Thomas, J. W., D. A. Leckenby, M. Henjum, R. J. Pedersen, and L. D. Bryant. 1988. Habitat-effectiveness index for elk on Blue Mountain Winter Ranges.

Tobalske, B. W. 1997. Lewis's woodpecker (*Melanerpes lewis*), The Birds of North America Online (A. Poole, Ed.). Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/284. Cornell Lab of Ornithology, Ithaca, NY.

Toupin, R. L., G. Filip, T. Erkert, and M. Barger. 2008. Field guide for danger tree identification and response. USDA Forest Service and USDI Bureau of Land Management, Portland, Oregon.

Traylor, D., L. Hubbell, B. Fiedler, and N. Wood. 1990. The 1977 La Mesa Fire Study: an investigation of fire and fire suppression impact on cultural resources in Bandelier National Monument. U.S. Department of the Interior, National Park Service, Division of Anthropology, Santa Fe, NM.

Tribe, N. P. 2013. Management Plan 2013-2028. Page 69 *in* D. o. F. R. Management, editor.

U.S. Department of Agriculture, F. S., and F. a. W. S. U.S. Department of Interior. 2006. Revised lynx conservation agreement. Letter to Forest Supervisors: Okanogan-Wenatchee, Colville, Umatilla, Malheur, and Wallowa-Whitman National Forests, On file with: Pacific Northwest Research Station, 1220 SW 3rd Ave., Portland, Oregon 97204.

U.S. Department of Agriculture, N. R. C. S. 2014. Soil Survey Geographic (SSURGO) Database for Wallowa-Whitman National Forest, Oregon. U.S. Department of Agriculture, Natural Resources Conservation Service, Fort Worth, Texas.

US Department of Agriculture, F. S. 1995. Inland native fish strategy environmental assessment decision notice and finding of no significant impact: Interim strategies for managing fish-producing watersheds in eastern Oregon and Washington, Idaho, western Montana, and portions of Nevada [INFISH].*in* N. Intermountain, and Pacific Northwest Regions., editor.

US Geological Survey. 2014. USGS Current Water Data for Oregon, Daily Streamflow Conditions.

USDA Forest Service. 1974. The Visual Management System.*in* N. F. L. M. N. Handbooks, editor. U.S. Department of Agriculture, U.S. Government Printing Office, Washington D.C.

USDA Forest Service. 1990. Land and Resource Management Plan, Final Environmental Impact Statement and Record of Decision, Wallowa-Whitman National Forest. USDA Forest Service Pacific Northwest Region, Baker City, Oregon.

USDA Forest Service. 1995. Scenery Management System, Landscape Aesthetics, A Handbook for Scenery Management. U.S. Department of Agriculture, Washington D.C.

USDA Forest Service. 1999. Roads Analysis: Informing Decisions About Managing the National Forest Transportation System.

USDA Forest Service. 2003. Hells Canyon National Recreation Area Comprehensive Management Plan. Page 88 *in* P. R. USDA Forest Service, Wallowa-Whitman National Forest, editor. USDA Forest Service, PNW Region, Portland, Oregon.

USDA Forest Service. 2005. Pacific Northwest Region invasive plant program, preventing and managing invasive plants, record of decision. Page 64 *in* P. N. R. USDA Forest Service, editor. USDA Forest Service, Portland, Oregon.

USDA Forest Service. 2009. Wallowa-Whitman National Forest Travel Management Plan: Draft Environmental Impact Statement. Baker City, OR.

USDA Forest Service. 2011a. Watershed condition classification technical guide. Page 49 *in* F. S. US Department of Agriculture, editor. USDA Forest Service, Washington D.C.

USDA Forest Service. 2011b. Watershed Condition Framework: A framework for assessing and tracking changes to watershed condition. Page 34. USDA Forest Service, Washington Office, Washington, D.C.

USDA Forest Service. 2013. Interim Directive 2020-2013-1 Ecological Restoration and Resilience. Page 12 *in* U. D. O. Agriculture, editor. Forest Service, Washington D.C.

USDA Forest Service. 2014a. 2070 Invasive, Non-Native species Restricted for Use during Revegetation and Restoration. Page 2 pp. *in* U. F. S. R. 1, editor., Missoula, MT.

USDA Forest Service. 2014b. Blue Mountains National Forests proposed Revised Land Management Plan (draft). Page 165 pp. *in* U. a. W.-W. N. F. Malheur, editor.

USDA Forest Service. 2014c. Draft Environmental Impact Statement Proposed revised land management plans for the Malheur, Umatilla, and Wallowa-Whitman National Forests. USDA Forest Service, Pacific Northwest Region, Baker City, OR.

USDA Forest Service. 2015a. USDA Forest Service Strategic Plan: FY2015-2020. Page 60 pp. Forest Service, Washington D.C. June 2015.

USDA Forest Service. 2015b. Wallowa-Whitman National Forest Invasive Plants Treatment Project, Draft Supplemental Environmental Impact Statement.*in* U. F. Service, editor.

USDA Forest Service, and USDI Bureau of Land Management. 1995. Interim strategies for managing anadromous fish-producing watersheds in eastern Oregon and Washington, Idaho, and portions of California (PACFISH).

USDI. 1986. Recovery Plan for the Pacific bald eagle. Page 160 p. U.S. Department of the Interior, Fish and Wildlife Service, Portland, OR.

Van Pelt, R. 2008. Identifying old trees and forests in eastern Washington. Page 166p. Washington State Department of Natural Resources, Olympia, WA.

Vavra, M., M. A. Hemstrom, and M. J. Wisdom. 2007. Modeling the effects of herbivores on the abundance of forest overstory states using a simple state-transition approach. Landscape and Urban Planning **80**:212-222.

Wales, B. C., K. Mellen-McClean, W. L. Gaines, and L. Suring. 2011. Focal species assessment of current condition and the proposed action (alternative B) for the Blue Mountains forest plan revision-DRAFT. Page?? Unpublished paper on file at: U.S. Department of Agriculture Forest Service, Wallowa-Whitman National Forest, Blue Mountain Forest Plan Revision Team, Baker City, OR.

Wales, B. C., L. H. Suring, and M. A. Hemstrom. 2007. Modeling potential outcomes of fire and fuel management scenarios on the structure of forested habitats in northeast Oregon, USA. Landscape and Urban Planning **80**:223-236.

Wallowa County. 2006. Wallowa County community wildfire protection plan. Page 88. Wallowa County, Wallowa County, Oregon.

Wallowa County. 2014. Draft Lower Joseph Creek Watershed Assessment. Wallowa County, Oregon.

Wallowa County, and Nez Perce Tribe. 1999. Wallowa County- Nez Perce tribe salmon habitat recovery plan with multi-species habitat stragey. Wallowa County, OR.

Warren, A. D. 2005. Butterflies of Oregon: their taxonomy, distribution, and biology. Page 408 pp. Lepidoptera of North America 6. C.P. Gillette Museum. Colorado State University, Fort Collins, CO.

Weller, T. J. 2005. Species accounts *Myotis thysanodes* fringed myotis. Page 3 p. Developed for 2005 Portland Bennial Meeting of the Western Bat Working Group. Western Bat Working Group, Rapid CIty, SD.

Westerling, A. L., H. G. Hidalgo, D. R. Cayan, and T. W. Swetnam. 2006. Warming and earlier spring increase western U.S. forest wildfire activity. Science **313**:940-943.

Western Forestry Leadership Coalition (WFLC). 2009. The True Cost of Wildfire in the Western US. Lakewood, CO.

Wightman, C. S., V. A. Saab, C. Forristal, K. Mellen-McLean, and A. Markus. 2010. White-headed woodpecker nesting ecology after wildfire. Journal of Wildlife Management **74**:1098-1106.

Wisdom, M. J., and L. J. Bate. 2008. Snag density varies with intensity of timber harvest and human access. Forest Ecology and Management **255**:2085-2093.

Wisdom, M. J., R. S. Holthausen, B. C. Wales, C. D. Hargis, V. A. Saab, D. C. Lee, W. J. Hann, T. D. Rich, M. M. Rowland, W. J. Murphy, and M. R. Eames. 2000. Source habitats for terrestrial vertebrates of focus in the interior Columbia basin: broadscale trends and management implications. Volume 1—Overview. Page 156 pp. General Technical Report PNW-GTR-485. U.S. Department of Agriculture, Forest Service, pacific Northwest Research Station, Portland, Oregon.

Witmer, G. W., S. K. Martin, and R. D. Sayler. 1998. Forest carnivore conservation and management in the interior Columbia basin: issues and environmental correlates. Page 51 pages. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

Wright, C. S., and J. K. Agee. 2004. Fire and vegetation history in the eastern Cascade Mountains, Washington. Ecological Applications **14**:443-459.

Xiao Tana, S. X. C., Richard Kabzemsb. 2005. Effects of soil compaction and forest floor removal on soil microbial properties and N transformations in a boreal forest long-term soil productivity study. Forest Ecology and Management **217**:158-170.

Young, J. A. 1965. Forage production and utilization in a mixed conifer forest in the wallowa Mountains foothills. Oregon State University.

Zhang, J., R. F. Powers, and C. N. Skinner. 2010. To Manage or Not to Manage: The Role of Silviculture in Sequestering Carbon in the Specter of Climate Change.*in* U. F. Service, editor.

Zhou, X., and M. A. Hemstrom. 2010. Timber volume and aboveground live tree biomass estimations for landscape analyses in the Pacific Northwest.*in* P. N. R. S. USDA Forest Service, editor., Portland, OR.

Zimmerman, G.T. and L.F. Neuenschwander. 1984. Livestock grazing influences on community structure, fire intensity, and fire frequency within the Douglas-fir/ninebark habitat type. Journal of Range Management 37(2):104-110.

Glossary

A

active management: Planned, intentional actions in an area that are specifically designed to obtain a desired objective or result.

active restoration: Refer to restoration.

administrative site: Areas such as work centers, fire lookouts, permitted ranch headquarters, seed orchards, communication sites, utility corridors, developed campgrounds, and other areas that are occupied or used by the Forest Service during the administration of work associated with national forest lands.

air pollutant: Any substance in air that could, if in high enough concentration, harm humans, animals, vegetation, or material. Air pollutants may include almost any natural or artificial matter capable of being airborne, in the form of solid particles, liquid droplets, gases, or a combination of these.

air quality: The composition of air with respect to quantities of pollution therein, used most frequently in connection with standards of maximum acceptable pollutant concentrations.

allotment (grazing): Area designated for the use of a certain number and kind of livestock grazing for a prescribed period.

allotment management plan (AMP): A document that specifies the actions to be taken to manage and protect the rangeland resources and reach a given set of objectives.

anadromous fish: Fish that hatch in fresh water, migrate to the ocean, mature there, and return to fresh water to reproduce; for example, salmon and steelhead.

animal unit: One mature cow of approximately 1,000 pounds, either dry or with calf up to 6 months of age, or the equivalent (one horse, five domestic sheep). This concept is based on a standardized amount of forage consumed.

animal unit month (AUM): The amount of forage required by one mature (1,000 lb.) cow or its equivalent for one month (based upon average forage consumption of 26 lb. of dry matter per day).

anthropogenic: Caused or produced through the agency of man; the scientific study of the origin of man.

aquatic: Pertaining to water.

aquatic ecosystem: Waters that serve as habitat for interrelated and interacting communities and populations of plants and animals. The stream channel, lake or estuary bed, water, biotic communities and the habitat features that occur therein.

assessment: The collection, integration, examination, and evaluation of information and values.

B

basal area: The cross-sectional area of the trunk of a tree or stand of trees at breast height (4.5 feet).

basalt: A finely or fine grained, dark, dense volcanic rock.

basin (river): (1) In general, the area of land that drains water, sediment, and dissolved materials to a common point along a stream channel. River basins are composed of large river systems; (2) the term refers to the equivalent of a 3rd-field hydrologic unit code, an area of about nine million acres, such as the Snake River Basin.

benches: Mid-elevation flat or gently sloping sites. Grazing and homesteading/ranching activities were concentrated in these areas, which were also used by American Indians for pasturing livestock. Benches from 2,000 to 4,500 feet generally have potential to support the bunchgrass associations described for the lower and mid-position slopes. Cheatgrass brome, Kentucky bluegrass, and an assortment of annual and perennial forbs (including some noxious weeds) dominate much of the benchland, some of which was severely disturbed by early farming and ranching activities.

beneficial uses: Any of the various uses which may be made of the water, including, but not limited to, domestic water supplies, fisheries and other aquatic life, industrial water supplies, agricultural water supplies, navigation, recreation in and on the water, wildlife habitat, and aesthetics.

best management practices (BMPs): Practice or set of practices that enable a planned activity to occur while still protecting the resource managed, normally implemented and applied during the activity rather than after the activity.

best management practices (BMPs) (Watershed): A practice or a combination of practices, that is determined by the state (or designated area-wide planning agency) after problem assessment, examination of alternative practices, and appropriate public participation to be the most effective, practicable (including technological, economic, and institutional considerations) means of preventing, or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals.

big game: Those species of large mammals normally managed as a sport hunting resource. Generally includes; elk, moose, white-tailed deer, mule deer, mountain goat, bighorn sheep, black bear and mountain lion.

biological diversity (biodiversity): The variety and variability among living organisms and the ecological complexes in which they occur.

biological soil crust: Thin crust of living organisms on or just below the soil surface composed of dense, low-growing community of various combinations of algae, mosses, liverworts, cyanobacteria (blue-green algae), micro fungi, bacteria, and lichens; and provide important components of grassland, shrub-steppe, and subalpine habitats. Also referred to as cryptogrammatic or microbiotic crust.

biophysical: The combination or grouping of biological and physical components in an ecosystem.

biotic: Living.

biomass: Dry weight of organic matter in plants and animals in an ecosystem, both above and below ground.

broad scale: A large, regional area, such as an entire river basin and typically a multi-state area.

browse: That part of leaf and twig growth of shrubs, woody vines, and trees available for animal consumption.

Bureau of Land Management (BLM): An agency within the U.S. Department of the Interior with land management responsibility for the public domain lands.

C

candidate species: Plant and animal species that may be proposed for listing as endangered or threatened in the future by the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NFMS); these species have no legal protection under the Endangered Species Act (ESA).

canopy: In a forest, the branches from the uppermost layer of trees; on rangeland, the vertical projection downward of the aerial portion of vegetation.

canopy cover: The proportion of the forest floor covered by the vertical projection of the tree crowns.

capability: The potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at a given level of management intensity. Capability depends upon current conditions and site conditions such as climate, slope, landform, soils, and geology, as well as the application of management practices, such as silviculture or protection from fire, insects, and disease.

carrying capacity: The number of animals or plants that can be maintained over a specific period of time on a specified amount of land without damage to either the organisms or the habitat.

cavity: The hollow excavated in a tree that is used by birds or mammals for roosting and/or reproduction.

ceded lands: Lands that American Indian tribes ceded to the United States by treaty in exchange for reservation of specific land and resource rights, annuities, and other promises in the treaties.

channel (stream): The deepest part of a stream or riverbed through which the main current of water flows.

channel morphology: The dimension (width, depth), shape and pattern (sinuous, meandering, straight) of a stream channel.

class I airshed: Under the Clean Air Act amendments, all international parks, national parks larger than 6,000 acres, and national wilderness areas larger than 5,000 acres which existed on August 7, 1977. This class provides the most protection to pristine lands by severely limiting the amount of additional air pollution that can be added to these areas.

climax: The final or mature seral stage in secondary plant succession that persists for an indefinite period of time if no major disturbances occur.

closed canopy: Greater than or equal to 60 percent canopy cover within the moist and cold upland forest potential vegetation groups; greater than or equal to 40 percent canopy cover within the dry upland forest potential vegetation group.

coarse woody material or debris: Pieces of woody material derived from tree limbs, boles, and roots in various stages of decay, having a diameter of at least three inches.

Code of Federal Regulations (CFR): A codification of the general and permanent rules published in the Federal Register (FR) by the executive departments and agencies of the federal government.

cold forest: High elevation forests dominated by subalpine fir, whitebark pine, spruce, and sometimes lodgepole pine.

collaboration: Working together; to cooperate willingly with an agency or instrumentality with which one is not immediately connected.

compaction: Making soil hard and dense and decreasing its ability to support vegetation because the soil can hold less water and air and because roots have trouble penetrating the soil.

compatible: Capable of existing together in harmony.

comprehensive management plan (CMP): The document that establishes the array, levels, and manner of resource uses within the Hells Canyon National Recreation Area on the Wallowa-Whitman National Forest. It was incorporated in 2003 as a part of the 1990 Land and Resource Management Plan.

connectivity: The arrangement of habitats that allows organisms and ecological processes to move across the landscape; patches of similar habitats are either close together or linked by corridors of appropriate vegetation. Connectivity is the opposite of fragmentation.

conservation strategy or agreement: Plans to remove or reduce threats to candidate and sensitive species of plants and animals so that a listing as threatened or endangered is unnecessary.

consultation: (1) An active, affirmative process that (a) identifies issues and seeks input from appropriate American Indian governments, community groups, and individuals; and (b) considers their interests as a necessary and integral part of the Forest Service's decision-making process; (2) the federal government has a legal obligation to consult with American Indian tribes. This legal obligation is based in such laws as the Native American Graves Protection and Repatriation Act, the American Indian Religious Freedom Act, and numerous other executive orders and statutes. This legal responsibility is, through consultation, to consider Indian interests and account for those interests in the decision; (3) the term also refers to a requirement under Section 7 of the Endangered Species Act (ESA) for federal agencies to consult with the USFWS and/or NOAA-Fisheries with regard to federal actions that may affect listed threatened and endangered species or critical habitat.

corridor: A tract of land forming a passageway. Can refer to areas of wildlife movement, boundaries along rivers, or the present or future location of transportation or utility rights-of-way within its boundaries.

Council on Environmental Quality (CEQ): An advisory council to the President established by the National Environmental Policy Act (NEPA) of 1969. The council reviews federal programs for their effects on the environment, conducts environmental studies, and advises the President on environmental matters.

cover: (1) Trees, shrubs, rocks, or other landscape features that allow an animal to conceal itself partly or fully for protection from predators, or to ameliorate conditions of weather, or in which to reproduce; (2) the area of ground covered by plants of one or more species.

cover type: A vegetation classification depicting a genus, species, group of species, or life form of tree, shrub, grass, or sedge of an area.

crown: The part of a tree containing live foliage; treetops.

culture: The ideals, values, and beliefs that members of a society share to interpret experience and generate behavior that is reflected by their work and thought (Haviland 1999).

cultural resources: An object or definite location of human activity, occupation, or use identifiable through field survey, historical documentation, or oral evidence. Cultural resources are prehistoric, historic, archaeological, or architectural sites, structures, places, or objects and traditional cultural properties. Cultural resources include the entire spectrum of resources for which the Heritage Program is responsible, from artifacts to cultural landscapes, without regard to eligibility for listing on the National Register of Historic Places

cumulative effects or impacts: Cumulative effects or impacts are the impacts on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Effects and impact are synonymous (40 CFR 1508.7).

cunit (one hundred cubit feet or CCF): 1 CCF is equal to 100 cubic feet of true volume. CCF to MBF (thousand board feet) conversions varies by log diameter. For example, larger diameter logs will generally yield more MBF volume per CCF than smaller logs. CCF to Ton conversions vary by species, moisture content, site index, and other factors.

D

decommission (road): Permanently closing a road to vehicular use and left in a hydrological maintenance free condition. Decommissioning would include activities such as water barring, out sloping, recontouring, decompaction of road surface, removal of drainage structures, and road barricades as needed. Decommissioning removes the road from the transportation system data base and is no longer used to calculate maintenance costs for the transporation system.

deferred maintenance: Maintenance that was not performed when it should have been or when it was scheduled and which, therefore, was put off or delayed for a future period. When allowed to accumulate without limits or consideration of useful life, deferred maintenance leads to deterioration of performance, increased costs to repair, and decrease in asset value. Deferred maintenance needs may be categorized as critical or noncritical at any point in time. Continued deferral of noncritical maintenance will normally result in an increase in critical deferred maintenance. Code compliance (such as safety, ADA, OSHA, or environmental), plan direction, best management practices, biological evaluations other regulatory or executive order compliance requirements, or applicable standards not met on schedule are considered deferred maintenance.

departure: The difference between an existing condition and the desired condition.

density (stand): The number of trees growing in a given area, usually expressed in terms of trees per acre.

design criteria: Provides the parameters, including guidelines, for how future site-specific activities can occur within the context of the plan.

designated critical habitat: Specific areas within the geographical area occupied by a species at the time of listing under Endangered Species Act that contain physical or biological features essential to the conservation of the species.

desired condition: A portrayal of the land or resource condition that is expected to result if goals and objectives are fully achieved.

developed recreation: Recreation that requires facilities that in turn result in concentrated use of an area; for example, a campground. Examples of developed recreation areas are campgrounds and ski areas; facilities in these areas might include roads, parking lots, picnic tables, toilets, drinking water, ski lifts, and buildings.

developed site: Facility provided for developed recreation use. Refer to facilities.

diameter at breast height (d.b.h.): Tree diameter measured at 4.5 feet from the ground.

direct effects: Impacts on the environment caused by the action and occur at the same time and place.

disease: A harmful deviation from normal functioning of physiological processes, usually pathogenic or abiotic in origin.

disjunct: Populations that are separated geographically from the main distribution of a species. Many plants with disjunct populations are biologically unique because they are not found again for dozens to over one hundred miles. Disjunct populations are thus rare in this portion of their distribution.

dispersed (recreation): Recreation that does not occur in a developed recreation site; for example, hunting or backpacking.

dispersed campsites: Primitive sites typically used for overnight, dispersed recreation. Usually includes a hardened area around a fire pit, a barren area, and/or user-constructed facility.

disturbance: Events that alter the structure, composition, or function of terrestrial or aquatic habitats. Natural disturbances include, among others, drought, floods, wind, fires, wildlife grazing, and insects and diseases. Human–caused disturbances include, among others, actions such as timber harvest, livestock grazing, roads, and the introduction of exotic species.

disturbance process: Events that alter the structure, function, or composition of aquatic or terrestrial habitats.

disturbance regime: Natural pattern of periodic disturbances, such as fire or flood, followed by a period of recovery from the disturbance such as growth of a forest after fire.

diversity: The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan.

down woody material: A tree or part of a tree that is dead and laying on the ground.

draft environmental impact statement (DEIS): The draft statement of predicted environmental effects that is required for major federal actions and released to the public and other agencies for comment and review.

dry forest: Low elevation forest dominated by ponderosa pine and sometimes Douglas-fir or grand fir.

E

early seral: Refer to seral stages.

early spring: Early spring is defined as that period when the perennial cool–season forage plants initiate growth and begin shoot elongation. It extends through the period of maximum carbohydrate use and the beginning of carbohydrate storage. The end of this period is determined by soil moisture. It ends prior to the time that soil moisture is expected to become limiting to the extent that essentially full regrowth cannot be ensured.

Eastside Screens: Regional Forester's Amendment 1, Interim management direction establishing riparian, ecosystem, and wildlife standards for timber sales on NFS lands in eastern Oregon and Washington (USDA Forest Service 1994).

ecological function: Refer to ecological processes.

ecological integrity: In general, ecological integrity refers to the degree to which all ecological components and their interactions are represented and functioning; the quality of being complete; a sense of wholeness. Absolute measures of integrity do not exist. Proxies provide useful measures to estimate the integrity of major ecosystem components (forestland, rangeland, aquatic, and hydrologic). Estimating these integrity components in a relative sense for an area helps to explain current conditions and to prioritize future management. Thus, areas of high integrity would represent areas where ecological functions and processes are better represented and functioning than areas rated as low integrity.

ecological processes: The flow and cycling of energy, materials, and organisms in an ecosystem. Examples of ecosystem processes include the carbon and hydrologic cycles, terrestrial and aquatic food webs, and plant succession, among others.

ecological status: The degree of departure of current vegetation from the potential natural vegetation, or potential natural community often synonymous with seral stage.

economics: A social science concerned primarily with description, distribution, and consumption of goods and services.

economic well-being: A condition that enables people to work, provide income for their families, and generate economic wealth to local communities, the region, and the nation.

economic efficiency: Producing goods and services in areas best suited for that production based on natural biophysical advantage or an area's ability to best serve regional demands of people.

economic impacts:

direct economic impact: Effects caused directly by forest product harvest or processing or by forest uses.

indirect economic impact: Effects that occur when supporting industries sell goods or services to directly affected industries.

induced economic impact: Effects that occur when employees or owners of directly or indirectly affected industries spend their income within the economy.

economy: System of production, distribution, and consumption of economic goods.

ecosystem: A complete, interacting system of living organisms and the land and water that make up their environment; the home places of all living things, including humans.

ecosystem diversity: The variety and relative extent of ecosystem types, including their composition, structure, and processes within all or a part of an area of analysis.

ecosystem management: The use of an ecological approach to achieve multiple-use management of public lands by blending the needs of people and environmental values in such a way that lands represent diverse, healthy, productive, and sustainable ecosystems.

ecosystem function (processes): The major process of ecosystems that regulate or influence the structure, composition, and pattern. These include nutrient cycles, energy flows, trophic levels (food chains), diversity patterns in time/space development and evolution, cybernetics (control), hydrologic cycles and weathering processes.

ecosystem health: A condition where the parts and functions of an ecosystem are sustained over time and where the system's capacity for self-repair is maintained, such that goals for uses, values, and services of the ecosystem are met.

ecosystem sustainability: The ability to sustain diversity, productivity, resilience to stress, health, renewability and/or yield of desired values, resource uses, products, or services from an ecosystem, while maintaining the integrity of the ecosystem over time.

edge: An area where plant communities meet or where successional stages or vegetation conditions within the plant communities come together.

effects: Environmental changes resulting from an action. Included are direct effects, which are caused by the action and occur at the same time and place, and indirect effects, which are caused by the action and are later in time or further removed in distance, but which are still reasonably foreseeable. Indirect effects may include growth–inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including ecosystems.

Effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic quality, historic, cultural, economic, social, or healthy effects, whether direct, indirect, or cumulative. Effects may also include those resulting from actions that may have both beneficial and detrimental effects even if on balance the agency believes that the effects will be beneficial (40 CFR 1508.8, 2).

eligible wild and scenic rivers: River segments that have been identified as eligible for inclusion in the national Wild and Scenic Rivers System under the authority of the Wild and Scenic Rivers Act. The river segment must be free-flowing and it must possess one or more outstandingly remarkable scenic, recreational, geological, fish and wildlife, historical, cultural, ecological or other value.

embeddedness: The degree that larger streambed particles (boulders, rubble, or gravel) are surrounded or covered by finer particle sizes such as fine sediment (Rhodes et al. 1994).

emission: A release of air contaminants into the outdoor atmosphere.

endangered species: Species listed under the Endangered Species Act by either the U.S. Fish and Wildlife Service or the National Marine Fisheries Service. Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range.

endemic: Occurring naturally in a certain region and distribution is relatively limited to a particular locality. Endemism is the occurrence of endemic species in an area.

environmental assessment (EA): A comprehensive evaluation of actions and their predictable short– and long–term environmental effects, which include physical, biological, economic, social, and environmental

design factors and their interactions. It is a formal document that must follow the requirements of NEPA, the CEQ, and guidelines and directives of the agency responsible for the project proposal.

environmental impact statement (EIS): A statement of the environmental effects of a proposed action and alternatives to it. It is required for major federal actions under Section 102 of the National Environmental Policy Act (NEPA), and released to the public and other agencies for comment and review. A draft EIS is released to the public and other agencies for review and comment. A final EIS is issued after consideration of public comments. A record of decisionis based on the information and analysis in the final EIS.

ephemeral: A channel in which streamflow occurs inconsistently, infrequently, or seasonally and, except during periods of streamflow, does not intersect the local groundwater table.

erosion: The wearing away of the land surface by running water, wind, ice, gravity, or other geological activities; can be accelerated or intensified by human activities that reduce the stability of slopes or soils.

essential fish habitat: Identification by the National Marine Fisheries Service (NMFS) of habitat essential to conserve and enhance federal fishery resources that are fished commercially under the Magnuson-Stevens Fishery Conservation and Management Act.

evaluation: An essential companion activity to monitoring; the tool for translating data gathered by monitoring into useful information that could result in change or changing future strategies.

even-aged management: The application of a combination of actions that results in the creation of stands in which trees of essentially the same age grow together. Managed even-aged forests are characterized by a distribution of stands of varying ages (and, therefore, tree sizes) throughout the forest area. The difference in age between trees forming the main canopy level of a stand usually does not exceed 20 percent of the age of the stand at harvest rotation age. Regeneration in a particular stand is obtained during a short period at or near the time that a stand has reached the desired age or size for regeneration and is harvested. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands.

evolutionarily significant units (ESU): The minimal unit of conservation management, the smallest population unit that can receive federal protection under the Endangered Species Act. An ESU is a set of populations that is morphologically and genetically distinct from other similar populations or a set of populations with a distinct evolutionary history.[8]

exotic species: A plant or animal species introduced from a distant place; not native to the area.

extinction: Complete disappearance of a species from the earth.

extirpation: Loss of populations from all or part of a species' range within a specified area.

F

facility: A single or contiguous group of improvements that exists to shelter or to support Forest Service programs. The term may be used in either a broad or narrow context; for example, a facility may be a ranger station compound, lookout tower, leased office, work center, separate housing area, visitor center, research laboratory, recreation complex, utility system, or telecommunications site.

[8] http://darwin.eeb.uconn.edu/eeb310/lecture-notes/systematics/systematicsli3.html

fauna: The vertebrate and invertebrate animals of an area or region.

fall/winter season: This period basically begins when all key perennial forage plants have achieved dormancy. It runs through the dormant period and ends just before the initiation of new growth on the key cool season perennial forage species in the spring. In very general terms, this often begins in mid to late October and runs through February, March, or April depending on the elevation, aspect and the weather patterns for a given year.

Federal trust responsibility: The Forest Service shares in the federal government's overall trust responsibility to American Indian tribes where treaty or other legally defined rights apply to national forest lands. In redeeming this shared responsibility, the agency assists in carrying out the intent of the treaty and any subsequent case law or amendments, by operating in a just and responsive way; making efforts to adjust the management of national forest lands in favor of the concerns of the respective American Indian tribe(s), as far as practicable, while still maintaining a responsibility to all the people – the general public. These actions and adjustments need to be carried out through consultations with other tribal officials or their designees, on a government–to–government basis.

federally listed species: Species that are listed under the Endangered Species Act.

fine organic matter: Plant litter, duff, and woody material less than 3 inches in diameter.

fine-scale: A single landscape, such as a watershed or subwatershed.

fire-dependent systems: Forests, grasslands, and other ecosystems historically composed of species of plants that evolved with and are maintained by fire regimes.

fire cycle, fire frequency: Refer to fire return interval.

low fire intensity: Soil surface litter and humus have not been destroyed by fire. Root crowns and surface roots will resprout. Potential surface erosion has not changed because of fire.

moderate fire intensity: On up to 40 percent of the area, the soil surface litter and humus have been destroyed by fire and the A horizon has had intense heating. Crusting of the soil surface produces accelerated erosion. Intensively burned areas may be water repellent. Root crowns and surface roots of grasses in the intensively burned area are dead and will not resprout.

high fire intensity: On 40 percent or more of the area, the soil surface litter and humus have been destroyed by fire and the A horizon has had intense heating. Crusting of the soil surface produces accelerated erosion. Intensively burned areas may be water repellent. Root crowns and surface roots of grasses in the intensively burned area are dead and will not resprout.

fire intolerant: Species of plants that do not grow well with, or die from, the effects of too much fire. Generally, these are shade-tolerant species.

fire management plan: A plan that identifies and integrates all wildland fire management and related activities within the context of approved land/resource management plans. It defines a program to manage wildland fires (wildfire, prescribed fire, and wildland fire use). The plan is supplemented by operational plans, including but limited to preparedness plans, preplanned dispatch plans, and prevention plans. Fire management plans assure that wildland fire management goals and components are coordinated.

fire regime: The characteristics of fire in a given ecosystem, such as the frequency, predictability, intensity, and seasonality of fire. A natural fire regime is a general classification of the role fire would

play across a landscape in the absence of modern human mechanical intervention but including the influence of aboriginal burning (Agee 1993; Brown 1995). Coarse-scale definitions for natural fire regimes were developed by Hardy and others (2001) and Schmidt and others (2002) and interpreted for fire and fuels management by Hann and Bunnell (2001). The five natural fire regimes are classified based on the average number of years between fires (fire frequency or Mean Fire Interval [MFI]) combined with the severity of the fire (the amount of vegetation replacement) and its effect on the dominant overstory vegetation. These five natural fire regimes are as follows:

fire regime 1: 0- to 35-year frequency and of low severity (most commonly associated with surface fires) to mixed severity (in which less than 75 percent of the dominant overstory vegetation is replaced).

fire regime 2: 0- to 35-year frequency and of high severity (stand replacement: greater than 75 percent of the dominant overstory vegetation is replaced).

fire regime 3: 35- to 200-year frequency and of mixed severity.

fire regime 4: 35- to 200-year frequency and of high severity.

fire regime 5: 200-year-plus frequency and of high severity.

fire regime condition class (FRCC): A classification of the degree of departure from the natural fire regime. The fire regime condition class classification is based on a relative measure describing the degree of departure from the historical natural fire regime. This departure can result in changes (or risks) to one, or more, of the following ecological components: vegetation (species composition, structural stages, stand age, canopy cover, and mosaic pattern across the landscape); fuel composition; fire frequency, severity, and pattern; and other associated disturbances.

condition class 1: Fire regimes are within the natural (historical) range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition, structure, and pattern) are intact and functioning within the natural (historical) range.

condition class 2: Fire regimes have been moderately altered from their natural (historical) range. Risk of losing key ecosystem components is moderate. Fire frequencies have departed from natural frequencies by one or more return intervals (either increased or decreased). This result in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation and fuel attributes have been moderately altered from their natural (historical) range.

condition class 3: Fire regimes have been substantially altered from their natural (historical) range. The risk of losing key ecosystem components is high. Fire frequencies have departed from natural frequencies by multiple return intervals. Dramatic changes occur to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been substantially altered from their natural (historical) range.

fire return interval: The average time between fires in a given area.

fire suppression: All work and activities connected with fire-extinguishing operation, beginning with discovery and continuing until the fire is completely extinguished.

fire-tolerant: Species of plants that can withstand a certain frequency and intensity of fire. Generally, these are shade-intolerant species.

fish-producing: Streams, rivers, wetlands, ponds, lakes, and reservoirs that serve as spawning or rearing habitat for fish.

fledgling: A young bird that has acquired the feathers necessary for flight.

floodplain: The lowland and relatively flat areas joining inland and coastal waters including debris cones and flood-prone areas of off-shore islands, including at a minimum, that area subject to a one percent (100-year recurrence) or greater chance of flooding in any given year (Executive Order 11988, Section 6c); or the area of relatively flat land adjacent to streams that is inundated during times of high flow; or an area formed by the deposition of stream-transported sediment.

floodplain function: Collectively, the normal physical and biological processes that are responsible for the formation and maintenance of river floodplains and the biotic communities that inhabit them.

flow regime: The range of magnitude, duration, timing and frequency of streamflows characteristic of a given stream.

forb: Broad-leafed, herbaceous, nongrass-like plant species other than true grasses, sedges, and non–woody plants; fleshy leafed plants; having little or no woody material.

forage: All browse and herbaceous foods that are available to grazing animals. It may be grazed or harvested for feeding. Refer to rangeland vegetation.

forested vegetation treatment: Combination of uneven-aged management methods that may be used to achieve a desired forested structure including single-tree selection, group selection, precommercial thinning, commercial thinning, salvage, and sanitation cutting.

forest fragmentation: Refer to fragmentation.

forest health: The perceived condition of a forest derived from concerns about such factors as its age, structure, composition, function, vigor, presence of unusual levels of insects and disease and resilience to disturbance. Perception and interpretation of forest health are influenced by individual and cultural viewpoints, land management objectives, spatial and temporal scales, the relative health in stands that comprise the forest, and the appearance of the forest at a point in time.

forest land: Land at least 10 percent occupied by forest trees of any size or formerly having had such tree cover and not currently developed for non-forest use. Lands developed for non-forest use include areas for crops, improved pasture, residential, or administrative areas, improved roads of any width, and adjoining road clearing and powerline clearing of any width.

forest roads: Any road wholly or partly within, or adjacent to, and serving the national forest and which is necessary for the protection, administration, and utilization of the national forests and the use and development of its resources (23 USC 101).

Forest Service Handbook (FSH): Directives that provide detailed instructions on how to proceed with a specialized phase of a program or activity.

Forest Service Manual (FSM): A system of manuals that provides direction for Forest Service activities.

forest transportation facility: A classified road, designated trail, or designated airfield, including bridges, culverts, parking lots, log transfer facilities, safety devices and other transportation network appurtenances under Forest Service jurisdiction that is wholly or partially within or adjacent to National Forest System lands (36 CFR 212.1).

forest transportation system management: The planning, inventory, analysis, classification, record keeping, scheduling, construction, reconstruction, maintenance, decommissioning, and other operations undertaken to achieve environmentally sound, safe, cost-effective access for use, protection, administration, and management of national forest lands.

fragmentation (habitat): The break-up of a large continuous land area by reducing and dividing into smaller patches isolated by areas converted to a different land type. Habitat can be fragmented by natural events or development activities.

fragmentation (forest): The breakup of a large land forest area into smaller patches isolated by areas converted to a different land type. Opposite of connectivity.

free-flowing: A river or stream that exists or flows in natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway (16 U.S.C. §1286).

fuel: Plants, both living and dead, and woody vegetative materials capable of burning.

fuel load: The dry weight of combustible materials per unit area; usually expressed as tons per acre.

fuel treatment: Any manipulation or removal of fuels to reduce the likelihood of ignition or to lessen potential damage and resistance to control.

functioning-at-risk: Riparian-wetland areas that are in functional condition but an existing soil, water, or vegetation attribute makes them susceptible to degradation (USDA Forest Service1993).

G

geographic information system (GIS): An information processing technology to input, store, manipulate, analyze, and display data; a system of computer maps with corresponding site-specific information that can be combined electronically to provide reports and maps.

geologic: Based on geology which is the study of the structure, processes, and chronology of the earth.

geological/geomorphic process: The actions or events that shape and control the distribution of materials, their states, and their morphology, within the interior and on the surface of the earth. Examples of geologic processes include: volcanism, glaciation, streamflow, metamorphism (partial melting of rocks), and landsliding.

goal: A concise statement that describes a desired condition to be achieved sometime in the future. It is normally expressed in broad, general terms and is timeless in that it has no specific date by which it is to be completed. Goal statements form the principal basis from which objectives are developed.

goods and services: The various outputs, including on-site uses, produced from forest and rangeland resources.

government-to-government consultation: The active and continuous process of contacting tribal leadership, soliciting their participation, involvement, comments, concerns, contributions, and traditional knowledge that will assist the agency in making informed decisions in planning, managing and decision-making actions.

graminoid: Grasses and grass-like plants such as sedges and rushes.

grassland: Land on which the vegetation is dominated by grasses, grass-like plants, or forbs.

grazing: The consumption of standing forage by livestock or wildlife.

grazing allotment: Area designated for the use of a certain number and kind of livestock for a prescribed period.

grazing lands: Any vegetated land that is grazed or has the potential to be grazed by animals (domestic or wild). This includes rangeland and grazable forestland.

grazing permit: Document authorizing livestock to use national forest lands or other lands under Forest Service control for livestock production.

groundwater: All of the water that has percolated through the surface soil into the bedrock.

Groundwater-dependent ecosystems: Communities of plants, animals, and other organisms whose extent and life processes are dependent on access to or discharge of groundwater. (USDA Forest Service 2011)

guideline: A guideline is a constraint on project and activity decision making that allows for departure from its terms, so long as the intent of the guideline is met. (§ 219.15(d)(3)). Guidelines are established to help achieve a desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

H

habitat: A place that provides seasonal or year-round food, water, shelter, and other environmental conditions for an organism, community, or population of plants or animals.

harvest: (1) Felling and removal of trees from the forest; and (2) removal of game animals or fish from a population, typically by hunting or fishing.

harvestable/harvestability: With regard to American Indian tribes, refers to a population of plants or animals that is self-sustaining and capable of producing a dependable harvest annually to meet spiritual, cultural, subsistence, and commercial needs.

headwaters: Beginning of a watershed; the uppermost, unbranched tributaries of a stream.

healthy ecosystem: An ecosystem in which structure and functions allow the maintenance of the desired conditions of biological diversity, biotic integrity and ecological processes over time.

Hells Canyon National Recreation Area (HCNRA) Act: The Act of December 31, 1975, as amended (PL 94-199, 89 Statute 117), which established the Hells Canyon National Recreation Area.

herbaceous: Green and leaf-like in appearance or texture; includes grasses, grass-like plants, and forbs, with little, or no woody component.

herbicide: A pesticide used for killing or controlling the growth of plants.

herbivore: An animal that subsists on plants or plant materials, either primarily or entirely.

hiding cover: Vegetation, primarily trees, capable of hiding 90 percent of a standing adult game animal from the view of a human at a distance equal to or less than 200 feet during all seasons of the year that elk or deer use the area. Generally, any vegetation used for security or to escape from danger.

high-severity fire: Refer to fire intensity.

historical conditions: Range of historical variation; range of the spatial, structural, compositional and temporal characteristics of ecosystem elements during a period specified to represent natural conditions.

historic property: Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register of Historic Places criteria.

Historic Range of Variability (HRV): A means to define the boundaries of ecosystem behavior and patterns that have remained relatively consistent over long periods. HRV is usually defined for centuries to millennia before the period of widespread human population increases and associated ecosystem changes that began in roughly the early to middle 1800s for many regions of western North America.

human-caused disturbance: Refer to disturbance.

hydrologic: Refers to the properties, distribution, and effects of water. Hydrology refers to the broad science of the waters of the earth, their occurrence, circulation, distribution, chemical and physical properties, and their reaction with the environment.

hydrologic function: The behavioral characteristics of a watershed described in terms of ability to sustain favorable conditions of water flow. Favorable conditions of water flow are defined in terms of water quality, quantity, and timing.

hydrological regimes: The spatiotemporal dynamics of water flow and associated fluvial process in an ecosystem. Refer to flow regime.

hydrologic unit: A hydrologic unit is a drainage area delineated to nest in a multi-level, hierarchical drainage system. Its boundaries are defined by hydrographic and topographic criteria that delineate an area of land upstream from a specific point on a river, stream or similar surface waters. A hydrologic unit can accept surface water directly from upstream drainage areas, and indirectly from associated surface areas such as remnant, noncontributing, and diversions to form a drainage area with single or multiple outlet points.

hydrologic unit code (HUC): A hierarchical coding system developed by the U.S. Geological Survey to identify geographic boundaries of watersheds of various sizes (12).

> **4th-code HUC** refers a subbasin generally about 450,000 acres in size.
>
> **5th-code HUC** refers to a watershed. These areas generally range from 40,000 to 250,000 acres in size.
>
> **6th-code HUC** refers to a subwatershed HU that generally ranges from 10,000 to 40,000 acres in size.

Individual Clumps and Openings (ICO) - this approach uses historical information at the stand- and landscape-level to design restoration strategies and prescriptions for restoration (e.g., see (Franklin et al. 2013b)). For example, the pattern of old trees, stumps and snags currently on the landscape provide

indicators of natural tree clumping and spacing, and thus the degree of horizontal spatial heterogeneity. In places where legacies of historic forest patterns are absent (e.g., young, post-fire forests), information is used from similar habitats.

impacts: Refer to effects.

implement: To carry out.

indicator species: Refer to management indicator species

indirect effects: Impacts on the environments that are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable.

infestation: The attack or invasion by parasites or pests.

infiltration: The process by which water seeps into the soil, influenced by soil texture, aspect, and vegetation cover.

infrastructure: The basic facilities, equipment, and installation needed for the functioning of a system; commonly refers to items such as roads, bridges, power facilities, and the like.

insecticide: A pesticide employed against insects.

instream flow: Flow of water in its natural setting (as opposed to waters diverted for off-stream uses such as industry or agriculture). Instream flow levels provided for environmental reasons enhance or maintain the habitat for riparian and aquatic life, with timing and quantities of flow characteristic of the natural setting.

integration: Bringing the values and systems of different disciplines together to address questions with a common framework using consistent techniques and measurement units.

interagency: Involving the Forest Service, Bureau of Land Management, Fish and Wildlife Service, National Marine Fisheries Service, Environmental Protection Agency, and/or other Federal agencies.

interdisciplinary team (IDT): A group of specialists assembled as a cohesive team with frequent interactions to solve a problem or perform a task.

intermittent stream: A stream in which the flow of water on the surface is discontinuous, or that alternates between zones of surface and sub-surface flow.

invasion (plant): The movement of a plant species into a new area outside its former range.

invasive nonnative species: Are those animal and plant species with an extraordinary capacity for multiplication and spread at the expense of other native species. Plants in this category may or may not be designated as noxious weeds.

invasive plant species: Nonnative plant species that invade or are introduced into an environment or ecosystem in which they did not evolve where they have the ability to compete with, and at times overshadow, the existing native plant species. Invasive species are also likely to cause economic or environmental harm or harm to human health. Invasive species include seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem (with respect to a particular ecosystem). Noxious weeds are a specific type of invasive plants that carry a legal designation due to their potential for detrimental impacts to the environment.

Inventoried roadless areas (IRAs): Those areas identified in the Land Management Plan and listed on a set of inventoried roadless area maps, contained in Forest Service Roadless Area Conservation, Final Environmental Impact Statement, Volume 2, (USDA Forest Service 2000), which are held at the Washington Office of the Forest Service, or any update, correction, or revision of those maps through the land management planning process.

invertebrate: Small animals that lack a backbone or spinal column. Spiders, insects, and worms are examples of invertebrates.

irretrievable commitment: Applies to losses of production or commitment of renewable natural resources. For example, while an area is used as a ski area, some or all of the timber production there is "irretrievably" lost. If the ski area closes, timber production could resume; therefore, the loss of timber production during the time the area is devoted to skiing is irretrievable but not irreversible, because it is possible for timber production to resume if the area is no longer used as a ski area.

irreversible commitment: Applies to nonrenewable resources, such as minerals and archaeological sites. Losses of these resources cannot be reversed. Irreversible effects can also refer to effects of actions on resources that can be renewed only after a very long period, such as the loss of soil productivity.

issue: A point, matter of controversy, dispute, question of public discussion, or general concern over resource management activities or land uses to be addressed or decided through the planning process. To be considered a significant environmental impact statement issue, it must be well defined, relevant to the proposed action, and within the ability of the agency to address through alternative management strategies.

L

ladder fuels: Vegetation located below the crown level of forest trees, which can carry fire from the forest floor to tree crowns. Ladder fuels may be low growing tree branches, shrubs, or smaller trees. Fire can move from surface fuels by convection into the crowns with relative ease.

landform: One of the attributes or features that make up the Earth's surface such as a plain, mountain, or valley, as defined by its particular combination of bedrock and soils, erosion processes, and climatic influences.

land and resource management plan (LRMP) or land management plan: A document that provides broad strategic guidance and information for project and activity decision making in a national forest through plan components (desired conditions, suitable uses, guidelines, special areas, and objectives), as required by the National Forest Management Act and the Planning Rule.

landscape: All the natural features such as grasslands, hills, forest, and water, which distinguish one part of the earth's surface from another part; usually that portion of land which the eye can comprehend in a single view, including all its natural characteristics.

landscape character: Identifiable image made by particular attributes, qualities, and traits of a landscape.

landscape ecology: The study of ecological effects to spatial patterns in ecosystems.

landscape-level/landscape-scale: Refer to broad-scale.

landscape pattern: Number, frequency, size and juxtaposition of landscape elements (stands and patches) that are important to the determination or interpretation of ecological processes.

landscape structure: The mix and distribution of stand or patch sizes across a given area of land. Patch sizes, shapes, and distributions are a reflection of the major disturbance regimes operating on the landscape.

late/old structure: Forest stands whose structural development incorporates the elements of the late and the old structural stages. The understory species can be found in all canopy layers. Overstory vigor begins to decline, as does tolerance to native pathogens and insects. In the late stage, the understory has become the dominant cover and the overstory is beginning to decline and collapse. In the old stage, stands in which all of the relic (pioneering) trees have died and which consist entirely of trees that grew from beneath. These structural stages may or may not contain the various characteristics sometimes identified with old growth structure.

late seral: Refer to seral stages.

late spring season: Late spring is defined as that period when the key perennial cool season forage plant growth is still occurring but soil moisture is beginning to limit growth. Livestock removal is not planned to occur during the time when assurance can be made that essentially full regrowth would occur.

late successional: The stage of ecological succession and type of vegetation that develops after a long period of time following a stand-replacing disturbance.

legacy tree: Trees that have been spared or have survived stand replacing disturbances (Mazurek and Zielinski, 2004). A legacy tree is any live tree greater than or equal to 21 inches d.b.h. and greater than 150 years old, located in a non-old forest stand.

lethal (stand-replacing) fires: Fires that result in stand replacement of the existing forested vegetation. Mortality levels are very high at all canopy levels within the stand. In forests, fires in which less than 20 percent of the basal area or less than 10 percent of the canopy cover remains; in rangelands, fires in which most of the shrub overstory or encroaching trees are killed.

lichens: Organisms made up of specific algae and fungi, forming identifiable crusts on soil, rocks, tree bark, and other surfaces. Lichens are primary producers in ecosystems; they contribute living material and nutrients, enrich the soil and increase soil moisture-holding capacity, and serve as food sources for certain animals. Lichens are slow growing and sensitive to chemical and physical disturbances.

litter: The uppermost layer of organic debris on the soil surface, which is essentially the freshly fallen or slightly decomposed vegetation material such as stems, leaves, twigs, and fruits.

local population: A group of individuals that spawn or breed in a particular area; the smallest group of individuals that is known to represent an interacting reproductive unit.

loess: Fine grained wind-deposited material predominantly of silt-size particles.

long term: Generally refers to a period longer than 10 years up to 100 years.

lower montane: A terrestrial community that generally is found in drier and warmer environments than the montane terrestrial community. The lower montane community supports a unique clustering of wildlife species.

M

mainstem: The main channel of the river in a river basin, as opposed to the streams and smaller rivers that feed into it.

maintain: To continue; or keep ecosystem functions, processes, and/or components (such as soil, air, water, vegetation) in such a condition that the ecosystem's ability to accomplish current and future management objectives is not weakened. Management activities may be compatible with ecosystem maintenance if actions are designed to maintain or improve current ecosystem condition.

major population group: A group of either salmon populations or group of steelhead populations that are geographically and genetically cohesive. The major population group is a level of organization between demographically independent populations and evolutionarily significant units or distinct population segments.

management area: An area with similar management objectives and a common management prescription, as prescribed by the land management plan.

management concern: An issue, problem, or a condition which constrains the range of management practices identified by the Forest Service in the planning process.

management direction: A statement of multiple-use and other goals and objectives, the associated management prescriptions, and standards and guidelines for attaining them.

management indicator species (MIS): In the original Forest Plans, a species selected because its welfare is presumed to be an indicator of the welfare of other species using the same habitat. A species whose condition can be used to assess the impacts of management actions on a particular area.

management intensity: A management practice or combination of management practices and associated costs designed to obtain different levels of goods and services.

management practice: A specific activity, measure, course of action, or treatment.

management prescription: Management practices and intensity selected and scheduled for application on a specific area to attain multiple-use and other goals and objectives.

mechanical equipment: Any contrivance which travels over ground, snow, or water on wheels, tracks, skids, or by flotation that is powered by a living source. This term does not include nonmotorized river craft, wheelchairs, or other similar devices used solely to assist persons with disabilities.

mechanical fuel treatment: Treatment of fuels using mechanical means, such as thinning by chainsaw, crushing down wood, or piling down wood.

mechanized: Wheeled forms of transportation (including nonmotorized carts, wheelbarrows, bicycles and any other nonmotorized, wheeled vehicle.

mesic: Pertaining to conditions of moderate moisture or water supply; used of organisms occupying moist habitats.

metapopulations: A group of conspecific populations coexisting in time but not space.

microclimate: The climatic conditions within a small habitat such as: a tree stump, under a boulder, in the space between grasses, or on the side of a slope.

migration corridor: The habitat pathway an animal uses to move from one place to another.

minerals-locatable: Those hardrock minerals that are mined and processed for the recovery of metals. They also may include certain nonmetallic minerals and uncommon varieties of mineral materials, such as valuable and distinctive deposits of limestone or silica.

minerals-leasable: Coal, oil, gas, phosphate, sodium, potassium, oil shale, sulphur, and geothermal resources.

minerals-materials (salable): A collective term to describe common varieties of sand, gravel, stone, pumice, pumicite, cinders, clay, and other similar materials. Common varieties do not include deposits of those materials that may be locatable.

mining: Any activity related to the discovery, extraction, and exploration of minerals under the Mining Act of 1872 and the Mineral Leasing Act of 1920 through the use of, among other things, hydraulic equipment, pans, ground sluicing, sluice boxes, rockers, or suction dredges.

mining claim: A particular parcel of public land, valuable for a specific mineral deposit or deposits, for which an individual has asserted a right of possession. The right is for developing and extracting a discovered mineral deposit.

mining lands: Lands primarily used for mining purposes as of June 13, 1994 and which are assigned to the mining land category in 36 CFR 292.22 of the private land use regulations.

mitigation: Measures designed and implemented to counteract environmental impacts or to make impacts less severe.

mixed-severity fire: These fire regimes will have the greatest toll on thinner barked and/or young age classes within the stand. Low intensity fires within the stand will favor overstory fire-resistant species (ponderosa pine, western larch, and Douglas fir). Crown fire potential does exist depending on stand structures and age classes of different stand cohorts of any available ladder fuels. If it occurs, the result will favor the return to grass and forbs.

moist forest: Area between drier, low elevation forests and higher elevation, cold forests.

mollisol - a soil order in USDA soil taxonomy. Mollisols have deep, high organic matter, nutrient-enriched surface soil (A horizon), typically between 60–80 cm in depth. This fertile surface horizon, known as a mollic epipedon, is the defining diagnostic feature of Mollisols. Mollic epipedons result from the long-term addition of organic materials derived from plant roots, and typically have soft, granular, soil structure. These environments have historically been strongly influenced by fire and organisms such as ants and earth worms.

monitoring: A process of collecting information to evaluate whether or not objectives of a project and its mitigation plan are being realized. Monitoring allows detection of undesirable and desirable changes so that management actions can be modified or designed to achieve desired goals and objectives while avoiding adverse effects to ecosystems.

montane: A terrestrial community that generally is found in moderate (ponderosa pine) and subalpine terrestrial communities. Montane communities are generally moister than lower montane and warmer than subalpine communities, and support a unique clustering of wildlife species.

mosaic: A pattern of vegetation in which two or more kinds of communities are interspersed in patches, such as clumps of shrubs with grassland between.

motorized equipment: Any machine powered by a nonliving source. This term does not include motorized river craft or small hand-held devices such as flashlights, shavers, wristwatches, and Geiger counters.

multi-story: More than one canopy layer.

multiple-use management: The management philosophy articulated by the Multiple Use Sustained Yield Act of 1960. This law provides that the renewable resources of the national forests are to be managed in the combination that best meets the needs of the American people. It further stipulates that the Forest Service is to make judicious use of the land for some or all of these resources and related services over areas large enough to ensure that sufficient latitude exists to subsequently adjust management in conformity with changing needs and conditions.

municipal watersheds (public supply watersheds): A watershed that serves a public water system as defined in Public Law 93-523 (Safe Drinking Water Act) or as defined in state safe drinking water regulations. The definition does not include communities served by a well or confined groundwater unaffected by Forest Service activities.

mycorrhizae: The symbiotic relationship between certain fungi and the roots of certain plants, especially trees; important for plants to take nutrients from soil.

N

National Ambient Air Quality Standards (NAAQSs): Standards set by the Federal Environmental Protection Agency for the maximum levels of air pollutants that can exist in the outdoor air without unacceptable effects on human health or the public welfare.

National Environmental Policy Act (NEPA): An act to declare a national policy which will encourage productive and enjoyable harmony between humankind and the environment, to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humanity, to enrich the understanding of the ecological systems and natural resources important to the nation, and to establish a Council on Environmental Quality.

National Forest Management Act (NFMA): A law passed in 1976 as an amendment to the Forest and Rangeland Renewable Resources Planning Act, requiring the preparation of Forest Plans and the preparation of regulations to guide that development.

National Forest System (NFS): All national forest lands reserved or withdrawn from the public domain of the United States; all national forest lands acquired through purchase, exchange, donation, or other means; the National Grasslands and land utilization projects administered under Title III of the Bankhead-Jones Farm Tenant Act (50 Stat. 525, 7 U.S.C. 1010-1012); and other lands, waters, or interests therein which are administered by the Forest Service or are designated for administration through the Forest Service as a part of the system.

National Forest System road: A classified forest road under the jurisdiction of the Forest Service. The term National Forest System roads is synonymous with the term forest development roads as used in 23 USC 205. Generally referred to as a Forest Road (FR).

National Recreation Trail: Trails designated by the Secretary of the Interior or the Secretary of Agriculture as part of the national system of trails authorized by the National Trails System Act. National recreation trails provide a variety of outdoor recreation uses.

National Register of Historic Places: A listing (maintained by the U.S. National Park Service) of areas that have been designated as being of historical significance. The Register includes places of local and state significance as well as those of value to the Nation.

National Wild and Scenic River System: Includes rivers with outstanding scenic, recreational, geological, fish and wildlife, historic, cultural or other similar values designated by Congress under the Wild and Scenic Rivers Act for preservation of their free-flowing condition. Refer to Wild and Scenic River.

native species: Species that normally live and thrive in a particular ecosystem. Animals or plants that have historically occupied a given aquatic or terrestrial area.

natural disturbance: Periodic impact of natural events such as: fire, severe drought, insect or disease attack, or wind.

neotropical: Those species of birds that nest in the United States or Canada and winter regularly in the Neotropics (south of the Tropic of Cancer and Capricorn) in Mexico, the Caribbean Islands, or Central or South America. 2).

no action alternative: The most likely condition expected to exist in the future if current management direction were to continue unchanged.

nongame species: Those species of animals that are not managed as a sport hunting resource.

nonlethal fire: Fires that consist of low intensity under burns with limited single tree or group torching. Fire related mortality to the dominant-fire resistant species is slow, but occurs because of this type of localized fire behavior. In forests, fires in which more than 70 percent of the basal area or more than 90 percent of the canopy cover survives; in rangelands, fires in which more than 90 percent of the vegetative cover survives (implies that fire is occurring in an herbaceous-dominated community).

nonnative invasive species (NNIS): Plant species that are introduced into an area in which they did not evolve and in which they usually have few or no natural enemies to limit their reproduction and spread. These species can cause environmental harm by significantly changing ecosystem composition, structure, or processes and can cause economic harm or harm to human health.

nonpoint source pollution: Pollution whose source is general rather than specific in location; the sources of the pollutant discharge are dispersed, not well defined or constant. Examples include sediments from logging activities and runoff from agricultural chemicals. It is widely used in reference to agricultural and related pollutants, such as production of sediments by logging operations, agricultural pesticide applications, or automobile exhaust pollution.

noxious weeds: Plants designated as noxious weeds by the Secretary of Agriculture or by the responsible state official. Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host of serious insects or disease, and being native or new to or not common to the united states or parts thereof. A noxious weed is one that causes disease or has other adverse effects on the human environment and therefore is detrimental to the agriculture and commerce of the United States and to the public health.

nutrient cycling: Ecological processes in which nutrients and elements such as carbon, phosphorous, nitrogen, calcium, and others, circulate among animals, plants, soils, and air.

O

objective: A concise, time-specific statement that describes the incremental progress expected to take place to meet goals (desired conditions) over the planning period with respect to estimated quantities of services and accomplishments. Objectives are projections of outcomes based on certain social, economic, and ecological indicators that measure the plans performance and identify specific opportunities and possible future proposals in terms of ongoing programs and future projects to support the goals for the planning area.

off-channel: Aquatic habitats separated from the main stream or river, such as side-channels, oxbows, ponds, or sloughs, which may or may not be directly connected to a river or stream.

off-highway vehicle (OHV): Any motor vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain.

old forest: Old forests are ecosystems distinguished by old trees and related structural attributes. Old forest encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics which may include tree size, accumulation of large dead woody material, number of canopy layers, species composition, and ecosystem function.

old forest multistory (OFMS): This structure class includes multiple age classes and vegetation layers, along with large, old trees. Decaying fallen trees may also be present that leave a discontinuous overstory canopy. Overstory diameters are generally greater than 20 inches.

old forest single story (OFSS): This structure class can include multiple age classes, but generally only includes one main overstory strata. Large, old trees are common. Decaying fallen trees may also be present that leave a discontinuous overstory canopy. Overstory diameters are generally greater than 20 inches.

ongoing actions: Those actions that have been implemented, or have contracts awarded or permits issued. Refer to new actions.

openings: Refers to meadows, clearcuts, and other areas of vegetation that do not provide hiding or thermal cover.

outcome: The long-term results of a program activity compared to its intended purpose (Government Performance and Results Act of 1993 (5 U.S.C. 306)). Outcome is a state of being similar to long-term ecological, social, or economic condition or goal (such as the maintenance of an ecosystem's biodiversity, jobs and income, or the quality of a regions' surface water as measured by indicators).

outfitting: Providing through rental or livery any saddle or pack animal, vehicle or boat, tents or camping gear, or similar supplies or equipment, for pecuniary remuneration or other gain. The term guide includes the holder's employees, agents, and instructors. Pecuniary remuneration means monetary reward (Washington Office Amendment 2709.11-95-11, 41-53C).

outputs: A broad term for describing any result, product, service or concern that a system produces by its activities. They are measurable and capable of being used to determine the effectiveness of programs and activities in meeting objectives. The unit of measure should indicate or serve as a proxy for what the recipients get rather than what the agency does in the process of producing the given output. Example: timber sold, recreation use, livestock grazing use, etc. Any good, service, or on-site use that is produced from rural resources.

outslope: Roads that are sloped toward the downhill side of the roadway to better match the natural drainage patterns and minimize the potential for diversion.

outstandingly remarkable values (ORVs): Term used in the Wild and Scenic Rivers Act of 1968; to qualify as outstandingly remarkable, a resource value must be a unique, rare, or exemplary feature that is significant at a regional or national level.

overgrazing: Consumption of rangeland grass by grazing animals to the point that it cannot be renewed, or can be only slowly renewed, because of damage to the root system.

overstory: Portion of the trees, in a forest or in a forested stand of more than one story, forming the upper or uppermost canopy.

overwinter: To keep livestock or plants alive through the winter by sheltering them, or to be kept alive in this way.

P

PACFISH: Regional Forester's Amendment 3, Interim strategies for managing anadromous fish–producing watersheds in Eastern Oregon and Washington, Idaho, and portions of California (USDA and USDI 1995).

paleontological sites: Areas that contain any remains, trace, or imprint of a plant or animal that has been preserved in the earth's crust before the Holocene epoch.

parcel: Contiguous tax lots under one ownership. For the purposes of the Private LURs, rights-of-way do not divide parcels into smaller units.

particulate emissions: Solid particles or liquid droplets that can be suspended or carried in the air, or released as air contaminants into the outdoor atmosphere.

PM_{10} – Particulate matter that measures 10 micrometers in diameter or less, a size considered small enough to invade the alveolar regions of the lung. PM_{10} is one of the six pollutants for which there are National Ambient Air Quality Standards.

$PM_{2.5}$ – Particulate matter that measures 2.5 micrometers in diameter or less.

passive management: Allowing nature to restore (heal) the natural balance between erosion/deposition, hydrologic, and vegetation processes by removing identified adversely affecting agents.

patch: An area of vegetation that is relatively homogeneous internally and differs from surrounding elements.

pathogen: An agent such as a fungus, virus, or bacterium that causes disease.

pattern: The spatial arrangement of landscape elements (patches, corridors, matrix) that determines the function of a landscape as an ecological system.

pesticide: A chemical preparation used to control individuals or populations of injurious organisms.

permittee (livestock): Any entity that has been issued a grazing permit.

phases: Plant communities or seral stages within a steady state connected to each other by community pathways.

plan amendment: The process for making substantive changes to a land management plan for the desired conditions, suitable uses, special areas, objectives and guidelines.

planning area: The area of the National Forest System covered by a regional guide or Forest Plan.

planning horizon: The overall time period considered in the planning process that spans all activities covered in the analysis or plan and all future conditions and effects of proposed actions which would influence the planning decisions.

planning record: A written record of the land management plan revision process containing detailed information and analysis used support conclusions and decisions made in the plan.

plant associations: A plant community type based on the land management potential, successional patterns and species composition.

plant communities: Any grouping of plants that have some structural similarity (Johnson and Simon 1987).

plateau: Any comparatively flat area of great extent and elevation; specifically an extensive land region considerably more elevated above the adjacent country; it is commonly limited on at least one side by an abrupt descent.

point source pollution: Pollution that comes from a single identifiable source such as a smokestack, a sewer, or a pipe.

pool: Portion of a stream where the current is slow, often with deeper water than surrounding areas and with a smooth surface texture. Often occur above and below riffles and generally are formed around stream bends or obstructions such as logs, root, wads, or boulders. Pools provide important feeding and resting areas for fish.

potential natural community (PNC): The biotic community that would become established if all successional sequences were completed without interference by humans under present environmental conditions. Natural disturbances are inherent in development.

potential vegetation group (PVG): A group of potential vegetation types grouped on the basis of similar general moisture or temperature environment and similar types of life forms.

potential vegetation types (PVT): A kind of physical and biological environment that produces a kind of vegetation; the species that might grow on a specific site I the absence of disturbance; can also refer to vegetation that would grow on a site in the presence of frequent disturbance that is an integral part of the ecosystem and its evolution.

precommercial thinning: The removal of trees not for immediate financial return but to reduce stocking to concentrate growth on the more desirable trees.

prehistoric site: An area that contains important evidence and remains of the life and activities of early societies that did not record their history.

prescribed fire: Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements (where applicable) must be met, prior to ignition.

prescription: A management pathway to achieve a desired objective(s).

present net value (PNV): The difference between the discounted value (benefits) of all outputs to which monetary values or established market prices are assigned and the total discounted costs of managing the planning area.

primitive recreation: Those types of recreation activities associated with unroaded land, for example: hiking, backpacking, and cross–country travel.

private land: Land not in federal, state, or local government ownership.

productive capacity: The growth and accumulation of plant biomass (primary productivity) as well as the growth of animal species that use the products (secondary productivity). Key elements of productivity include the physical, chemical, and biological properties of soils which provide for vegetative growth and the accumulation and cycling of nutrients.

productivity: Productivity is based on using natural resources no faster than they are produced or can be replaced and using natural resources without impairment of the long-term productive capacity of the ecosystem from which they are derived.

programmatic agreement (PA): This is a historic preservation document that records the terms and conditions agreed upon to resolve the potential adverse effects of a Federal agency program, complex undertaking or other situations in accordance with the Section 106 review under NHPA [36CFR800.14(b)].

proper functioning condition (PFC): Riparian and wetland areas achieve proper functioning condition when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high water flows. This thereby reduces erosion and improves water quality; filters sediment, captures bedload, and aids floodplain development; improve flood–water retention and ground water recharge; develops root masses that stabilize stream banks against cutting action; develops diverse ponding and channel characteristics to provide the habitat and water depths, duration, and temperature necessary for aquatic vertebrate and invertebrate production, waterfowl breeding, and other issues; and supports greater biodiversity. The functioning condition of riparian and wetland areas is a result of the interaction among geology, soil, water and vegetation.

project: An organized effort to achieve an objective identified by location, timing, activities, outputs, effects, and time period and responsibilities for executions.

project-level: Site-specific analysis and planning processes for a specific project or set of projects usually on an individual ranger district.

proposed action: A proposal by a federal agency to authorize, recommend, or implement a management action.

public issue: A subject or question of widespread public interest relating to management of the National Forest System.

public roads: Any road or street under the jurisdiction of and maintained by a public authority and open to public travel (23 U.S.C. §101(a)).

Q

qualitative: Traits or characteristics that relate to quality and cannot be measured with numbers.

quality of life: Refers to the satisfaction people feel for the places where they live (or may visit) and for the places they occupy as part of that experience.

quantitative: Traits or characteristics that can be measured with numbers.

R

range forage condition: The current composition or productivity of rangeland relative to what that rangeland is capable of producing as a potential natural community, and often synonymous with forage condition.

range analysis: The systematic interpretation, analysis, and evaluation of data for rangeland resource management planning. It provides ecological and other information for overall forestland and resource management planning and allotment management planning.

rangeland (range): Lands where the vegetation is predominately grasses, grass-like plants, forbs, or shrubs. Rangelands include natural grasslands, shrublands, savannahs, tundra, most deserts, and riparian and wetland plant communities, including marshes and wet meadows, with greater than about 200 pounds of forage production per year per acre.

rangeland resources: The physical and biotic resources of rangeland ecosystems.

rangeland resource inventory: The systematic acquisition of inventory data that characterizes the vegetation, soil, and other rangeland resources.

rangeland vegetation: Vegetation on all land with rangeland resource objectives or rangeland resource values, including riparian areas. Generally, the focus is on land supporting grass or grass-like plants, forbs, or shrubs during one or more ecological stages. Forested and nonforested sites providing forage and habitat for wild and domestic animal species are included.

rare plants: Plants that are federally listed as threatened, endangered, or proposed for federal listing; Forest Service Sensitive for Regions 1, 4, and 6, or disjunct species. This includes plants considered rare both globally (G1, G2, G3) or within states (S1, S2 or S3). Refer to the project record for a complete description.

rearing habitat: Area in rivers or streams where juvenile salmon and trout find food and shelter to live and grow.

recontour: To move soil back (usually with mechanical or hand tools) to a previous condition thus making an area blend with the natural landscape.

record of decision (ROD): An official document separate from, but associated, with a final environmental impact statement in which a deciding official identifies all alternatives, and specifies which were environmentally preferable, states the decision, and states whether all practicable means to avoid environmental harm from the alternative have been adopted, and if not, why not (40 CFR 1505.2).

recovery plans: A plan for the survival and conservation of species listed under the Endangered Species Act. The Act [Section 4(f)] requires that recovery plans contain: 1) objectives, measurable goals for delisting; 2) a comprehensive list of the actions necessary to achieve the delisting goals; and 3) an estimate of the cost and time required to carry out those actions. In addition, NOAA Recovery Planning Guidelines suggest that recovery plans include an assessment of the factors that led to population declines and/or which are impeding recovery. Finally, it is important that the plans include a comprehensive

monitoring and evaluation program for gauging the effectiveness of recovery measures and overall progress toward recovery (USDI 1988).

recreation: Leisure time activity such as swimming, picnicking, boating, hunting, and fishing.

developed recreation: Recreation that requires facilities that, in turn, result in concentrated use of an area. Examples of developed recreation areas are campgrounds and ski areas; facilities in these areas might include roads, parking lots, picnic tables, toilets, drinking water, ski lifts, and buildings.

dispersed recreation: A general term referring to recreation use outside developed recreation sites; this includes activities such as scenic driving, hiking, backpacking, hunting, fishing, snowmobiling, horseback riding, cross–country skiing, and recreation in primitive environments.

recreation opportunity: The availability of choices for users to participate in the recreational activities they prefer within the settings they prefer.

recreation opportunity spectrum (ROS): A recreation opportunity setting is the combination of physical, biological, social, and managerial conditions that give value to a place. Thus, an opportunity includes qualities provided by-nature (vegetation; landscape, topography, scenery), qualities associated with recreational use (levels and types of use), and conditions provided by management (developments, roads, regulations). By combining variations of these qualities and conditions, management can provide a variety of opportunities for recreationists. The settings, activities, and opportunities for obtaining experiences have been arranged along a continuum or spectrum divided into six classes: primitive, semiprimitive nonmotorized, semiprimitive motorized, roaded natural, rural, and urban (40 CFR 1505.2).

primitive - Area is characterized by an essentially unmodified natural environment of fairly large size Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use within the area is not permitted.

semiprimitive nonmotorized – Area is characterized by a predominantly natural or natural appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but would be subtle. Motorized recreation use is not permitted, but local roads used for other resource management activities may be present on a limited basis. Use of such roads is restricted to minimize impacts on recreational experience opportunities.

semiprimitive motorized – Area is characterized by a predominantly natural or natural appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions use of local primitive or collector roads with predominantly natural surfaces and trails suitable for motor bikes is permitted.

roaded natural -Area is characterized by predominantly natural-appearing environments with moderate evidence of the sights and sounds of man. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high, with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is allowed and incorporated into construction standards and design of facilities

rural -Area is characterized by substantially modified natural environment. Resource modification and utilization practices are to enhance specific recreation activities and to maintain vegetative cover

and soil. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities is designed for use by a large number of people Facilities are often provided for special activities. Moderate densities are provided far away from developed sites Facilities for intensified motorized use and parking are available.

urban - Area is characterized by a substantially urbanized environment, although the background may have natural appearing elements. Renewable resource modification and utilization practices are to enhance specific recreation activities. Vegetative cover is often exotic and manicured. Sights and sounds of humans, on-site, are predominant. Large numbers of users can be expected, both on site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site.

recreation residences: Privately owned recreation cabins authorized by special use permit on National Forest System land that occupy planned, approved tracts or those groups of tracts established for recreation residence use.

recreation site: Specific places in the forest other than roads and trails that are used for recreational activities. These sites include a wide range of recreational activities and associated development. These sites include highly developed facilities like ski areas, resorts, and campgrounds. It also includes dispersed recreation sites that have few or no improvements but show the effects of repeated recreation use.

recreation visit: An entry of one person to a recreation site or area of land or water for the purpose of participating in one or more recreation activities for an unspecified period.

recreational facilities: Refers to facilities associated with or required for outdoor recreational activities and includes, but are not limited to, parks, campgrounds, hunting and fishing lodges, and interpretive displays.

recreational river: Refer to Wild And Scenic River.

redd: Nest in gravel of stream bottom where a fish deposits eggs.

reforestation: Treatments or activities that help to regenerate stands of trees after disturbances such as timber harvest or wildfire. Typically, reforestation activities include preparing soil, controlling pests, and planting seeds or seedlings.

refugia: Areas that have not been exposed to great environmental changes and disturbances undergone by the region as a whole; refugia provide conditions suitable for survival of species that may be declining elsewhere.

regeneration: The process of establishing new plant seedlings, whether by natural means or artificial measures (planting).

regeneration harvest: A timber harvest by which a new age class is created by using clearcutting, seed tree, shelterwood, or selection methods.

regulations: Generally refers to the CFR, Title 36, chapter II, which covers management of the Forest Service.

rehabilitate: To repair and protect certain aspects of a system so that essential structures and functions are recovered, even though the overall system may not be exactly as it was before.

relic: Persistent remnants of formerly widespread fauna or flora species existing in certain isolated areas or habitats. The existence of an organism or species in an otherwise extinct taxon (phylum, order, family, genus, or species) from an earlier time that has survived in an environment that has undergone considerable change.

renewable energy: Energy derived from natural sources, such as sunlight, wind, rain, tides, or geothermal resources, that does not consume the resource when used.

research natural area (RNA): An area set aside by a public or private agency specifically to preserve a representative sample of an ecological community, primarily for scientific and educational purposes. In Forest Service usage, Research Natural Areas are areas designated to ensure representative samples of as many of the major naturally–occurring plant communities as possible.

resident fish: Fish that spend their entire life in freshwater; examples include redband trout and bull trout a.

resource: Anything which is beneficial or useful, be it animal, vegetable, mineral, a location, a labor force, a view, an experience, etc. Resources, in the context of land use planning, thus vary from such commodities as timber and minerals to such amenities as scenery, scenic viewpoints, or recreation opportunities.

responsible official: The Forest Service employee who has the authority to select and/or carry out a specific planning action.

restoration: Restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. It is an intentional activity that initiates or accelerates the recovery of an ecosystem with respect to its health, integrity, and sustainability. Restoration is an attempt to return an ecosystem to its historic trajectory, but not necessarily to a former state.

resource allocation: The action of apportioning the supply of a resource to specific uses or to particular persons or organizations.

riparian area: An area with distinctive soils and vegetation between a stream, or other body of water, and the adjacent upland area consisting of vegetation that requires free, or unbound, water for survival.

riparian-dependent species: Plant species that rely on free or unbound water for establishment and survival, and animal species that would normally occupy, or rely on, riparian habitats.

riparian habitat conservation areas (RHCAs): Portions of watershed where riparian–dependent resources receive primary emphasis and management activities are subject to specific standards and guidelines. Riparian habitat conservation areas include traditional riparian corridors, wetlands, intermittent headwater streams, and other areas where proper ecological functioning is crucial to maintenance of the streams' water, sediment, woody debris, and nutrient delivery system.

> **fish-bearing streams:** Riparian habitat conservation areas consist of the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet total, including both sides of the stream channel), whichever is greatest. In degraded or incised streams, the riparian management area should extend from the edge of the active channel to the outer extent of the former floodplain.

permanently flowing non-fish-bearing streams: Riparian habitat conservation areas consist of the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance (300 feet total, including both sides of the stream channel), whichever is greatest. In degraded or incised streams, the riparian management area should extend from the water's edge to the outer extent of the former floodplain.

ponds, lakes, reservoirs, and wetlands greater than 1 acre: Riparian habitat conservation areas consist of the body of water or wetland and: the area to the outer edges of the riparian vegetation, or to the extent of seasonally saturated soil, or the extent of unstable and potentially unstable areas, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance from the edge of the wetland greater than 1 acre or the maximum pool elevation of constructed ponds and reservoirs, whichever is greatest.

seasonally flowing or intermittent streams, wetlands, seeps and springs less than 1 acre, and landslide and landslide prone areas: This category applies to features with high variability in size and site-specific characteristics. At a minimum, the riparian habitat conservation areas should include:

- The extent of unstable and potentially unstable areas (including earthflows).
- The stream channel and extend to the top of the inner gorge, or in incised streams, to the edge of the former floodplain.
- The stream channel or wetland and the area from the edges of the stream channel or wetland to the outer edges of the riparian vegetation, extending from the edges of the stream channel to a distance equal to the height of one site-potential tree, or 100 feet slope distance, whichever is greatest. A site-potential tree height is the average maximum height of the tallest dominant trees for a given site class.
- Intermittent streams are defined as any nonpermanent flowing drainage feature having a definable channel and evidence of annual scour or deposition. This includes what are sometimes referred to as ephemeral streams if they meet these two physical criteria.. Accurate identification of these features is critical to the correct implementation of the strategy and protection of the intermittent stream and wetland functions and processes. Identification of these features is difficult at times due to the lack of surface water or wet soils during dry periods. Fish-bearing intermittent streams are distinguished from non-fish-bearing intermittent streams by the presence of any species of fish for any duration. Many intermittent streams may be used as spawning and rearing streams, refuge areas during flood events in larger rivers and streams or travel routes for fish emigrating from lakes. In these instances, the guidelines for fish-bearing streams would apply to those sections of the intermittent stream used by the fish.

.

riverine: On or near the banks of a river; riparian.

road: A motor vehicle route over 50 inches wide, unless designated and managed as a trail. A road may be classified, unclassified, or temporary (36 CFR 212.1).

classified roads: Roads wholly or partially within or adjacent to national forest lands that are determined to be needed for long-term motor vehicle access, including state roads, county roads, privately owned roads, forest roads, and other roads authorized by the Forest Service (36 CFR 212.1).

closed road: A road with all use suspended year–long by an active form of facility management utilizing regulations and appropriate enforcement to secure and ensure user compliance with closure.

open road: A road that has no use restrictions or regulations imposed and is available for use by vehicles at any time during the year.

temporary roads: Roads authorized by contract, permit, lease, other written authorization, or emergency operation not intended to be a part of the forest transportation system and not necessary for long-term resource management (36 CFR 212.1).

unclassified roads: Roads on national forest lands that are not managed as part of the forest transportation system, such as unplanned roads, abandoned travel ways, and off-road vehicle tracks that have not been designated and managed as a trail; and those roads that were once under permit or other authorization and were not decommissioned upon the termination of the authorization (36 CFR 212.1).

road construction: Activity that results in the addition of forest classified or temporary road miles (36 CFR 212.1). New construction activities may include vegetation clearing and grubbing, earthwork, drainage installation, instream activities, pit development or expansion, surfacing (including paving), and aggregate placement.

road decommissioning: Activities that result in the stabilization and restoration of unneeded roads to a more natural state (36 CFR 212.1, FSM 7703). Road decommissioning activities include revegetation, recontouring, water barring, roadbed scarification or ripping, culvert removal, berm construction, and side cast pullback. A road can also be “decommissioned” by taking it off the transportation system data base and removing the road sign that indicates the road number. This approach is used when a road is naturally closed and is hydrologically stable.

road density: An indicator of the concentration of roads in an area.

road maintenance: The ongoing upkeep of a road necessary to retain or restore the road to the approved road management objective.

road maintenance levels (MLs): Maintenance levels define the level of service provided by, and maintenance required for, a specific road. Maintenance levels must be consistent with road management objectives and maintenance criteria. Roads assigned to MLs 2 through 5 are either constant service roads or intermittent service roads during the time they are open to traffic.

Level 1: Assigned to intermittent service roads during the times they are closed to vehicular traffic. The closure period must exceed 1 year. Basic custodial maintenance is performed to keep damage to adjacent resources to acceptable levels and to perpetuate the road to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Appropriate traffic management strategies are prohibit and eliminate.

Roads receiving ML 1 maintenance may be of any type, class, or construction standard, and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at ML 1, they are closed to vehicular traffic, subject to prohibitions and restrictions, and may be available and suitable for nonmotorized users.

ML 1 maintenance activities include road condition surveys, evaluation, and monitoring of maintenance needs. Activities include limited equipment operation, opening closed roads, manual

cleaning of drainage structures, and vegetation management that stabilizes or reduces erosion. Repairs are scheduled and completed within funding limitations when critical resource damage is reported.

Roadway activities including blading, clearing logs, and noncritical repairs that can be delayed are accomplished when the road is placed in an active status.

Level 2: Assigned to roads open for use by high-clearance vehicles. Providing access for passenger cars is not a consideration. Traffic is normally minor, usually consisting of administrative, permitted, dispersed recreation, and/or other specialized uses. Log hauling may occur. Appropriate traffic management strategies are either to discourage or prohibit passenger cars or to accept or discourage high-clearance vehicles.

ML 2 maintenance activities include roadside brushing, hazard-tree removal, surface blading, drainage maintenance, structure maintenance, clearing logs, slide and slip cleanup and repair, sign maintenance and surface replacement. Drainage function and soil stabilization are of prime importance. Many roads in this category have grass in the travel way. User comfort is not a consideration.

Level 3: Assigned to roads open and maintained for travel by prudent drivers in standard passenger cars. User comfort and convenience are not considered priorities.

Roads in this maintenance level are typically low-speed, single-lane, with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material. Appropriate traffic management strategies are encourage or accept. Discourage or prohibit strategies may be employed for certain classes of vehicles or users.

ML 3 maintenance activities include roadside brushing, hazard-tree removal, surface blading, drainage maintenance, structure maintenance, clearing logs, slide and slip cleanup and repair, sign maintenance and surface replacement. Drainage function and soil stabilization are of prime importance. Dust abatement and more frequent blading may be needed on segments of multi-purpose roads.

Level 4: Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double-lane and aggregate-surfaced. However, some roads may be single-lane. Some roads may be paved and/or dust abated. The most appropriate traffic-management strategy is encourage. However, the prohibit strategy may apply to specific classes of vehicles or users at certain times.

ML 4 maintenance activities include roadside brushing, hazard tree removal, surface blading, drainage maintenance, structure maintenance, clearing logs, slide and slip cleanup and repair, sign maintenance and surface replacement. Drainage function and soil stabilization are of prime importance. Dust abatement and more frequent blading may be needed on segments of multi-purpose roads.

Level 5: Assigned to roads that provide a high degree of user comfort and convenience. These roads are normally double lane, paved. Some may be aggregate-surfaced and dust-abated. The appropriate traffic management strategy is encourage.

ML 5 maintenance activities include roadside brushing, hazard-tree removal, surface blading, drainage maintenance, structure maintenance, logging out, slide and slip cleanup and repair, sign maintenance and surfacing replacement. Drainage function and soil stabilization are of prime

importance. Dust abatement and more frequent blading may be needed on segments of multi-purpose roads. All of the ML 5 roads within a national forest have a permanent (paved) surface.

road management objectives: Road management objectives define the level of service provided by a National Forest System road consistent with the surrounding recreation opportunity spectrum (ROS) class.

semi–primitive nonmotorized (SPNM): Most semi-primitive nonmotorized areas do not have developed roads. All motorized traffic is prohibited. Semi-primitive nonmotorized roads provide hiking or equestrian trails on closed or decommissioned roads.

semi–primitive motorized (SPM): Semi-primitive motorized roads are generally used for four-wheel drive, logging, or ranching activities. Passenger-car use is discouraged by entrance conditions or signage. Users can expect SPM roads where there are no attractions such as viewpoints or trailheads.

rural (R): Rural is generally the highest standard of road. These arterial roads provide the main access to the national forest lands but generally lack the speeds and alignment provided by state highways. Roads are double–lane with a road-surface treatment and generally 24-feet wide. The road has center striping and often stripes marking the shoulders. Corresponds to a road Maintenance Level 5 and Traffic Service Level A (abbreviated: 5-A).

road prism: an area consisting of the road surfaces and any cut slope and road fill.

road reconstruction: Activity that results in improvement or realignment of an existing classified road as defined below. Reconstruction activities may include vegetation clearing and grubbing, earthwork, drainage installation, instream activities, surfacing (including paving), and aggregate placement.

road improvement: Activity that results in an increase of an existing road's traffic service level, expands its capacity, or changes its original design function.

road realignment: Activity that results in a new location of an existing road or portions of an existing road and treatment of the old roadway (36 CFR 212.1).

road restoration: Road restoration activities are commensurate with the assigned maintenance level and include storm proofing, bridge replacement, installation of drainage dips and water bars, culvert installation and upgrade, surface shaping, and draining, surface material processing. Refer to road maintenance.

roads subject to the Highway Safety Act: National Forest System roads open to use by the public for standard passenger cars. This includes roads with access restricted on a seasonal basis and roads closed during extreme weather conditions or for emergencies, but which are otherwise open for general public use.

road surface types:

asphalt/concrete: A well-graded aggregate and asphalt cement.

aggregate: Stone, slag, gravel, or any other hard, inert, mineral material meeting certain specified quality requirements for use in a road pavement or surfacing structure.

chip seal: A road surface treatment consisting of one or more spray applications of asphalt followed immediately by an application of aggregate (chips) on a paved surface.

grid–rolled: Aggregate consisting of native materials of a quality that can be taken directly from a given source, without crushing or screening, and broken down to a specified maximum dimension on the road by grid–rolling.

paved: One or more bituminous bound layers of aggregate placed on a prepared road foundation.

pit run: Aggregate consisting of native materials from a given source with a maximum size and grading suitable for placing directly on a road without crushing or screening.

native surface: A road surface consisting of soil or aggregate materials naturally existing at the road location.

spot rock: Aggregate placed on a road as a pavement or surfacing structure in designated areas that are not continuous throughout the entire length of the road.

strip rock: Aggregate placed on a road as a surfacing structure in designated areas or portions of a road greater than 200 feet in length but not continuous throughout the entire length of the road.

surface treated: One or more applications of asphalt or other processed or natural materials to a road surface to provide traction, abate dust, protect, or renew the surface without increasing pavement structural capacity. Surface treatment is commensurate with existing surface.

runoff (surface): Fresh water from precipitation and melting ice that flows on the earth's surface into nearby streams, lakes, wetlands, or reservoirs.

S

salmonids: Fishes of the family Salmonidae, including salmon, trout, chars, whitefish, ciscoes, and grayling.

salvage harvest: Harvest of trees that are dead, dying, or deteriorating due to fire, wind, insect or other damage, or disease.

satisfactory condition: A condition in which the soil is adequately protected and the forage species composition and production meets the land management plan objectives or the trend in forage species composition and production is acceptable.

savannah: The transitional biome between grassland and desert or desert and rainforest, typically having drought resistant vegetation dominated by grasses with scattered tall trees.

scabland: A region characterized by elevated tracts of rocky ground with little or no soil cover.

scale: (1) The level of resolution under consideration (for example, broad-scale or fine-scale); (2) the ratio of length on a map to true length.

scenery management system (SMS): The SMS is the method that was adopted after the Forest Plan was completed in 1990. The SMS utilizes two indicators to determine desired landscape character: ecological landscape integrity and scenic integrity. Ecological landscape integrity evaluates whether the landscape is managed in a sustainable and ecologically sound manner. Scenic integrity evaluates whether the landscape character is being managed in a way that conserves constituent values in terms of the level of human-caused deviations that are acceptable to the public (USDA Forest Service 1993 SMS HANDBOOK).

scenic area: Places of outstanding or matchless beauty that require special management to preserve these qualities. They may be established under 36 CFR 294.1 whenever lands possessing outstanding or unique natural beauty warrant this classification.

scenic class: Scenic class indicates the importance or value of a particular landscape determined by constituent information.

scenic identity: The scenic image and identity is the landscape character of an area. The landscape character identifies the "ideal" or optimal set of valued scenery attributes and describes the setting provided by these scenery attributes within each biophysical setting. It is important to understanding of the process, structure, and functions that support the valued set of scenery attributes. This understanding helps identify conditions and stressors that put scenery resources at risk.

scenic integrity level: Measures the degree to which a landscape is free from visible disturbances that detract from the natural or socially valued appearance. Scenic integrity objectives establish the desired level of scenic integrity for an area. Scenic stability measures the degree to which the valued landscape character and its scenery attributes can be sustained through time and ecological progression. Scenic stability objectives establish the desired level of scenic stability for a particular area. It is used to describe an existing situation, an objective for management, or desired conditions.

> **very high scenic integrity:** Scenery with fully intact landscape features and scenic compositions presenting the optimal landscape character in complete harmony, with very minute, if any, scenic discordance. Due to the optimal scenic integrity of the physical, biological, and cultural features in these scenic compositions, the landscape character and sense of place are expressed at the highest possible level. Very high scenic integrity is most compatible with wilderness, backcountry, biophysical, or cultural preserves, and other special classification areas.
>
> **high scenic integrity:** Scenery with whole or nearly intact landscape features and scenic compositions that present the optimal landscape character completely or nearly in full, and contain scenic discordances that are not evident.
>
> **moderately high scenic integrity:** Scenery with slightly altered landscape features and compositions in which the valued landscape character is the dominant scenic impression, yet minor discordance is apparent, but visually subordinate. The "moderate" level of scenic integrity in the Scenery Management Handbook has been split into two categories to reflect more accurately the scenic conditions on the in the Blue Mountains.
>
> **moderately low scenic integrity:** Scenery with altered landscape features and compositions that display a beginning dominance of valued landscape character expression and readily noticeable discordance.
>
> **low scenic integrity:** Scenery with obviously altered landscape features and compositions that dominate yet still express some aspects of valued landscape character. The scenic harmony of the valued landscape character is seriously fragmented and barely restorable within reasonable periods and resource expenditures.
>
> **very low scenic integrity:** Scenery with extremely altered landscape features and composition that no longer sustains significant aspects of valued landscape character. The scenic harmony of the optimal landscape character does not exist and its restoration may be impossible if not unrealistic.

scenic integrity objective: An established goal for the management of the scenic resource applied to a specific portion of the forest.

scenic river areas: Refer to Wild and Scenic River.

scenic river: Refer to Wild and Scenic River.

scoping process: A part of the NEPA process; the early stages of preparation of an environmental impact statement, early and open activities used to solicit public opinion, receive comments and suggestions, and determine the scope and significance of the issues to be considered in the development and analysis of a range of actions, alternatives, and impacts to be considered. Scoping may involve public meetings, telephone conversations, mailings, letters, or other contacts (40 CFR 1501.7).

screening: The reduction or elimination of the visual impact of any structure or land modification as seen from any public travel route within the national forests.

security: An area where wildlife, such as elk, retreat to for safety when disturbance in their usual range is intensified, such as by logging activities or during the hunting season.

secondary productivity: The growth of animal species that use the products derived from the growth and accumulation of plant biomass (primary productivity).

sediment: Solid materials, both mineral and organic, in suspension or transported by water, gravity, ice, or air; may be moved and deposited away from their original position and eventually will settle to the bottom.

sediment regime: The rate, frequency, magnitude, and duration of sediment movement. Refer to flow regime.

self-sustaining populations: Populations that are sufficiently abundant, interacting, and well-distributed in the plan area, within the bounds of their life history and distribution of the species and the capability of the landscape, to provide for their long-term persistence, resilience and adaptability over multiple generations.

sensitive soils: Forest land areas that have a moderate to very high hazard for soil compaction. Erosion, displacement, mass wasting, or forest floor displacement.

sensitive species: Plant or animal species identified by a regional forester for which population viability is a concern either: 1) because of significant current or predicted downward trends in population numbers or density; or 2) because of significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution. Those species that have appeared in the Federal Register as proposed for classification or are under consideration for official listing as endangered or threatened species, that are on an official state list, or that are recognized by the regional forester as needing special management to prevent placement on federal or state lists.

seral: Refers to the stages that plant communities go through during the progression in structure and composition over time. Development stages have characteristic structure and plant species composition. See succession for definitions of different seral stages.

seral stage: The developmental phase of a forest stand or rangeland with characteristic structure and plant species composition.

shade intolerant: Species of plants that do not grow well in or die from the effects of too much shade. Generally, these are fire-tolerant species.

shade tolerant: Species of plants that can develop and grow in the shade of other plants. Generally, these are fire-intolerant species.

shrubland: Area of land where the potential vegetation is dominated by shrubs.

short term: Generally refers to a period of 10 years or less.

silvicultural system: A management process whereby forests are tended, harvested, and replaced, resulting in a forest of distinctive form. Systems are classified according to the method of carrying out the fellings that remove the mature crop and provide for regeneration and according to the type of forest thereby produced.

single-story: Vegetation with a single canopy layer.

site: (1)A specific location of an activity or project, such as a campground, a lake, or a stand of trees to be harvested; (2) The location of a significant event, a prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined or vanished, where the location itself maintains historical or archeological value regardless of the value of any existing structure [36CFR65] (historic or archaeological definition).

site-potential tree: The average maximum height of the tallest trees for a given site class.

snag: A standing dead tree usually greater than five feet in height and six inches in diameter at breast height (d.b.h.).

social well-being: A condition that enables citizens, communities, and visitors to contribute to their wellness, values and quality of life.

society: A group of people who have a common homeland, are interdependent, and share a common culture.

soil: The earth material that has been so modified and acted upon by physical, chemical, and biological agents that it will support rooted plants.

soil function: The characteristic physical and biological activity of soils that influences productivity, capability, and resiliency.

soil productivity: The inherent capacity of a soil to produce plant growth, due to the soil's chemical, physical, and biological properties (such as depth, temperature, water-holding capacity, and mineral, nutrient, and organic matter content). It is often expressed by some measure of biomass accumulation.

soil quality: The capacity of a soil to function within ecosystem boundaries to sustain biological productivity, maintain environmental quality, and promote plant and animal health.

soil stability: (1) Mass stability of the soil profile or resistance to mass failure; (2) stability of the soil surface with respect to accelerated sheet, rill, and gully erosion processes.

soil surveys: All soil surveys are made by examining, describing, and classifying soils in the field and delineating their areas on maps. The map scale for field mapping must be large enough to allow areas of minimum size to be delineated legibly. Recognition of the different soil survey levels is helpful for communicating about soil surveys and maps, even though the levels cannot be sharply separated from each other. The order of a survey is consequence of field procedures, the minimum size of delineation, and the kinds of map units that are used.

source habitat: Habitat in such conditions that result in a positive or increasing population growth for a particular species. Those characteristics of vegetation that support long-term wildlife species persistence, or characteristics of vegetation that contribute to stable or positive population growth for a species in a specified area and time. Source habitats are described using dominant vegetation cover type and structural stage combinations that can be estimated reliably at the 247-acre (100-hectare) patch scale. Various combinations of these cover type–structural stages make up the source habitats for the terrestrial species discussed in this FEIS, and provide the range of vegetation conditions required by these species for food, reproduction, and other needs (Wisdom et al. 2000).

spatial: Related to or having the nature of space.

special habitat: A habitat which has a special function not provided by plant communities and successional stages. Includes riparian zones, snags, dead and downed wood, and edges (Thomas 1979).

specially designated areas: Also referred to as special areas and is one of the plan components. Areas designated because of their unique or special characteristics, such as botanical areas or areas designated by stature or administrative processes such as wilderness, wild and scenic rivers, or research natural areas.

special use authorization: A permit, term permit lease, or easement which allows occupancy, use, rights, or privileges of national forest lands (36 CFR 251.51).

species: A population or series of populations of organisms that can interbreed freely with each other but not with members of other species.

species composition: The species that occur on a site or in a successional stage of a plant community (Thomas 1979).

species diversity: The number of species occurring in a given area.

species of concern: Species for which management actions may be necessary to prevent listing under the Endangered Species Act. Criteria for selection as a species of concern include:

- Identified as candidate and proposed for listing under the Endangered Species Act.
- Has a G1 to G3 NatureServe ranking.
- Intraspecific taxa with NatureServe ranking of T1 to T3.
- Has been petitioned for listing under the Endangered Species Act.

sprouter: Flora capable of vegetative reproduction from roots or stems.

stand: A group of trees in a specific area that re sufficiently alike in composition, age, arrangement, and condition so as to be distinguishable from the forest in adjoining areas.

stand composition: The vegetative species that make up the stand.

stand density: Refers to the number of trees growing in a given area, usually expressed in trees per acre.

stand initiation (SI): Stand conditions that arise following a stand-replacing disturbance such as wildfire or timber harvest. Colonizers disperse seed into disturbed areas, the seed germinates, and new seedlings establish and develop. A single canopy stratum of tree seedlings and saplings is present. Average tree diameters are generally less than five inches.

stand-replacement fire: A fire severity classification where at least 75 percent replacement of the upper layer of vegetation is removed.

stand structure: The mix and distribution of tree sizes, layers, and ages in a forest. Some stands are all one size (single-story) some are two-story, and some are a mix of trees of different ages and sizes.

standard: A standard is a mandatory constraint on project and activity decision making, established to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

state and transition model: Nonequilibrium ecological model to describe vegetation dynamics of rangeland sites as adopted by the Natural Resource Conservation Service. Models recognize multiple steady states of vegetation and emphasize disturbance processes.

strategy: Part two of a land management plan that explains the suitable uses and includes the special designated areas, and management categories.

stream channel: Refer to channel.

stem exclusion: The stage created when vigorous, fast growing trees occupy the growing space. Establishment of new trees is precluded by a lack of sunlight or moisture. This stage could be maintained by thinning or fire. Stands only have one dominant layer. Average tree diameters range from 5 to 20 inches.

stringers: Relatively narrow areas suitable to be occupied by forested plant associations within a landscape that is otherwise unsuitable due to site or environmental factors.

stronghold: Directly associated with strong populations. For native fish, strong populations have stable numbers or are increasing, and all major life history forms that historically occurred within the watershed are present.

stocking level: The ratio of the current stand density to an assumed ideal level of stand density.

structure: (1) Any permanent building or facility, or part thereof such as barns, outhouses, residences, and storage sheds including transmission line systems, substations, commercial radio transmitters, relays or repeater stations, antennas, and other electronic sites and associated structures; or (2) the size and arrangement of vegetation, both vertically and horizontally.

structural stage: A stage of development of a vegetation community that is classified on the dominant processes of growth, development, competition, and mortality.

subalpine: A terrestrial community that generally is found in harsher environments than the montane terrestrial community. Subalpine communities are generally colder than montane and support a unique clustering of wildlife species.

subbasin: A drainage area of approximately 800,000 to 1,000,000 acres, equivalent to a 4th-field HUC watershed.

subsistence: Customary and traditional uses of wild renewable resources (plants and animals) for food, shelter, fuel, clothing, tools, etc.

subwatershed: A drainage area of approximately 20,000 acres, equivalent to a 6th-field HUC (12 digit). Hierarchically, subwatersheds (6th field HUC) are contained within watersheds (5th field HUC, which in turn are contained within a subbasin (4th field HUC).

succession: The sequential replacement over time of one plant community by another, in the absence of major disturbance. Conditions of the prior plant community or successional stage create conditions that are favorable for the establishment of the next stage. The different stages of succession are often referred to as seral stages. Developmental stages are as follows:

> **early seral:** Communities that occur early in the successional path and generally have less complex structural developmental than other successional communities. Seedling and sapling size classes are an example of early seral forests.
>
> **mid-seral:** Communities that occur in the middle of the successional path. For forests, this usually corresponds to the pole or medium sawtimber growth stages.
>
> **late-seral:** Communities that occur in the later stage of the successional path with mature, generally larger individuals, such as mature forests.

suitable habitat: Habitat that currently has both the fixed and variable stand attributes for a given species habitat requirements. Variable attributes change over time and may include seral stage, cover type and overstory canopy cover.

suitability: The appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences and the alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices.

suitable uses: Uses that are compatible with the desired conditions and objectives for a given area which are identified as guidance for project and activity decision making and do not represent a commitment or final decision approving projects or activities.

surface fire: A fire that burns surface litter, dead woody fuels, other loose debris on the forest floor, and some small vegetation without significant movement into the overstory, usually with a flame less than a few feet high.

surface water development: The practice of diverting or impounding surface water sources by the construction of dams, diversions, canals, or ditches for use, such as irrigation, livestock watering, and human consumption.

sustainability: Meeting needs of the present generation without compromising the ability of future generations to meet their needs. Sustainability is composed of desirable social, economic, and ecological conditions or trends interacting at varying spatial and temporal scales, embodying the principles of multiple-use and sustained-yield (FSM 1905).

sustained-yield of products and services: The achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the National Forest System without impairment of the productivity of the land.

T

talus: A slope formed by the accumulation of rock debris at the base of a cliff.

temporal: Related to time.

terrestrial: Pertaining to the land.

terrestrial wildlife: Wildlife species that dwell primarily on land (Thomas 1979).

thermal regulation: The processes by which many animals actively maintain the temperature of all or parts of their body; the protection against local climatic extremes provided by, for example, shade produced by vegetation, protection from wind or sun, or protection from extreme cold.

thinning: An operation to remove stems from a forest for the purpose of reducing fuel, maintaining stand vigor, regulating stand density/composition, or for other resource benefits. Although thinning can result in commercial products, thinning generally refers to noncommercial operations.

threatened species: Species listed under the Endangered Species Act by either the U.S. Fish and Wildlife Service or the National Marine Fisheries Service. These species are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

timber harvest: The removal of trees for wood fiber utilization and other multiple-use purposes.

timber production: The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use. For purposes of this subpart, the term timber production does not include production of fuelwood.

total maximum daily load (TMDL): A calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. The Clean Water Act, Section 303, establishes the water quality standards and TMDL programs.

traditional cultural areas: Those areas of the forest used by Native American Indian tribes for traditional activities and often referred to as "religious use areas" or "sacred areas." They may include areas traditionally used for gathering of special forest products.

travel corridors: An area of vegetation that provides completely or partially suitable habitat for animals to travel from one location to another.

travel route: A route, such as a county or national forest road or river or trail, that is open for use by members of the public.

treaty-reserved right: Tribal rights or interests reserved in treaties, by Native American Indian tribes for the use and benefit of their members. The uses include such activities as described in the respective treaty document. Only Congress may abolish or modify treaties or treaty rights.

treaty resource: A resource associated with the language in a specific treaty, usually interpreted to include collections or association of species; not limited to a single species. For example: fish may include all fish species (some treaties included rights to erect temporary houses for curing fish); roots and berries may include a wide variety of plants that will encompass the nature of the plants as they were used historically; grasses are necessarily included for the treaty reserved right to graze cattle or livestock. Hunting rights may include all species of animals hunted in historic and prehistoric times. As these apply to the Forest Service, they are public natural resources on national forest lands, to which American Indian tribes have reserved certain rights for taking or gathering.

trend: As used to define range conditions, the direction of change in range or forage condition or in ecological status.

tribe: Term used to designate any native American Indian tribe, band, nation, or other organized group or community which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians.

trust resource: A resource or property that constitutes a corpus or object of trust that is held in trust status by another (trustee) on behalf of a beneficiary. A trustee is usually a governmental entity (Secretary of the Interior) who is assigned a trust duty to care for resources that are for the exclusive use and benefit of Indian tribes and/or their members. A beneficiary may be an Indian tribe or individual tribal member, who has property being held in trust status, for example: land, money, timber, or any Indian-owned asset.

U

understory: Lower vegetation in a forest, the small trees and other woody species/shrubs growing under a more–or–less continuous cover of branches and foliage formed collectively by the taller adjacent trees and other woody growth.

understory reinitiation (UR): New age classes of trees establish as the overstory trees die or are thinned and no longer occupy all of the growing space. Regrowth of understory vegetation then occurs, and trees begin to develop in vertical layers. This stage contains multiple layers and multiple tree sizes. Average tree diameters range from 5 to 20 inches.

uneven-aged management: The application of a combination of actions needed to simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products. Cutting is usually regulated by specifying the number or proportion of trees of particular sizes to retain within each area, thereby maintaining a planned distribution of size classes. Cutting methods that develop and maintain uneven-aged stands are single-tree selection and group selection.

> **uneven-aged management (group selection):** The group selection variant of uneven–aged management is designed to facilitate the establishment of shade intolerant species, reduce damage to the residual stand, and lengthen the cyclic entry period. The opening created under the group selection prescription would often be no larger than one to two tree heights (as influenced by aspect and slope) so as not to lose the site protection afforded by the surrounding trees. Size, shape, and location of groups should be designed to achieve landscape character goals and scenic integrity objectives.
>
> **uneven-aged management (single-tree selection):** This silvicultural system is intended to perpetuate uneven–aged stands composed of intermingled trees of differing ages, species, and sizes. Individually selected trees are removed to maintain a desired range of tree sizes over a prescribed distribution. Cyclic entries designed to control the structure and species composition and provide the openings necessary for establishment and growth of the continuously occurring regeneration are a function of the site quality and resource considerations.

ungulates: Hoofed, plant-eating mammals such as elk, deer, and cattle.

upland: The portion of the landscape above the valley floor or stream.

unroaded area: Portion of the national forest that does not contain classified roads. Refer to road.

utility corridor: A parcel of land, without fixed limits or boundaries that is being used as the location for one or more transportation or utility rights-of-way.

V

vascular plants: Plants that have specialized tissues which conduct nutrients, water, and sugars, along with other specialized parts such as roots, stems, and reproductive structures. Vascular plants include flowering plants, ferns, shrubs, grasses, trees, and many others.

vector: An organism that carries or transmits a pathogenic agent from one host to another.

vegetation management: Activities designed primarily to promote the health of forest vegetation in order to achieve desired results. Vegetation management is the practice of manipulating the species mix, age, fuel load, and /or distribution of wildland plant communities within a prescribed or designated area in order to achieve desired results. It includes prescribed burning, grazing, chemical applications, biomass harvesting, and any other economically feasible method of enhancing, retarding, modifying, transplanting, or removing the aboveground parts of plants.

vertebrate: An animal with a backbone; mammals, fishes, birds, reptiles, and amphibians are vertebrates.

viability: In general, viability means the ability of a population of a plant or animal species to persist for some specified time into the future.

viable population: A population that is regarded as having the estimated numbers and distribution of reproductive individuals to ensure that its continued existence is well distributed in the project area.

vision: Part one of a land management plan that describes the roles, contribution, and desired conditions of the national. This section also contains monitoring measures to assess progress toward the desired conditions.

W

water right: A right to use surface water or ground water evidenced by a court decree or by a permit or certificate approved by the state water resources department. Statutory exempt uses of surface water and ground water are not water rights, nor are time-limited licenses. A perfected water right is defined by applicant name, source, purpose, amount (quantity, rate and duty), season of use, priority date, point of diversion, place of use, and certificate number.

water quality: A term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose.

watershed: (1) The region draining into a river, river system or body of water; or (2) subdivisions within a subbasin, which generally range in size from 40,000 to 250,000 acres; the fifth level (10-digit) in the hydrologic hierarchy.

watershed condition classes: Watersheds are rated as Class 1, 2, or 3.

> **Class 1 Condition:** Watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. Drainage network is generally stable. Physical, chemical, and biological] conditions suggest that soil, aquatic, and riparian systems are predominantly functional in terms of supporting beneficial uses.

Class 2 Condition: Watersheds exhibit moderate geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. Portions of the watershed may exhibit an unstable drainage network. Physical, chemical, and biological conditions suggest that soil, aquatic, and riparian systems are at risk in being able to support beneficial uses.

Class 3 Condition: Watersheds exhibit low geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. A majority of the drainage network may be unstable. Physical, chemical, and biological conditions suggest that soil, aquatic, and riparian systems do not support beneficial uses.

watershed function: The processes acting on hillslopes and stream channel within a drainage basin that control the movement of water, wood, sediment, and nutrients.

weed: A plant considered undesirable, unattractive, or troublesome, usually introduced and growing without intentional cultivation.

wetlands: Those areas that are inundated by surface or ground water with a frequency sufficient to support and under normal circumstances do or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds (Executive Order 11990, Section 7c).

wild and scenic river (WSR): Those rivers or sections of rivers designated as such by congressional action under the Wild and Scenic Rivers Act of 1968, as supplemented and amended. Wild and scenic rivers include all national forest lands within the designated wild and scenic river corridor (15). The following classifications are used:

wild river areas: Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted.

scenic river areas: Those rivers or sections of rivers that are free of impoundments, with watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

recreational river areas: Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

study river areas: Those rivers formally designated by Congress to be studied under Sections 5(a) and 5(b) of the Wild and Scenic Rivers Act.

wildfire: An unplanned wildland fire including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other wildland fires where the objective is to put the fire out (NWCG 2012).

wildland: A nonurban, natural area that contains uncultivated land, timber, range, watershed, brush or grassland.

wildland fire: Any non-structure fire that occurs in the wildland. Three distinct types of wildland fire have been defined and include wildfire, wildland fire use, and prescribed fire. (NWCG 2012).

wildland fire situation analysis (WFSA): A decision-making process that evaluates alternative management strategies against selected safety, environmental, social, economic, political, and resource management objectives (USDA Forest Service 1998).

wildland fire suppression: An appropriate management response to wildland fire that results in curtailment of fire spread and eliminates all identified threats from the particular fire. All wildland fire suppression activities provide for firefighter and public safety as the highest consideration, but minimize loss of resource values, economic expenditures, and/or the use of critical firefighting resources (USDA Forest Service 1998).

wildland fire use: The application of the appropriate management response to naturally-ignited wildland fires to accomplish specific resource management objectives in pre-defined designated areas outlined in Fire Management Plans. Operational management is described in the Wildland Fire Implementation Plan (WFIP) (NWCG 2012).

wildland-urban interface (WUI): The area directly adjacent to home and communities.

winter range: The area available to and used by wildlife (big game) during the winter season. Generally, lands below 4,000 feet in elevation, on south and west aspects, that provides forage and thermal/snow intercept.

woodland: Dry, low elevation areas with a potential vegetation type of juniper.

X

xeric: Very dry region or climate; tolerating or adapted to dry conditions. Dry soil moisture regime. Some moisture is present but does not occur at optimum levels for plant growth. Irrigation or summer fallow is often necessary for crop production

Appendices

Appendix A – Maps (In a separate map packet)

Map 1. Location of the Lower Joseph Creek Restoration Project
Map 2. Watershed Condition Framework ratings for the LJCRP area
Map 3. Lower Grande Ronde subbasin and watersheds of the Lower Joseph Creek Restoration Project
Map 4. Droughty soils within the Lower Joseph Creek Restoration Project
Map 5. Non-native invasive plant species found within the LJCRP area
Map 6. Current level of connectivity between designated old groth (MA15) and other late seral old forest.
Map 7. Current forest canopy cover classes across the LJCRP area.
Map 8.Water quality limited waters associated with the Lower Joseph Creek Restoration Project
Map 9. Soils of the Lower Joseph Creek Restoration Project
Map 10. Five Panel Map illustrating applicaton of FSH 1909.12 Chapter 71 potential wilderness criteria
Map 11a. Wallowa-Whitman Forest Plan management areas and Alternative 2 treatments within the Lower Joseph Creek Restoration Project boundaries
Map 11b. Wallowa-Whitman Forest Plan management areas and Alternative 3 treatments within the Lower Joseph Creek Restoration Project boundaries
Map 12. Existing condition – road status
Map 13. Alternative 1 - Road status
Map 14. Alternative 2 -Forest vegetation treatments, including the location of Alternative 2 treatments areas where the proposed Forest Plan (Eastside Screens) amendment would apply
Map 15. Alternative 2 - Road network
Map 16. Alternative 3 - Vegetation treatments, including location of Alternative 3 treatments areas where the proposed Forest Plan (Eastside Screens) amendment would apply

Map 17. Alternative 3 - Road network
Map 18. Landforms of the Lower Joseph Creek Restoration Project
Map 19. Grazing allotments of the Lower Joseph Creek Restoration Project and Alternative 2 vegetation treatments
Map 20. Alternative 2 - Prescribed fire priorities
Map 21. Alternative 3 - Prescribed fire priorities
Map 22. Overlap of vegetation treatments under alternatives 2 and 3 with IRA, PWA, and other undeveloped lands
Map 23. Overlap of vegetation treatments under alternatives 2 and 3 with areas identified as unroaded by Oregon Wild
Map 24. Sensitive plant surveys and locations in the Lower Joseph Creek Restoration Project area
Map 25. Estimated logging systems needed to implement Alternative 2
Map 26. Estimated logging systems needed to implement Alternative 3

Appendix B - Forest Plan Direction, and Other policies, Laws, Regulations, and Agreements

This appendix compiles or summarizes:

- General Forest Plan direction applicable to the LJCRP.
- More information on other policies, laws, treaties, and regulations pertinent to the LJCRP mentioned in Chapter 2.
- Relevant amendments to the Wallowa-Whitman National Forest Plan

Tiering and Incorporating by Reference

In order to eliminate repetition and focus on site-specific analysis, this environmental impact statement is tiered to the following documents as permitted by 40 CFR 1502.20.

Forest Plan Management Direction

This FEIS is tiered to the final environmental impact statement (FEIS) for the WWNF Land and Resource Management Plan, as amended (USDA Forest Service 1990)(WWNF Forest Plan) and the Hells Canyon National Recreation Area Comprehensive Management Plan FEIS and Record of Decision dated April 1982, as amended in 1983, 1984, and 2003 (USDA Forest Service 2003). The Comprehensive Management Plan (CMP) was incorporated into the WWNF Forest Plan.

The Forest Plan, as amended, includes management goals and objectives and standards and guidelines, both forestwide and specific to land allocations (management areas).

The project area includes 8 Management Areas (MA) as described in the WWNF Forest Plan (starting pg. 4-56). Timber Production Emphasis (MA-1) makes up approximately 28,256 acres of the project area. Wildlife/Timber (MA 3) includes another 36,068 acres. Outside the HCNRA, Wild and Scenic Rivers (MA 7), Research Natural Areas (MA 12) and Old Growth Preservation (MA 15) comprise approximately 6,350 acres. The remaining 3 management areas within the project areas (approximately 28,735 acres) are within the HCNRA as described in the CMP (Appendix C, Table C1) and consist of HCNRA Dispersed Recreation/Native Vegetation (MA 9), HCNRA Forage Production (MA 10) and HCNRA Dispersed Recreation/Timber Management (MA 11).

> **MA 1** - Timber Production - emphasizes wood fiber production on suitable timber lands while providing high levels of forage and recreation opportunities.
>
> **MA 3 -** Wildlife/Timber - are similar to MA 1; however, timber management is designed to provide near-optimum cover and forage conditions on big game winter ranges .
>
> **MA7 -** Wild and Scenic Rivers - Management is intended to preserve the special values of those rivers, such as Joseph Creek, which are part of the National Wild and Scenic Rivers System.
>
> **MA 9** – HCNRA Dispersed Recreation/Native Vegetation - all activities will be managed to provide many opportunities for dispersed recreation and to enhance native vegetation. It is envisioned that these areas will eventually be almost entirely occupied by native plant species.

MA 10 - HCNRA Forage Emphasis - This management area lies within the grasslands interwoven with timbered stringers in the HCNRA. Timbered portions will provide old-growth habitat at approximately current levels.

MA 11- HCNRA Dispersed Recreation/Timber Management - These areas combine dispersed recreation with timber management on the more productive sites within the HCNRA. The management objective is to provide a variety of tree species, a diversity of healthy timber stands, and ample dispersed recreation opportunities.

MA 12 - Research Natural Areas (RNAs) - emphasizes the preservation of natural ecosystems for comparison with those influenced by humans; provides educational and research areas for ecological and environmental studies; and preserves gene pools for typical, rare, and endangered plants and animals.

MA 15 - Old Growth Preservation- are intended to maintain habitat diversity, preserve aesthetic values, and provide old growth habitat for wildlife.

Policies, Treaties and Regulations Pertinent to the LJCRP

Nez Perce Tribe Ceded Lands

The Wallowa-Whitman National Forest, including the LJCRP, contains lands ceded by the Nez Perce Tribe in 1855 through Treaty with the United States. Although tribal lands were ceded to the Federal Government, tribal sovereignty and treaty rights were reserved. The Forest Service, through the Secretary of Agriculture, lies within the executive branch of government and therefore has a trust responsibility to consult, cooperate, and coordinate with federally recognized tribes regarding decisions or policies that have the potential to affect tribal interests. The Forest Service is also vested with a statutory authority and responsibility for managing natural resources and their associated habitats on NFS lands. These natural resources are considered treaty resources by the Nez Perce Tribe. The LJCRP is located entirely within traditional territory of the Chief Joseph Band of the Nez Perce subject to the rights the Tribe reserved, and the United States secured, in the Treaty of 1855. The Chief Joseph Band of the Nez Perce is a constituent member of, and, represented by, the Confederated Tribes of the Colville Reservation (CTCR). The CTCR was created by the Executive Order of 1872 as amended by the North-Half Agreement of 1891. The Colville Business Commission (CCT) delegated to the Tribal Historic Preservation Officer (THPO) the responsibility of representing the CCT with regard to cultural resource management issues throughout the traditional territories of their constituent tribes (*pers. comm*. Guy Mora, THPO).

Tribal Consultation

The Forest Service **Tribal consultation** responsibilities are guided by a variety of laws and Executive Orders, including the National Environmental Policy Act (NEPA), National Historic Preservation Act (NHPA) as amended, Archaeological Resources Protection Act (ARPA), American Indian Religious Freedom Act (AIRFA), National Forest Management Act (NFMA), Native American Graves Protection and Repatriation Act of 1990 (NAGPRA), and the American Indian Religious Freedom Act of 1978 (AIRFA). Executive Orders and Memoranda include Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and E.O. 13007 (Accommodation of Sacred Sites). Consultation is also guided by Forest Service policy to maintain a government-to-government relationship with federally recognized Tribes, coordinate land and resources management plans and actions with tribal land and resource management plans and actions to promote the health of ecosystems, and consult with Tribes on matters that may affect tribal rights and interests (FSM 1563.03). Forest Service policy also provides direction to develop land management goals and objectives within the

framework defined by laws, Indian treaties, regulations, collaboratively developed public and Indian tribal values and desires, historical conditions, current and likely future ecological capabilities, a range of climate change predictions, the best available science, information, and technical and economic feasibility (FSM 2020.3). For a summary of staff to staff and government consultation between the IDT, Wallowa-Whitman National Forest, and the Nez Perce Tribe, refer to the Tribal Relations Specialist report.

Heritage Resources

The 2004 Programmatic Agreement between Region 6 of the Forest Service and the Oregon State Heritage Protection Office (SHPO) will guide compliance on heritage resource concerns.

Travel Management

Travel analysis assesses the current forest transportation system and identifies issues and assesses benefits, problems, and risks to inform decisions related to identification of the minimum road system per 36 CFR Part 212.5(b)(1) and designation of roads, trails and areas for motor vehicle use per 36 CFR Part 212.51. Travel analysis is not a decision-making process. Rather, travel analysis informs decisions relating to administration of the forest transportation system and helps to identify proposals for changes in travel management direction. Travel analysis (FSH 7709.55, chapter 20) is used to inform decisions related to identification of the minimum road system needed for safe and efficient travel and for administration, utilization, and protection of NFS lands per 36 CFR 212.5(b)(1) and to inform decisions related to the designation of roads, trails, and areas for motor vehicle use per 36 CFR 212.51. 2. Travel analysis for purposes of identification of the minimum road system is separate from travel analysis for purposes of designation of roads, trails, and areas for motor vehicle use. Travel analysis for both purposes may be conducted concurrently or separately. Any proposals resulting from travel analysis for either purpose may be addressed in the same or different environmental analyses. The LJCRP decision may include proposed changes to the transportation system, or the responsible official may choose to defer any changes until the Subpart B travel analysis is complete.

Invasive Plant Management

USDA Forest Service, PNW Region 2005 Invasive Plant Management Record of Decision for invasive species management documented prevention actions and Region-wide standards for invasive species management (USDA Forest Service 2005). In March 2010, the Final EIS for the WWNF Invasive Plants Treatment was completed. A Record of Decision was signed on April 2, 2010, but due to litigation, could not be fully implemented until a supplemental EIS (SEIS) was completed. The SEIS was signed in 2016. ,

Research Natural Areas

Establishment of research natural areas has been sanctioned in the Code of Federal Regulations in Section 7 CFR 2.42, 36 CFR 251.23, and 36 CFR 219.25. Direction for establishment is provided in Forest Service Manual 4063 and in “A Guide for Developing Natural Area Management and Monitoring Plans” written by the Pacific Northwest Interagency Natural Area Committee.

Legal Requirements and Required Disclosures

This FEIS adheres to the following Federal legal requirements

The National Environmental Policy Act (NEPA) of 1969 (Pub. L. 91-190): The purposes of this act are “to declare a national policy which will encourage productive and enjoyable harmony between man and his environment, to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental

Quality." (42 U.S.C. Sec. 4321). NEPA establishes the format and content requirements for environmental analyses and documentation. The preparation of this FEIS complies with NEPA.

The National Forest Management Act (NFMA) of 1976 (Pub. L. 4-588): This act guides development and revision of national forest land and resource management plans and contains regulations that prescribe how land and resource management planning is to be conducted on NFS lands to protect national forest resources. The different alternatives for this project were developed to comply with NFMA and to represent varying degrees of resource protection.

The Endangered Species Act (ESA) of 1973, as amended: This act provides for the conservation of threatened and endangered species and their habitats. ESA requires that the Forest Service ensure that any actions it approves will not jeopardize the continued existence of threatened and endangered species or result in the destruction or adverse modification of critical habitat. Refer to the PETS wildlife and plants non-significant issue and the additional information provided in the plants, wildlife and fisheries sections in chapter 3.

The Migratory Bird Treaty Act (MBTA) of 1918: This establishes an international framework for the protection and conservation of migratory birds. MBTA implements various treaties and conventions between the U.S. and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. The act makes taking, killing, or possessing migratory birds, including nests and eggs, unlawful. A list of Neotropical migratory birds protected by MBTA is provided in 50 CFR 10.13. Additional information on MBTA can be found in the Wildlife Resources section in chapter 3.

Executive Order (EO) 13186 (MBTA): In January 2001, the President signed an executive order outlining responsibilities of Federal agencies to protect migratory birds in compliance with MBTA. As a complementary measure to the executive order, the Forest Service and the U.S. Fish and Wildlife Service entered into a memorandum of understanding (MOU) to strengthen migratory bird conservation through enhanced collaboration between the agencies, in coordination with state, tribal, and local governments.

Forest Service & FWS MOU: The purpose of this MOU is, *"to strengthen migratory bird conservation by identifying and implementing strategies that promote conservation and avoid or minimize adverse impacts on migratory birds through enhanced collaboration between the Parties, in coordination with State, Tribal, and local governments."*. Under the MOU the FS Shall: Address the conservation of migratory bird habitat and populations when developing, amending, or revising management plans for national forests and grasslands, consistent with NFMA, ESA, and other authorities listed above. When developing the list of species to be considered in the planning process, **consult the current (updated every 5 years) FWS Birds of Conservation Concern, 2008 (BCC), State lists, and comprehensive planning efforts for migratory birds**. Within the NEPA process, evaluate the effects of agency actions on migratory birds, focusing first on species of management concern along with their priority habitats and key risk factors.

Executive Order 11644 (February 8, 1972) "Use of Off-Road Vehicles on the Public Lands," as amended by EO 11989 (May 24, 1977): National direction for travel planning, specifically off-road use of motor vehicles on Federal lands, is provided by EO 11644 as amended. Section 3(a) of EO 11644 directs the Forest Service to promulgate regulations that provide for designation of trails and areas for off-road motor vehicle use. The regulations require that designation of these trails and areas be based upon protection of NFS resources, promotion of public safety, and minimization of conflicts among uses of NFS lands. Section 9(b) was added to EO 11644 when it was amended by EO 11989. Section 9(b) specifically authorizes the Forest Service to adopt the policy to designate those areas or trails that are suitable for motor vehicle use and to close all other areas and trails to that use.

2001 Roadless Area Conservation Rule: The 2001 Roadless Area Conservation Rule (RACR) sets forth particular requirements when timber may be cut, sold, or removed within Inventoried Roadless Areas. Criteria that only apply to the management within IRAs include:

- The timber is generally small diameter. 36 CFR 294.13 (b)(1).
- Timber cutting, sale, and/or removal are needed to maintain or improve one or more of the roadless area characteristics. 36 CFR 294.13 (b)(1).
- The cutting, sale, or removal of timber is incidental to the implementation of a management activity not otherwise prohibited. 36 CFR 294.13 (b)(2). This criterion would only be applied to cutting and removal of roadside danger trees.
- The cutting and sale of timber is expected to be infrequent. 36 CFR 294.13 (b).

The Clean Air Act, as amended in 1990: All proposed prescribed burning would be conducted in compliance with National Ambient Air Quality Standards and Oregon Department of Environmental Quality (ODEQ) regulations and restrictions contained in the Oregon Smoke Management Plan (ODEQ Directive 1-4-1-601). Fuel activities can be timed to minimize the impacts of smoke on forest users and local communities. An operator's burn plan is developed prior to ignition. On site weather conditions are monitored before, during, and after an ignition. Ocular smoke observations are made throughout the ignition phase. Residual smoke is monitored for dispersion and direction. No ignitions would occur if there is an air stagnation advisory in place within the northeast Oregon geographic area. No ignitions would occur if existing or forecast conditions would transport measurable smoke into downwind communities. The removal and direct treatment of biomass would reduce emissions should a wildfire occur. The effect of smoke under any action alternative would be short term. Particulate matter is not expected to exceed standards

The Federal Water Pollution Control Act of 1972 (Pub. L. 92-500) as amended in 1977 (Pub. L. 95-217) and 1987 (Pub. L. 100-4), also known as the Clean Water Act: The primary objective of this act is to restore and maintain the integrity of the Nation's waters by: 1) Eliminating the discharge of pollutants into the Nation's waters; and 2) Achieving water quality levels that are fishable and swimmable. This act establishes a non-degradation policy for all federally proposed projects to be accomplished through planning, application, and monitoring of best management practices (BMPs) (see appendix G). Identification of BMPs is mandated by Section 319 of the Water Quality Act of 1987 (also referred to as the Clean Water Act), which states, "It is national policy that programs for the control of nonpoint sources of pollution be developed and implemented." Additional information about BMPs is provided in appendix G and the Soil and Water Resources section in chapter 3.

Executive Order 11988, Floodplains: Requires that the Forest Service "avoid to the extent possible the long and short term adverse impacts associated with the occupation or modification of floodplains. The proposed action is consistent with this executive order as it does not propose to occupy or modify any floodplains.

Executive Order 11990, Wetlands: Requires the Forest Service "avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands. The proposed action is consistent with this executive order as it does not propose to cause the destruction or modification of any wetland.

The Antiquities Act of 1906: This act provides penalties for any person who shall appropriate, excavate, injure, or destroy any historic or prehistoric ruin or monument, or any object of antiquity, situated on lands owned by the government of the United States. Cultural resource surveys would be completed for

any proposed addition to the current designated travel system and any cultural resources identified would be protected as required through consultation with the State Historic Preservation Officer (see Non-significant Issues section).

The National Historic Preservation Act (NHPA) of 1966, as amended: This act requires Federal agencies to consult with SHPO and local interested parties and American Indian tribes before nonrenewable cultural resources, such as archaeological sites and historic structures are damaged or destroyed. Section 106 of this act requires Federal agencies to review the effects that project proposals may have on cultural resources in the project area. It requires agencies to consider the effects of undertakings on properties eligible for or listed in the National Register of Historic Places (NRHP) by following the regulatory process specified in 36 CFR 800. Actions permitted, approved, or initiated by the Forest Service that may affect cultural resources must comply with provisions of the NHPA of 1966, as amended, and as implemented by Federal guidelines 36 CFR 800. Section 106 of the NHPA requires a Federal agency to take into account the effects of the agency's undertaking on properties listed on, or eligible for listing on, the National Register of Historic Places (NRHP).

The Archaeological Resources Protection Act (ARPA) of 1979: ARPA prohibits the excavation, removal, damage, or destruction of archaeological resources located on public lands and specifies civil and criminal penalties for persons found guilty of violations. Authorized excavation and removal of archaeological resources requires a permit issued by the managing Federal agency. ARPA, as referenced in the Freedom of Information Act (FOIA) (5 U.S.C. 552[b]), protects the confidentiality of archaeological sites from public disclosure. Other provisions of the law promote communication and cooperation between Federal agencies, American Indian tribes, professional archaeologists, and private individuals for the protection of archaeological resources on public lands. The procedures for implementing ARPA are outlined in 36 CFR, Part 296.

Federal statutes governing theft and destruction of government property also prohibit the removal, damage, or destruction of archaeological resources on public lands (18 U.S.C. 641 and 18 U.S.C. 1361) (see Non-significant Issues section).

Invasive Species Executive Order (EO) 13112 of February 3, 1999: The Forest Service is obligated by law, and regulations such as Executive Order 13112, to respond to invasive species that threaten terrestrial and aquatic resources of the National Forest System and to collaborate with Federal, State, and local partners to address invasive species that can spread from adjacent lands. Forest Service policy for invasive species management and research has recently been updated by direction provided in Forest Service Manual (FSM) 2900 and by directions provided in FSMs 3400 and 4000.

2013 National Strategic Framework for Invasive Species Management: The 2013 National Strategic Framework for Invasive Species Management prioritizes and guides the prevention, detection, and control of invasive insects, pathogens, plants, wildlife, and fish that threaten our Nation's terrestrial and aquatic ecosystems. The Framework incorporates the Invasive Species Systems Approach (ISSA) developed by the Forest Service to respond to these threats over the next 5 to 10 years and supersedes the Invasive Species Strategy and Implementation Plan (2004). This Framework describes how National and Regional Invasive Species Issue Teams (NISIT and RISITs, respectively) will coordinate activities within the Forest Service and with Federal, State, and local partners. National priorities will be reviewed at least once every 5 years and adjusted as needed. RISITs will assess and adjust their regional invasive species priorities for their respective ecosystems at least once every 5 years.

2013 Oregon Dept. of Agriculture Noxious Weed Policy and Classification System: Noxious weeds, for the purpose of this system, shall be listed as either A or B, and may be added to the T List, as directed by the Oregon State Weed Board.

A Listed Weed – a weed of known economic importance which occurs in the state in small enough infestations to make eradication or containment possible; or is not known to occur, but its presence in neighboring states make future occurrence in Oregon seem imminent. Infestations are subject to eradication or intensive control when and where found.

B Listed Weed – a weed of economic importance which is regionally abundant, but which may have limited distribution in some counties. Limited to intensive control at the state, county or regional level as determined on a site specific, case-by-case basis. Where implementation of a fully integrated statewide management plan is not feasible, biological control (when available) shall be the primary control method.

T Designated Weed – Annually, a designated list of weed species is selected that will be the focus for prevention and control by the Noxious Weed Control Program. Action against these weeds will receive priority. T designated noxious weeds are determined by the Oregon State Weed Board and directs ODA to develop and implement a statewide management plan. T designated noxious weeds are species selected from either the A or B list.

Executive Order 12898: Executive Order 12898 directs Federal agencies to make environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. An associated memorandum emphasizes the need to consider these types of effects during NEPA analysis. The proposed action and alternatives would not disproportionately adversely affect minority or low-income populations (including American Indians) because the WWNF Travel Management Plan affords access to all groups equally

Hunting: The Oregon Department of Fish and Wildlife regulates hunting in the Chesnimnus and Sled Springs Game Management Unit through controlled hunts which requires a hunting tag.

Other Policies, Laws, Treaties and Regulations

This project is also consistent with:

- Council on Environmental Quality Regulations (CEQ)
- Regional Water Quality Control Board Requirements
- ORS 2013 564.105 (Responsibility to protect and conserve native plants by Oregon state law)
- USDA viability regulation 9500-004 2008
- USFWS 2007 Recovery Plan for *Silene spaldingii* (Spalding's catchfly)
- Other relevant Federal and State laws and regulations, and Forest Service manuals and handbooks.
- Wallowa County Community Wildfire Protection Plan (Wallowa County 2006).
- Prescribed burning of forest fuels (logging slash or natural) will comply with Oregon Administrative Rules (OAR) 629-048-0001 to 629-048-0500 (Smoke Management Rules) within any forest protection district as described in OAR 629-048-0500 to 0575.
- National Fire Plan (August 2000) developed with the intent of responding to severe wildland fires and their impacts to communities while addressing five key points: firefighting, rehabilitation, hazardous fuels reduction, community assistance and accountability.

- The Wallowa County/Nez Perce Tribe Salmon Habitat Recovery Plan with Multi-Species Habitat Strategy (Wallowa County and Nez Perce Tribe 1999) provides a plan to restore and maintain habitat for chinook salmon and possibly other salmonid fish in Wallowa County, Oregon.

Plan Amendments

Major plan amendments relevant to this project include:

PACFISH – In 1995, the "Interim Strategies for Managing Anadromous fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California" (**PACFISH**) Decision Notice amended the Forest Plan (US Department of Agriculture 1995). PACFISH added goals and objectives for anadromous fish habitat condition and function, and identified Riparian Habitat Conservation Areas (RHCAs), where management activities will meet interim standards and guidelines.

Eastside Screens -In 1993, the Forest Service adopted interim measures to preserve late-successional/old-growth forests on the eastside of the Cascade crest in Oregon and Washington until they could be replaced by more permanent and complete decisions. These measures, known as the Eastside Screens, consist of a series of procedures for screening proposed timber sales. Among other things, the Eastside Screens prohibit logging live trees greater than 21-inches in diameter at breast height. The adoption of the Eastside Screens amended all land and resource management plans (Forest Plans) for National Forests east of the Cascade Crest.

These and other relevant Forest Plan amendments are summarized chronologically in the table below:

		Amendments to the 1990 Wallowa-Whitman National Forest Plan
Amendment Number	**Date**	**Amendment Topic**
4	04/02/1992	Changed standards and guidelines to say management of competing and unwanted vegetation will tier to the FEIS for Managing Competing and Unwanted Vegetation, USDA Forest Service, Pacific Northwest Region, December 1988 or subsequent NEPA documents.
14 (RF#1)	05/20/1994	Extended interim management direction establishing riparian, ecosystem, and wildlife standards for timber sales on Eastside forests pending completion of the Eastside Ecosystem Management Strategy. (Regional Forester Amendment #1).
11	05/26/1994	Added direction for long and short term snag management levels. Redesigned Sufferin Smith Timber Sale to meet eastside ecosystem screens.
13	06/07/1994	Incorporated management direction for the Joseph Creek Wild and Scenic River.
17	02/22/1995	Documented selection of the preferred alternative for the Washington Watershed Project for fuels reduction within the Baker City Watershed. Amendments are 1) eliminate the Washington Gulch C&H domestic grazing allotment and close the area to domestic livestock grazing; 2) treatment of late/old structure stands – treatment will not meet RF 1; 3) allocate 300 acres of old-growth habitat (MA 15) and a 300-acre pileated woodpecker feeding area.
RF 3	02/24/1995	Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH). (Regional Forester Amendment #3).
RF 2	06/08/1995	Revised Interim Standards for Timber Sales on Eastside Forests. (Regional Forester Amendment #2).
RF 4	07/28/1995	Interim Strategies for Managing Inland Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (INFISH). (Regional Forester Amendment #4).

		Amendments to the 1990 Wallowa-Whitman National Forest Plan
Amendment Number	**Date**	**Amendment Topic**
19	07/31/1995	Documented selection of the preferred alternative for the Eagle-Paddy Timber Sale, which affected the Eastside Screens.
22	12/18/1996	Documented selection of the preferred alternative for Dark Horn Salvage Sale Project. Affected PACFISH by treating riparian habitat conservation areas.
23	12/18/1996	Documented selection of the preferred alternative for Eagle Holcomb Timber Sale. Affected Eastside Screens by harvesting trees greater than 21 inches DBH. As a result of administrative appeals, trees greater than 21 inches were dropped from the sale.
21	05/13/1997	Documented selection of preferred alternative for Spring Creek Restoration Project. Affected PACFISH by treating riparian habitat conservation areas.
24	07/14/1997	Allowed harvest in 34 acres of Late Old Structure stands in the Dry Melon Timber Sale. Affected Regional Forester Amendment #2 by harvesting LOS stages in a watershed that is below the Historic Range of Variation for LOS.
26	03/20/2000	Allowed cutting of trees greater than 21 inches in diameter on the Starkey Research Restoration and Fuels Reduction Project to validate squirrel/dwarf mistletoe research.
27a	05/10/2000	Changed the Government Draw Research Natural Area from a “proposed RNA” to an “established RNA”. Name was later changed to Gerald S. Strickler RNA.
27b	05/01/2001	Carrol Creek Fire Salvage and Restoration Project – Modified area of Old Growth designation.
28	05/25/2001	Changed Vance Knoll Research Natural Area from a “proposed RNA” to an “established RNA”.
29	07/21/2003	Revised Comprehensive Management Plan for the Hells Canyon National Recreation Area.
31	11/10/2004	Changed Duck Lake Research Natural Area from a “proposed RNA” to an “established RNA”.
32	12/15/2004	Mt. Emily Fuels Reduction project – The Forest Plan Amendment includes changes to two sections in the Forest Plan for the Mt. Emily analysis area. The two sections are: 1) treatment of late and old structure that are below the historic range of variability and 2) treatment in the Bull Canyon allocated old growth (MA 15).
RF 5	10/11/2005	Pacific Northwest Region Invasive Plant Program Preventing and Managing Invasive Plants – new goals, objectives, and standards for managing invasive plants.
34	6/28/2006	Mt. Emily II – Forest Plan amendments for: 1) treatment of late and old structure that are below the historic range of variability and 2) added applicable conservation measures from the Canada Lynx Conservation Assessment and Strategy for the project area.
35	2/22/2007	Bald Angel Vegetation Management Project –Forest Plan amendment needed for treatment of late and old structure that is below the historic range of variability – Decision pulled in July 2006, new decision made in February, 2007
36	12/18/2006	Mt. Howard - Forest Plan amendments for: 1) treatment of late and old structure below the historic range of variability and 2) added applicable conservation measures from the Canada Lynx Conservation Assessment and Strategy for the project area.
38	8/18/2008	Horsefly Vegetation Management Project – Forest Plan Amendments needed for 1) 1) treatment of late and old structure below the historic range of variability, 2) treatment in areas of marginal cover in MA 3, and 3) removal of trees over 21” dbh to treat mistletoe infestation

		Amendments to the 1990 Wallowa-Whitman National Forest Plan
Amendment Number	**Date**	**Amendment Topic**
39	4/9/2010	Sugar Vegetation Management Project – Forest Plan amendment for treatment of LOS below HRV.
40	8/26/2010	Tremble Aspen Restoration Project – Forest Plan amendment for 1) harvest of live trees greater than 21-inch diameter, and 2) harvest within LOS for other than moving from one LOS stage to another.
42	11/30/11	Cove II WUI – Forest Plan amendments for 1) harvest in MSLT below HRV, and 2) harvest in MA 15 old growth.
43	Decision Withdrawn	Travel Management Plan
44		Snow Basin Vegetation Management Project – Forest Plan amendment for 1) harvest of live trees great than 21-inch diameter, and 2) harvest in LOS below HRV.

Appendix C - Landscape Modeling Methods

State-and-transition Modeling Overview

Scenario projections for vegetation growth, development, management, natural disturbance, climate change interactions, and some cumulative effects for the Lower Joseph Creek Restoration project area were done using state and transition models (STMs) developed as part of the Integrated Landscape Assessment Project (ILAP). ILAP was designed to support ecosystem management planning and assessments across all forests, woodlands, and arid lands of Arizona, New Mexico, Oregon, and Washington. The project explored the dynamics of broad scale, multi-ownership, vegetated landscapes by integrating information about current and future vegetation and fuel conditions, climate change, wildlife habitat, fuel treatment economics, and community economics (Burcsu et al. In press). STMs were used by the ILAP effort to represent the range of vegetation types from forested to arid lands and project changes from vegetation community development, natural disturbances, and management events.

According to Burcsu et al. (In press):

> "STMs can be thought of as box and arrow diagrams of vegetation where boxes represent states within the vegetation type in which properties are temporally-related and can be described using structural and functional attributes, and may include one or more successional phases (Bestelmeyer et al. 2009). In this concept arrows represent the drivers causing state change, such as succession, disturbance, and management (Stringham et al. 2003). STMs can be designed to address both broad- and fine-scale research questions. STMs have been used extensively in rangeland management to represent highly dynamic and perturbation-sensitive rangeland ecosystems (Stringham et al. 2003, Briske et al. 2005, Petersen et al. 2009), examine ecosystem resilience and the effects of restoration (Forbis et al. 2006), to project the distribution of states on the landscape and their associated changes through time as part of an integrative modeling framework for planning (Baker 1989, Hemstrom et al. 2007, Vavra et al. 2007, Wales et al. 2007, Bestelmeyer et al. 2009). As a decision support tool, this type of model allows synthesis of assumptions about vegetation growth, natural disturbance regimes, and management regimes in a single modeling environment (Bestelmeyer et al. 2003, Hemstrom et al. 2007). Models developed under this framework are also relatively simple to parameterize and can integrate information from expert opinions with information derived from data (Stringham et al. 2003, Provencher et al. 2009)."

> "…individual STMs represented vegetation dynamics (alternate states, successional processes, disturbance, etc.) within units of potential vegetation. Potential vegetation was a useful modeling unit because common species assemblages, site productivity and disturbance patterns could be represented, and finer classifications (plant association groups and plant associations) commonly used by federal land management agencies for planning and project implementation (e.g., (Hall 1998)) could also be included. More importantly, potential vegetation types provided concise descriptions of biophysical conditions and disturbance regimes. Within our project area, potential vegetation maps provided the ecological boundaries and area in which each STM operated, similar to the use of Biophysical Setting (BpS) by the LANDFIRE project (Rollins 2009), or the Ecological Site Descriptions (ESD) by the Natural Resources Conservation Service (www.nrcs.usda.gov)."

Burcsu et al. (In press) describe the individual state classes (boxes) within ILAP STMs as representing *cover types*, usually the dominant species or vegetation assemblage, and *structural stages*, based on physical attributes such as vegetation height, percent cover, and canopy layers. For example, in a forest type STM a state may have represented ponderosa pine of the 10-15" diameter class in multiple structural stages, depending on whether it had open, mid, or closed canopy cover.

The transitions (arrows) in the STMs simulated successional processes such as growth and development, natural disturbances such as wildfire and insect outbreaks, and management actions such as prescribed wildfire and tree harvesting (Burcsu et al. In press). Transitions were classified as either deterministic or probabilistic. Deterministic transitions occurred at a specific vegetation age, whereas probabilistic transitions were defined by an annual transition probability. Some transitions moved vegetation from one state class to another, for instance a stand-replacing disturbance moved vegetation from a dense forest to a grass/forb state. Other transitions resulted in vegetation remaining in the same state, such as surface fires, mild insect activity, drought, and some types of grazing.

To link these abstract STM states to current landscape conditions, spatial data representing current vegetation conditions were used. The spatial area in each of the current vegetation's discrete classes (of cover type and structure) allocated area by modeling strata into the various states within a model, forming the modeling initial conditions. These initial conditions provided the starting point from which STMs projections began. Current vegetation data came from a combination of maps developed from recent stand examinations for those vegetation stands within the Lower Joseph project area and ILAP data for the stands surrounding the project area. Current and potential vegetation data were re-sampled from the original ILAP 30m pixels to 90m pixels or, in the case of recent stand exams, from stand exam polygons to 90m pixels.

STMs were run using the StSim modeling platform (http://www.apexrms.com/projects/stsm). All models used Monte Carlo simulations of variation in wildfire and insect/disease disturbances. Except for the Historical Range of Variability simulations, wildfire and other natural disturbance probabilities were from the ILAP models and, for wildfire, were derived from Monitoring Trends in Burn Severity data (www.mtbs.gov). Annual variation in wildfire was estimated from the Monitoring Trends in Burn Severity data. Annual variation in insect/disease disturbances came from expert opinion supplied by Craig Schmidt (entomologist, USDA Forest Service, retired) and other local experts.

General Assumptions and Data Sources

The modeling area is a rectangle that includes the LJCRP area. The rectangle is large enough to reduce or eliminate edge effects for fire and other disturbances that propagate into the Lower Joseph Project Area from origin points outside the project area. The modeling rectangle is about 453,000 acres in size. National Forest System (NFS) lands in the Project Area are about 100,000 acres. Project area boundary spatial data were supplied by the Blue Mountains Restoration Team (BMRT). Hemstrom selected the modeling rectangle.

To model direct and indirect effects, management disturbances are turned off on all lands outside the project area. Cumulative effects assessments used management disturbance assumptions for non-NFS lands based on the best available information.

Outside the project area, existing vegetation condition spatial data for cover type and structure stage are from the Integrated Landscape Assessment Project (ILAP) as modified by Chris Zanger (TNC) using methods developed by Mike Simpson and others. Data were re-sampled to a 90m grid (approximately 2 acres per grid cell).

For the project area only, data from local stand exams and the Wallowa-Whitman NF EVG database were substituted for ILAP data. These local data for the project area were supplied by the BMRT and were cross-walked to modeling cover types and structure classes by Hemstrom.

Potential Vegetation Type (PVT) spatial data came from ILAP.

Spatial data on Management Areas from the existing Wallowa-Whitman NF Plan were supplied by the BMRT, accessed from: http://www.fs.fed.us/r6/data-library/gis/umatilla/index.shtml (Wallowa-Whitman, Umatilla, Malheur), and http://www.fs.fed.us/r6/data-library/gis/ochoco/ (Ochoco).

Proposed and alternative commercial harvest unit and potential pre-commercial thinning unit spatial data were supplied by the BMRT.

Preliminary timber volume outputs were estimated using volume tables for each state class generated by Xiaoping Zhou (PNW Research Station) specifically for the Blue Mountains. She used Forest Inventory and Analysis plot data to estimate volume, biomass, and other characteristics as part of the ILAP effort (Zhou and Hemstrom 2010). A difference method was used to estimate removed volume: volume in the ending state class following a timber harvest transition was subtracted from volume in the beginning state class before harvest. The difference was assumed to approximate or index the timber volume removed by harvest transitions.

All spatial inputs to the model were re-sampled to a 90m grid to match the existing and potential vegetation data inputs. This resulted in the generalization of finer-scale data.

Reference Conditions Scenario

The Reference Conditions (RC) scenario reflects the long-term effects of no management and no wildfire suppression, hypothetically representing the Historic Range of Variation, e.g. conditions prior to about 1850.

Wildfire probabilities were cross-walked to ILAP PVTs from LANDFIRE National (2010) models and biophysical environment data. A group involving Shlisky, Zanger (TNC), Simpson, Hemstrom, and others developed the cross-walk of LANDFIRE biophysical environments to PVTs. In general, LANDFIRE wildfire probabilities for the reference condition were four to eight times greater than current annual probabilities, though there was considerable variation.

There were no available assumptions to use for reference conditions insect and disease disturbances, so current insect and disease disturbance assumptions were used.

RC models were run for 500 years and 5 Monte Carlo simulations, beginning with current conditions. Examination of the results suggested that vegetation and disturbance conditions changed rapidly for the first 150 years, then stabilized around a set of values after about 300 years. Model results from years 300 to 500 years were used for analysis.

Initial conditions are not considered to highly influence final, stable conditions produced after 300-500 years of simulation.

Wildfire Scenarios Methods

The Reference Condition (HRV) model was run for 500 years and 5 Monte Carlo simulations. The last 50 years from each Monte Carlo simulation was used to estimate the average amount of stand replacement wildfire (WFSR), mixed severity wildfire (WFMS), and non-lethal wildfire (WFNL). The standard deviation was also calculated.

Each management scenario (Alternatives 1, 2, and 3) was run for 30 years and 5 Monte Carlo simulations. All 30 years from each Monte Carlo simulation was used to estimate the average amount of stand replacement wildfire (WFSR), mixed severity wildfire (WFMS), and non-lethal wildfire (WFNL). The standard deviation was also calculated.

All potential vegetation types were lumped as were all management areas when statistics were computed. This gave overall estimates of the average (and SD) amount of WFSR, WFMS, and WFNL that allows comparison of the amount of wildfire by severity class for the HRV, Alt 1, Alt 2, and Alt 3 Scenarios.

No Action Scenario (Alternative 1)

The No Action (NA) scenario reflects short to mid-term effects of current levels of stand growth and succession without management, aside from current levels of fire suppression.

All management activities aside from current levels of fire suppression were turned off on all lands.

Models were run for 30 years and 5 Monte Carlo simulations, starting with current conditions.

Proposed Action Scenario (Alternative 2)

The Proposed Action (PA) scenario reflects short to mid-term effects of the proposed actions developed by the BMRT. The PA is designed to actively move as much area as realistically possible toward reference conditions across multiple management areas.

Commercial thinning was applied to all commercial thinning unit areas within boundaries supplied by the BMRT. These treatment boundaries crossed an assortment of management areas. The PA allowed limited harvest of trees over 21” DBH as long as the trees were not old. The state and transition model includes two kinds of commercial thinning partial harvests (PH); one that causes a change in cover type (e.g. from Douglas-fir to western larch in cool, moist forests) and one that does not. Modeling assumed that commercial thinning targeted to change cover types might harvest some level of trees over 21” DBH, but commercial thinning that does not change cover type would remove very few, if any, trees over 21” DBH. Since the PA scenario was designed to move cover type to that reflected by reference conditions, the model emphasized thinning that changed cover type by equally splitting harvest targets between the two types of thinning.

Stand improvement is also known as pre-commercial thinning (PCT), and was applied in a similar fashion to treatment area boundaries supplied by the BMRT. PCT was applied in two ways in the model; one that changed cover type and one that did not. PCT was only applied to seedling/sapling and pole size classes in the model and was assumed not to remove any trees over 21” DBH regardless of scenario. Since the PA scenario attempted to move forest cover type toward reference conditions, the models targeted equal amounts of PCT that changed cover type and PCT that did not. The model assumed that PCT would be done over a period of 10 years and would target the entire area within the PCT unit boundaries supplied by the BMRT. Where commercial and PCT unit boundaries overlapped, they were targeted for commercial harvest rather than PCT.

Prescribed Fire was modeled for all appropriate dry forest stands (e.g. where trees were large enough to survive prescribed fire). This dry forest prescribed fire effort started after the initial 10 year period and continued for 20 years was allowed in any management area within the 103,000 acre project area. Prescribed fire was modeled to achieve a 1 in 20 probability for any acre to be treated in any one year. Time since treatment for prescribed fire was set to 20 years to prevent re-treating the same areas within the 20 year time frame.

Models were run for 30 years and 5 Monte Carlo simulations.

Alternative 3

Alternative 3 (A3) removes PH and PCT treatment from management areas designated as inventoried roadless, old growth management areas (MA 15), and the riparian habitat conservation area network.

Excluded management area designations were supplied by the BMRT. It also removes harvest of trees over 21” DBH.

The models were run on vegetation data derived from the area excluded from both PH and PCT treatments using designations supplied by the BMRT. This removed considerable area from treatment compared to the PA scenario and resulted in relatively lower treatment amounts over the 10 year treatment period compared to the PA.

The model turned off all PH treatments that changed forest cover type since these treatments were assumed to remove some trees over 21” DBH. However, the model did not turn off PCT treatments that changed cover type because A3 still had the goal of moving cover type toward reference conditions within the constraints imposed. PCT was assumed not to remove trees over 21” DBH.

Prescribed fire was modeled for all appropriate dry forest stands (e.g. where trees were large enough to survive prescribed fire). This dry forest prescribed fire effort started after the initial 10 year period and continued for 20 years. Prescribed fire was allowed in any management area within the 103,000 acre project area. Prescribed fire was modeled to achieve a 1 in 20 probability for any acre to be treated in any one year. Time since treatment for prescribed fire was set to 20 years to prevent re-treating the same areas within the 20 year time frame.

Models were run for 30 years and 5 Monte Carlo simulations.

Results – Vegetation Change under Current Climatic Conditions

The tables below summarize the percentage of each PVG in each cover type and average tree size for the current condition and conditions projected 10 and 30 years into the future. Current conditions of forest cover type and stand size class were compared to projected future conditions at years 10 and 30 for alternatives 1, 2, and 3. Potential vegetation types were combined into three potential vegetation groups (non-forest, moist forest, and dry forest) to simplify analysis and results. Currently (year 0), Douglas-fir (DF) cover types make up 57% of the moist forest PVG while 28% is grand-fir/Engelmann spruce (GFES) and the rest is in Douglas-fir/grand fir (DG), ponderosa pine (PP), and western larch/lodgepole pine (WLLP) cover types. Projected 30-year results indicate that alternatives 2 and 3 are likely to increase WLLP compared to alternative 1 in moist forests. Similarly, dry forests currently are dominated by Douglas-fir cover types with lesser amounts of PP and DG cover types. Projections indicated that after 30 years, the representation of PP cover types in dry forests would increase in alternatives 2 and 3 compared to alternative 1. Due variation in data sources, minor data correction since modeling was conducted, and rounding errors, current conditions displayed here may differ slightly from those displayed in the Vegetation sections of the FEIS, although trends are consistent.

% of PVG year 0	non-forest	DF	DG	GFES	PP	WLLP	Total %
non-forest	89	7	2	0	2	0	100
moist forest	4	57	2	28	2	6	100
dry forest	9	53	17	1	21	0	100
Alt 1 - % of PVG year 10	non-forest	DF	DG	GFES	PP	WLLP	Total %
non-forest	89	7	2	0	2	0	100
moist forest	4	54	2	31	2	6	100
dry forest	9	52	17	1	22	0	100
Alt 2 - % of PVG year 10	non-forest	DF	DG	GFES	PP	WLLP	Total %
non-forest	89	7	2	0	2	0	100
moist forest	4	56	2	25	2	10	100
dry forest	9	47	15	1	29	0	100
Alt 3 - % of PVG year 10	non-forest	DF	DG	GFES	PP	WLLP	Total %
non-forest	89	7	2	0	2	0	100
moist forest	4	56	2	27	2	9	100
dry forest	9	48	16	1	26	0	100

Alt 1 - % of PVG year 30	non-forest	DF	DG	GFES	PP	WLLP	Total %
non-forest	89	7	2	0	2	0	100
moist forest	4	50	2	33	2	8	100
dry forest	9	50	16	1	24	0	100
Alt 2 - % of PVG year 30	non-forest	DF	DG	GFES	PP	WLLP	Total %
non-forest	89	7	2	0	2	0	100
moist forest	4	52	2	27	2	13	100
dry forest	9	45	14	1	31	0	100
Alt 3 - % of PVG year 30	non-forest	DF	DG	GFES	PP	WLLP	Total %
non-forest	89	7	2	0	2	0	100
moist forest	4	51	2	28	2	13	100
dry forest	9	46	15	1	29	0	100

Moist forests are currently dominated by an even mix of small (10-15” DBH), medium (15-20” DBH), and large (over 20” DBH) trees. Thirty year projections indicated that all three alternatives might produce declines in large trees and an increase in small or medium trees, due mostly to losses of large trees to insects and disease. Alternatives two and three retain more large trees than alternative one, with Alternative 2 retaining slightly more than Alternative 3. The story is different in dry forests where alternatives two and three produce higher proportions of large trees than are present in the current condition or that might be produced by alternative one. Alternatives two and three produce about the same amounts of large trees after 30 years in dry forests. Due variation in data sources, minor data correction since modeling was conducted, and rounding errors, current conditions displayed here may differ slightly from those displayed in the Vegetation sections of the FEIS, although trends are consistent.

% of PVG year 0	non-forest	Grass/Forb	<5"	5-10"	10-15"	15-20"	>20"	Total %
non-forest	89	0	2	0	4	3	2	100
moist forest	4	0	15	9	25	24	23	100
dry forest	9	1	15	26	2	34	14	100

Alt 1 - % of PVG year 10	non-forest	GF	<5"	5-10"	10-15"	15-20"	>20"	Total %
non-forest	89	0	2	0	4	3	2	100
moist forest	4	2	12	14	37	17	13	100
dry forest	9	7	11	14	24	26	10	100

Alt 1 - % of PVG year 30	non-forest	GF	<5"	5-10"	10-15"	15-20"	>20"	Total %
non-forest	89	0	2	3	0	4	2	100
moist forest	4	3	7	13	20	45	9	100
dry forest	9	5	8	30	19	21	8	100

Alt 2 - % of PVG year 10	non-forest	GF	<5"	5-10"	10-15"	15-20"	>20"	Total %
non-forest	89	0	2	0	4	3	2	100
moist forest	4	2	13	14	31	19	17	100
dry forest	9	4	11	9	23	29	14	100

Alt 2 - % of PVG year 30	non-forest	GF	<5"	5-10"	10-15"	15-20"	>20"	Total %
non-forest	89	0	2	0	4	3	2	100
moist forest	4	3	10	17	33	18	15	100
dry forest	9	3	6	10	14	37	21	100

Alt 3 - % of PVG year 10	non-forest	GF	<5"	5-10"	10-15"	15-20"	>20"	Total %
non-forest	89	0	2	0	4	3	2	100
moist forest	4	2	13	13	32	21	16	100
dry forest	9	5	11	10	23	29	14	100

Alt 3 - % of PVG year 30	non-forest	GF	<5"	5-10"	10-15"	15-20"	>20"	Total %
non-forest	89	0	2	0	4	3	2	100
moist forest	4	4	11	15	34	18	13	100
dry forest	9	4	7	9	14	36	20	100

Trends in forest tree canopy cover varied over time and by alternative as well. Moist forests are currently dominated by medium (40-60% canopy cover) and high density conditions with smaller amounts of low (10-40%) and open (non-forest) conditions. After 30 years, Alternative 1 produced declines in both medium and high density conditions, with an increase in low density conditions, as the result of insect and disease activity. Alternatives 2 and 3 also produced declines in medium and high density conditions, but the change was smaller than in Alternative 1. Alternatives 2 and 3 differed little in the amount of medium and high density forests after 30 years. Dry forests, on the other hand, had very little dense forest canopy conditions (about 1%) in the current condition or in any of the alternatives. Open and medium density canopy conditions currently dominate dry forests. After 30 years, Alternative 1 produced a small decline in moderate canopy density conditions and an increase in open conditions. Alternatives 2 and 3 produced nearly identical results after 30 years; substantial increases in open conditions and corresponding declines in moderate conditions. Due variation in data sources, minor data correction since modeling was conducted, and rounding errors, current conditions displayed here may differ slightly from those displayed in the Vegetation sections of the FEIS, although trends are consistent.

% of PVG year 0	non-forest	10-40%	40-60%	>60%	total %
non-forest	89	4	7	0	100
moist forest	4	4	54	38	100
dry forest	9	29	61	1	100

Alt 1 - % of PVG year 10	non-forest	10-40%	40-60%	>60%	total %
non-forest	89	4	7	0	100
moist forest	4	31	37	28	100
dry forest	9	36	54	1	100

Alt 1 - % of PVG year 30	non-forest	10-40%	40-60%	>60%	total %
non-forest	89	4	7	0	100
moist forest	4	53	16	27	100
dry forest	9	43	48	1	100

Alt 2 - % of PVG year 10	non-forest	10-40%	40-60%	>60%	total %
non-forest	89	4	7	0	100
moist forest	4	26	54	16	100
dry forest	9	69	21	1	100

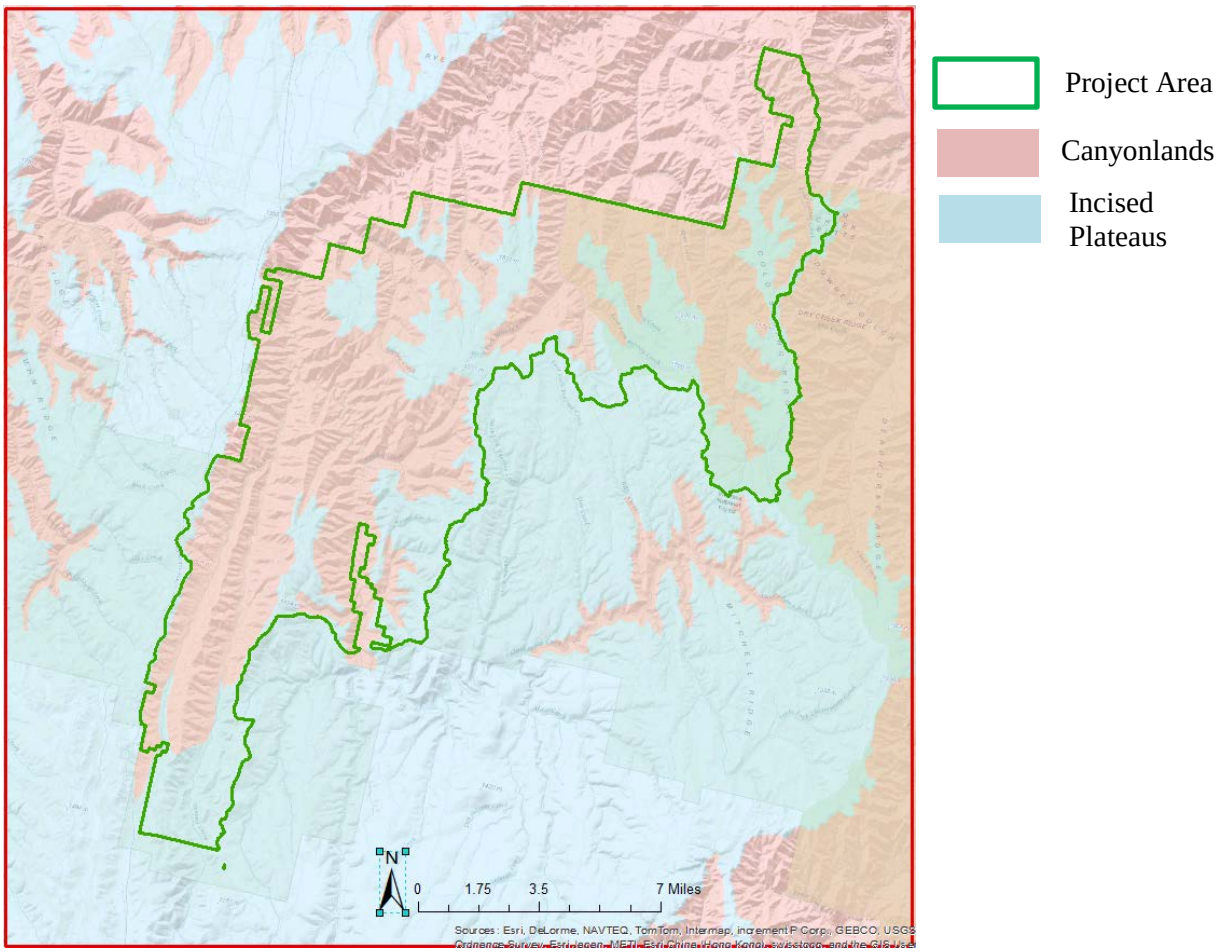
Alt 2 - % of PVG year 30	non-forest	10-40%	40-60%	>60%	total %
non-forest	89	4	7	0	100
moist forest	4	36	39	20	100
dry forest	9	74	17	1	100

Alt 3 - % of PVG year 10	non-forest	10-40%	40-60%	>60%	total %
non-forest	89	4	7	0	100
moist forest	4	25	50	20	100
dry forest	9	68	23	1	100

Alt 3 - % of PVG year 30	non-forest	10-40%	40-60%	>60%	total %
non-forest	89	4	7	0	100
moist forest	4	41	33	22	100
dry forest	9	73	17	1	100

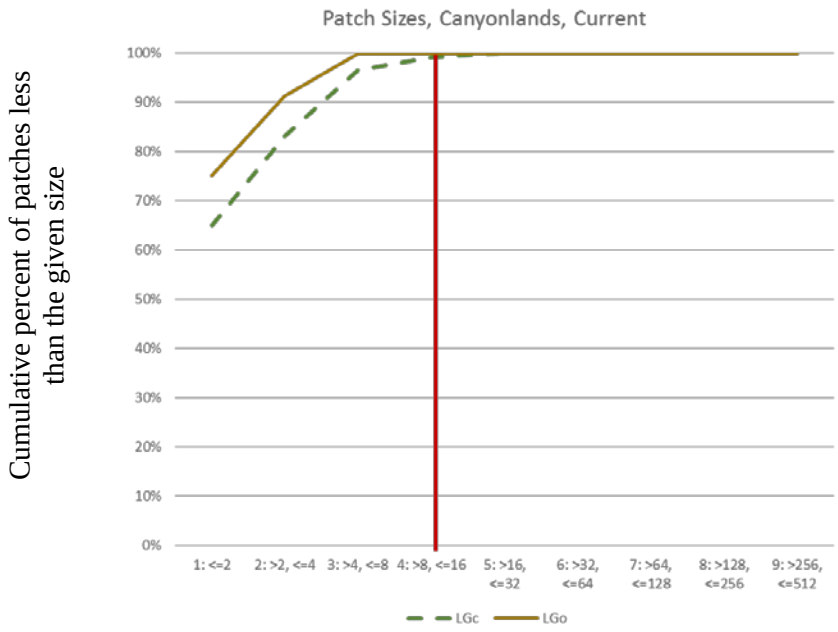
Reference Condition by Land Type Association

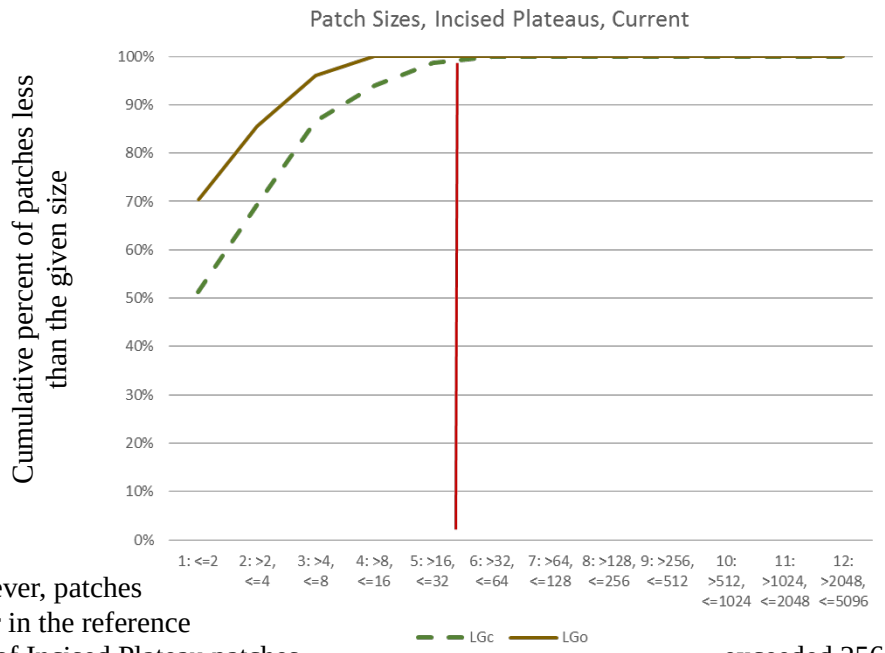
Land Type Associations (LTA) are mapping units that distinguish geographic areas with differing topography, soils, climate, and potential vegetation (available from Karen Bennett, Regional Soil Scientist, USDA Forest Service, Pacific Northwest Region, Portland, Oregon). Reference conditions were simulated by LTA groups for the Lower Joseph area to quantify the differences that these factors have in reference condition vegetation and disturbance regimes. The Lower Joseph area is dominated by two LTA units. Canyonlands are deeply eroded canyons that cut through lower elevations of the area. Wildfire frequently encounters fuel breaks along exposed ridges and forest vegetation patches tend to be highly dissected and naturally fragmented. Incised Plateaus are relatively more uniform and gentle terrain cut by Canyonlands. Wildfires spread more easily across this gentler terrain, generating somewhat larger and more contiguous patches.



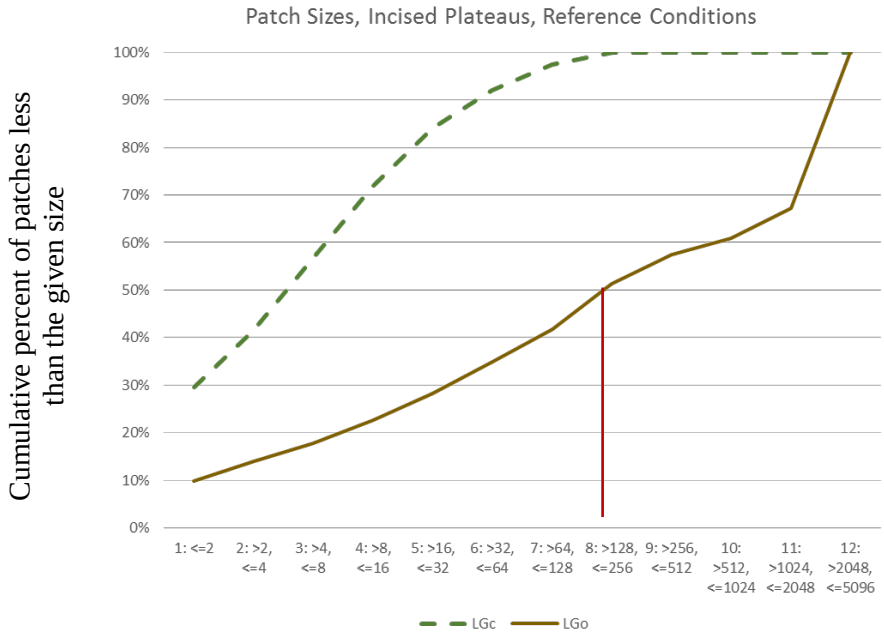
Reference condition modeling by LTA focused on the ranges of stand structural conditions and patch sizes. Stand structural conditions, both current and reference conditions, were somewhat different in the two LTAs. Grass/forb/shrub and seedling/sapling conditions were more abundant under the reference condition in Incised Canyonlands and slightly more abundant in the current conditions as well. Medium and large tree closed structures were generally more abundant in Canyonlands than in Incised Plateaus. In addition, current amounts of large tree closed stands were more highly departed from reference conditions in the Canyonlands.

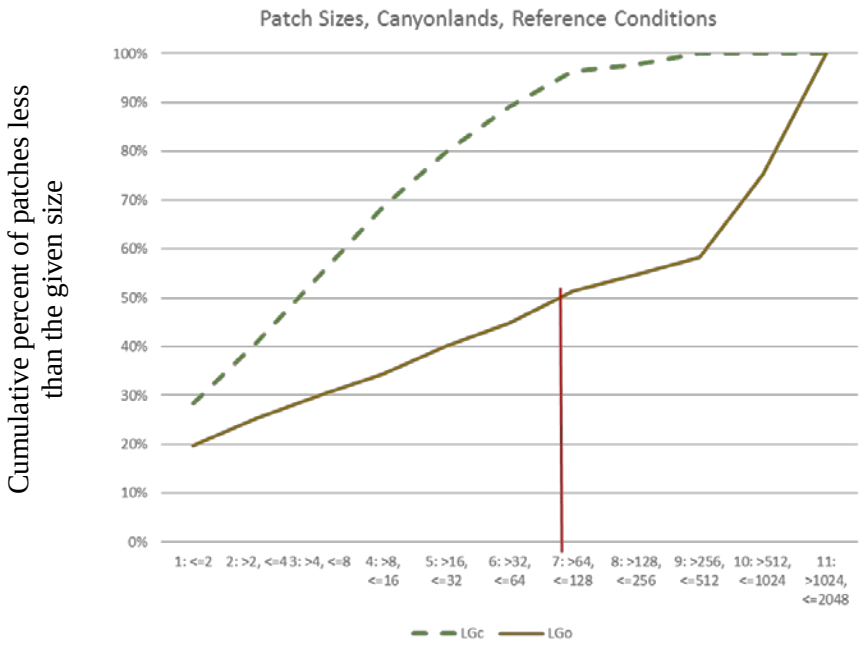
More importantly, patch sizes in the current conditions were much smaller than those in the reference condition. In both Canyonlands and Incised Plateaus, all current patches were less than 32 acres in size (red line indicates intersection of both LGc and LGo structure classes with 100% of cumulative patches at a patch size of less than 32 acres).





However, patches were considerably larger in the reference condition. More than 50% of Incised Plateau patches exceeded 256 acres in size while those in Canyonlands were somewhat smaller (half exceeded 128 acres). This decrease in patch sizes from reference condition to current condition is due to a combination of management activities that tend to generate relatively small patches and somewhat smaller wildfires under the current fire suppression regime. Canyonlands have smaller patches than Incised Plateaus under reference conditions due to natural fragmentation by ridges and areas that do not burn.




Patch Sizes, Canyonlands, Reference Conditions
Cumulative percent of patches less than the given size
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1: <=2
2: >2, <=4
3: >4, <=8
4: >8, <=16
5: >16, <=32
6: >32, <=64
7: >64, <=128
8: >128, <=256
9: >256, <=512
10: >512, <=1024
11: >1024, <=2048
LGc
LGo

Climate Informed Modeling

"Climate-informed" STMs (Halofsky et al. 2014), produced by the USFS Pacific Northwest Research Station, were used to investigate the interaction between the alternatives and projected climate effects under a variety of emissions scenarios. These climate-informed STMs use output from the dynamic global vegetation model (DGVM) MC2 for four climate scenarios to develop state-and-transition simulation models (STSM) for vegetation change. Climate scenarios included one representative concentration pathway (RCP 8.5) and simulated data from four downscaled (30-arc sec) general circulation models from the newer CMIP5 process (NOR, MIROC, Hadley, and CSIRO).

Predicting vegetation response to climate change requires consideration of interacting physical and biological processes at multiple spatial and temporal scales. Dynamic global vegetation models are currently considered to be among the most advanced tools to assess climate change effects on ecosystems. DGVMs integrate state-of-the-art knowledge of plant physiology, biogeography, biogeochemistry, and biophysics, with climate model projections to simulate changes in vegetation structure and composition (biogeography) as well as ecosystem function (biogeochemistry) through time. MC2 is new more efficient version of MC1 that integrates biogeography, biogeochemistry, and fire into a single modeling environment. MC1 has been extensively used for regional- to global-scale assessments of potential climate change effects on ecosystems in the published scientific literature. Results from MC2 can be translated into directions and magnitude of change applicable to STMs and community- and species-level dynamics, making output more useful for sub-regional management and planning efforts.

The climate change and vegetation model building was accomplished by Becky Kerns and John Kim (USFS PNW Station), Jessica Halofsky (University of Washington), and Dave Conklin (Common Futures). Land management alternatives of the LJCRP were incorporated into the climate-informed STMs to project comparative interactions between the No Action alternative and Alternative 2.

Methods

Modeling scenarios representing Alternatives 1, 2, and 3 were run using methods from Halofsky et al. (2014) and the results from 4 climate models:

- MIROC – the best case (least change from current) scenario
- CSIRO – the worst case (most change from current) scenario
- NOR – an intermediate scenario (results similar to CSIRO)
- Hadley – an intermediate scenario (results similar to CSIRO)

Results from the MIROC (best case) and CSIRO (worst case) climate models were compared to illustrate the potential range of effects of climate change in the future. Results for alternatives 2 and 3 were very similar; only Alternative 2 results are shown.

Climate change models were run for 90 years (2010 to 2100). Only one Monte Carlo simulation was run for each scenario because the climate models themselves are not stochastic; each climate model generates one deterministic estimate of future conditions.

Climate change models have been simplified (fewer potential vegetation types) compared to non-climate change models due to lower vegetation resolution in the climate models.

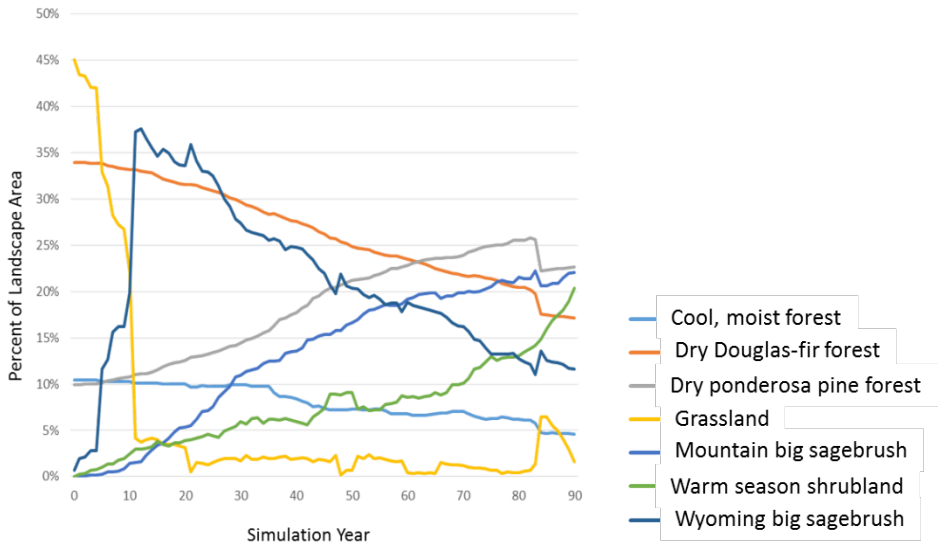
Climate change models were not run spatially due to concerns about how accurate spatial representations of climate change might be at this scale. Results from spatial and non-spatial models will not be the same because non-spatial models do not model disturbance contagion in the same way that spatial models do.

Because the climate change models were run non-spatially and because they are simplified from the STM used for all other analyses, initial conditions for climate change models do not exactly match those for non-climate change models.

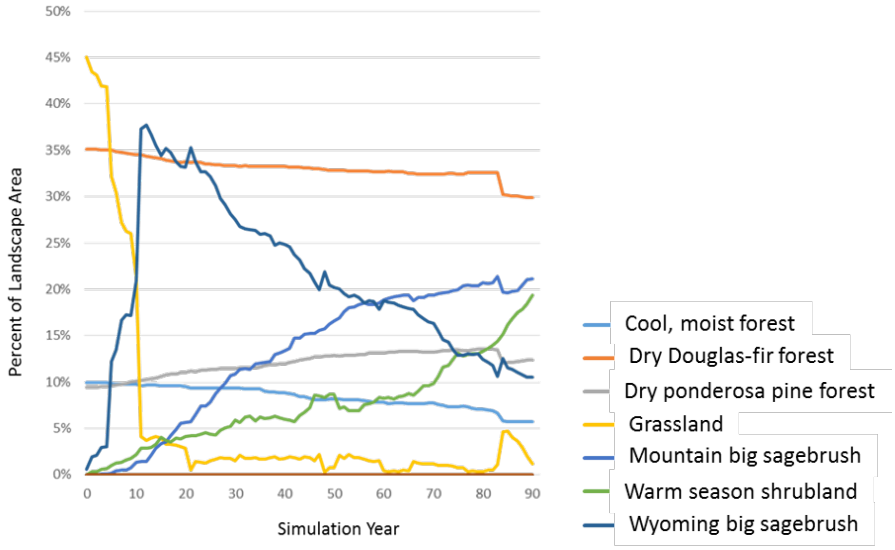
Results – Vegetation Change under Future Climate Projections

Change in Potential Vegetation Type – best case climate model (MIROC)

Alternative 1



Alternative 2

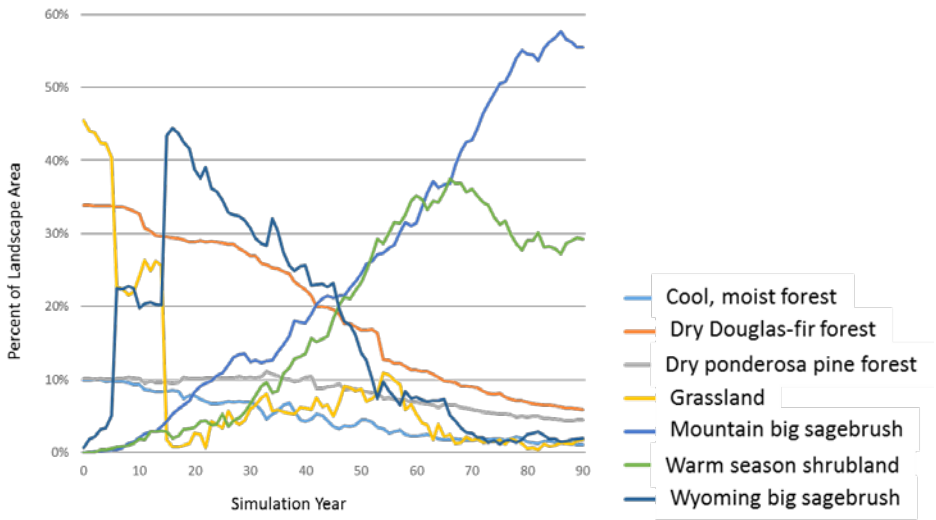


Alternative 1 shows a strong decline in Douglas-fir potential vegetation types and a strong increase in ponderosa pine over 9 decades under the MIROC scenario (which is the best case climate scenario for

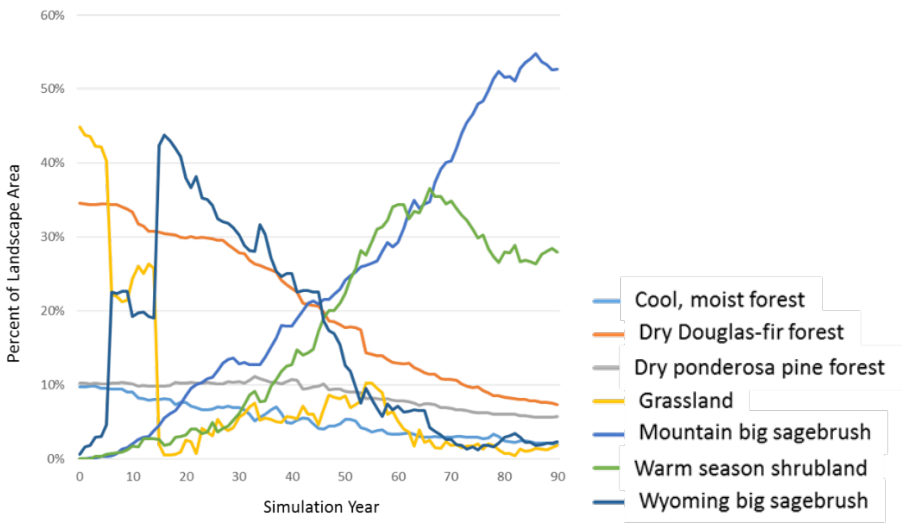
forests). Alt. 2 keeps a strong Douglas-fir PVT component with a slight increase in ponderosa pine compared to Alt 1. Shrublands increase at the expense of forests under both alternatives.

Change in Potential Vegetation type – worst case climate model (CSIRO)

Alternative 1



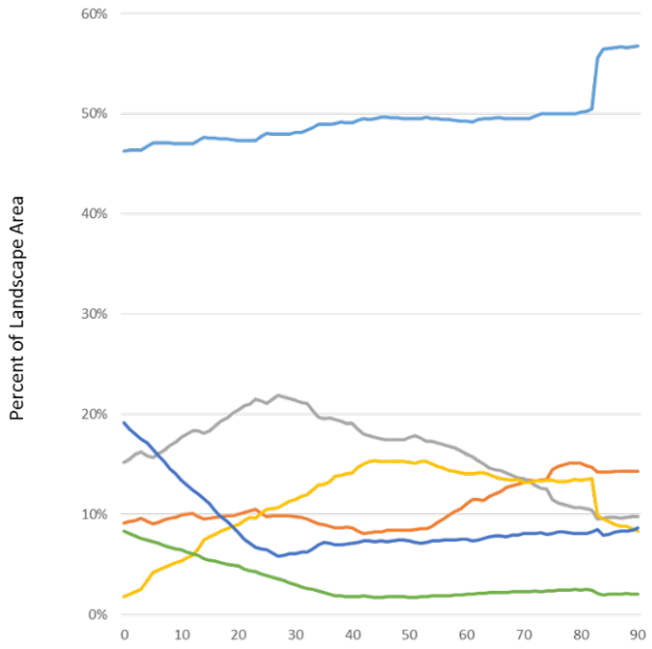
Alternative 2



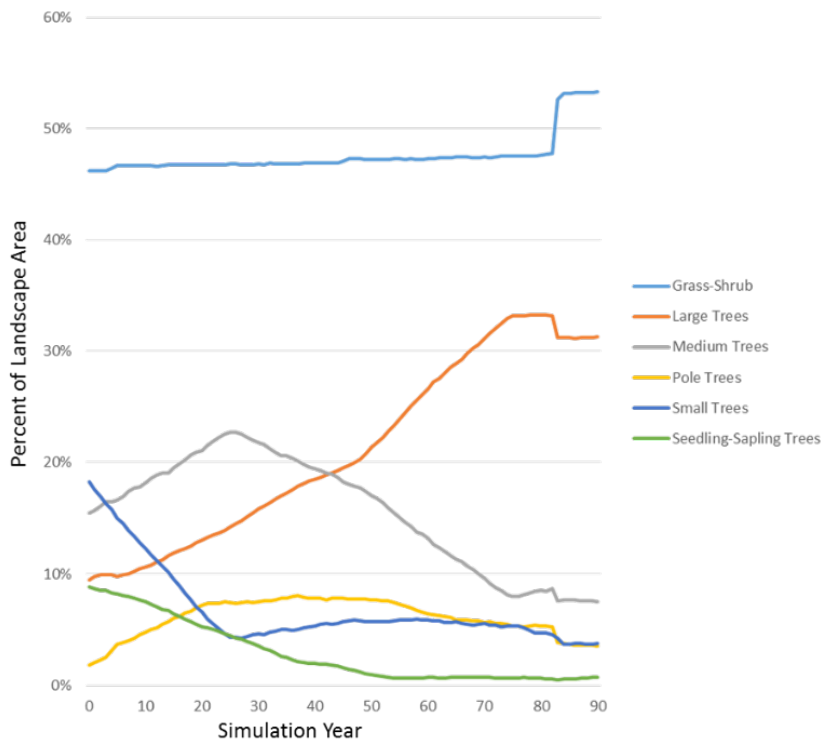
The CSIRO climate model is the worst-case for conversion of forested lands to arid lands in the project area. Alt 2 slows the conversion just a little, but the differences are not large. All forested potential vegetation types decline substantially under both alternatives.

Change in Forest Structure – best case climate model (MIROC)

Alternative 1 (see Alternative 2 for legend)



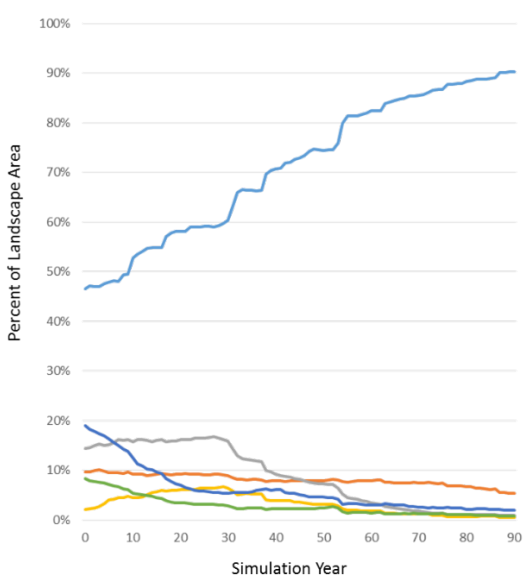
Alternative 2



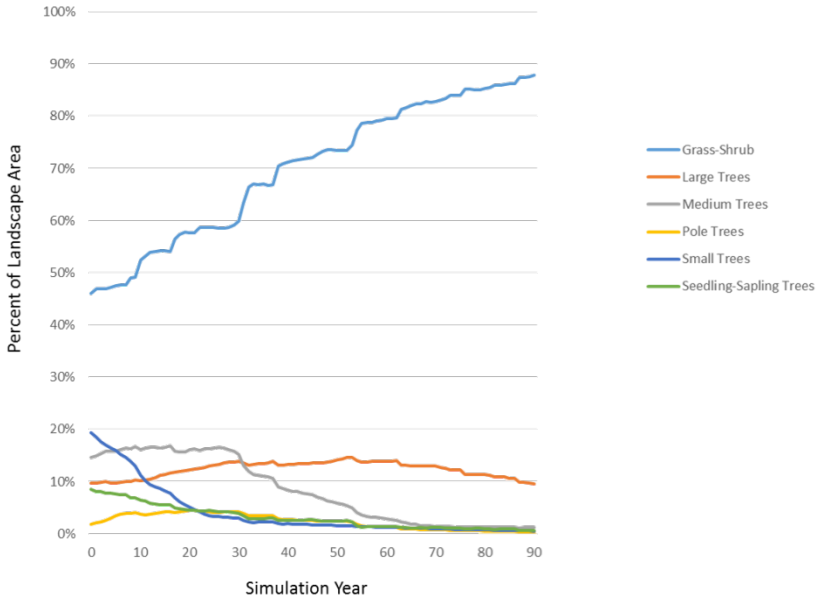
Alternative 1 maintains or slightly increases large trees over the simulation period while Alternative 2 generates a strong increase in large trees.

Change in Forest structure – worst case climate model (CSIRO)

Alternative 1 (see Alternative 2 for legend)



Alternative 2



Alternative 2 maintains slightly more large tree structure compared to Alternative 1 under the worst-case climate model, but the difference is not large.

Summary

- Three out of four climate scenarios indicate a strong conversion of forested lands to arid lands in the next 9 decades. In most cases, the landscape becomes dominated by mountain big sagebrush communities, often with exotic grasses.
- One out of four climate scenarios indicates continued strong representation of forests, but conversion of most forests to ponderosa pine.
- Alternative 1 allows a bit more conversion of forest land to arid lands than Alternatives 2 and 3.
- Alternatives 2 and 3 generate considerably more large tree forest than Alternative 1 under the best case climate model. But, very little large tree forests remain after 90 years under the other 3 climate models.

Effects of Past, Present and Projected Potential Future Forest Treatments on Large Tree Numbers

Methods and Data Sources

Inventory plots (CVS and FIA) for Blue Mountains ecoregion were used (about 3,317 plots) to get a large sample. This sample represents average conditions for each structure class over the entire Blue Mountains ecoregion. Plots for only the Wallowa-Whitman NF or the Lower Joseph Creek Restoration project area were not used because the sample sizes became too small.

Each plot was assigned to a Potential Vegetation Type (PVT) and structure class category. Cover type was not used as an additional stratification because sample sizes became too small.

Trees per acre greater than or equal to 20” DBH (large trees) were calculated for each plot by the LEMMA Team (http://lemma.forestry.oregonstate.edu/).

The average number of large trees per acre (TPA) was computed for each PVT-structure category by taking the average of all plots that had been assigned to each structure class category (see Table A, below).

Existing vegetation map data came from a combination of field inventory data (for FS-managed lands) and imputed conditions from Gradient Nearest Neighbor analysis (http://lemma.forestry.oregonstate.edu/). These data were current as of 2012 and included the effects of past amendments for 21” trees were in 2000, 2008, and 2010.

Project Level Analyses

StSim model acreage outputs were summarized to Planning Area, PVT, and structure classes for the Modified Proposed Action (PA) and No Management scenarios in the Lower Joseph area. Two “flavors” of the PA were examined. These differed only by how many large trees were assumed to be removed.

- (PA)-High - Assumed that management would remove relatively high numbers of large trees; enough so that the resulting managed stands would have the same average number of large trees as the natural and managed stands of the same structure that were sampled by the inventory plots. The PA-High is about the maximum level of large tree removal that could occur while still meeting PA objectives.
- Modified Proposed Action (PA) - Assumes that management would attempt to retain a high level of large trees; removing only those necessary to achieve silvicultural/ecological objectives. Neil McCusker estimated that management under the PA might remove only 15% of the potentially

available large trees. The PA is our best estimate of large tree effects for the Modified Proposed Action.

- No Management – Assumes that no active management except continued wildfire suppression would happen.

Changes in big trees were summarized by transition type into groups: Natural Disturbances (Wildfire+Insects+Disease), Growth, and Management Activities for all scenarios. Note, the Management Activities category is missing from the No Management scenario because there was no management in this scenario.

The annual change in large trees was computed for every simulated transition that occurred every year for 30 years for each Planning Area, PVT, and structure class for all scenarios.

The average change in large trees per acre was computed for different management areas. This adjusts for the differing spatial size of the management areas and makes the numbers more comparable across land units of differing sizes.

Wallowa-Whitman National Forest Level Analyses

For a larger scale context, hypothetical "Resilience Management" and "No Management" scenarios were run for the entire Wallowa-Whitman National Forest for 30 years and 10 Monte Carlo simulations. The Resilience scenario does skips-and-gaps management across the whole Forest using average annual activity rates calculated from 15 years' worth of activity data (2000-2014) supplied by the Forest (Table B, below). The No Management scenario turned off all management except continued wildfire suppression. Estimated changes in large trees were computed using the same methods as above for these scenarios.

The effects of two "flavors" of the Resilience scenario were examined to bracket likely management effects on large trees.

The first (Management-High) assumes that management would remove relatively high numbers of large trees; enough so that the resulting managed stands would have the same average number of large trees as the natural and managed stands of the same structure that were sampled by the inventory plots.

The second (Management-Low) assumes that management would attempt to retain a high level of large trees; removing only those necessary to achieve silvicultural/ecological objectives. The estimate was that management under Management-Low might remove 15% of the potentially available large trees.

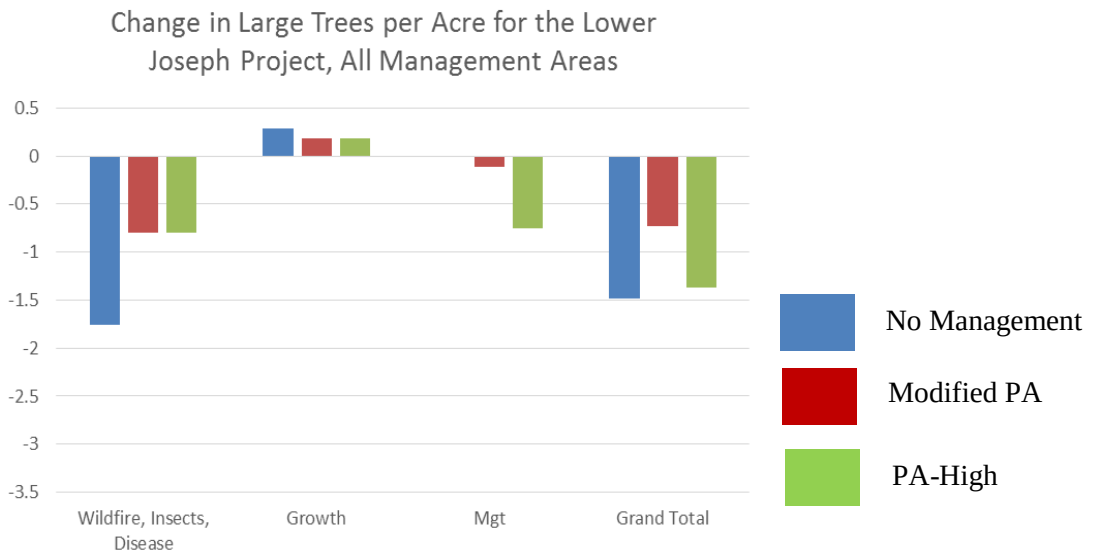
Considerations

The model does not capture the increased growth rate of thinned stands of large trees compared to un-thinned stands. The rate of increase in large trees from growth for the Modified Proposed Action is likely an under estimate.

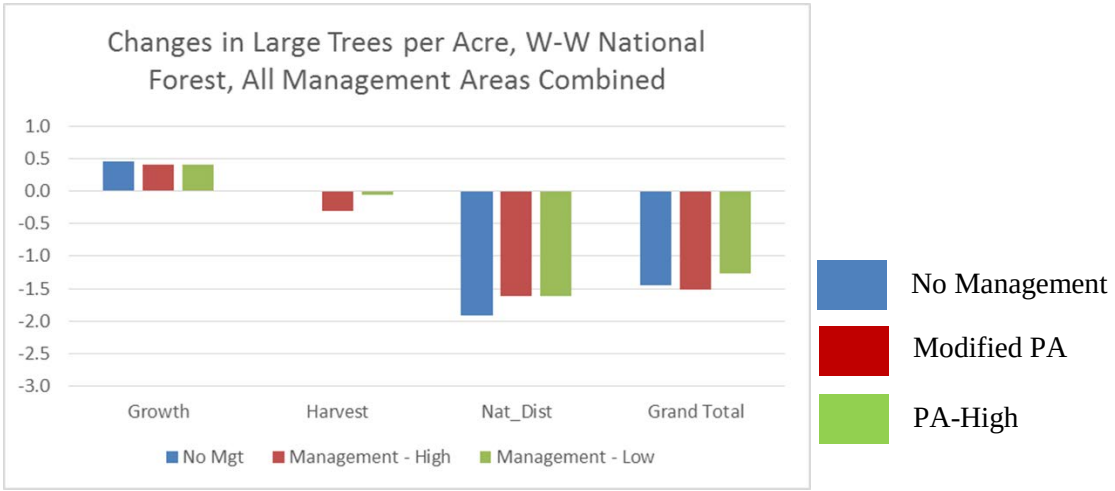
These estimates are only approximate, based on modeling and inventory plot data. These estimates are intended to provide a perspective on the *relative* changes that may occur with and without management over time. Actual changes in large trees over time will be different.

Results –Potential Changes in Large Tree Abundance at the Project and National Forest Scales

Potential Changes in Large Trees per Acre over 30 Years for the Lower Joseph Project under the Modified Proposed Action, PA-High, and No Management Scenarios



Potential Changes in Large Trees per Acre over 30 Years for the Wallowa-Whitman NF under the Management-High, Management-Low, and No-Management Scenarios



Discussion

Summary of local effects in the Lower Joseph Area:

- Natural disturbances remove more large trees than harvest.
- The no-management scenario removes more large trees, in total, than the Modified Proposed Action or PA-high.

- The Modified Proposed Action scenario removes less than half the number of large trees, in total, compared to the no-management scenario.

Summary of Effects across the Wallowa-Whitman National Forest:

- Likely loss of large trees to natural disturbances is considerably larger (4.8 million) than likely loss to management (146,000, Management-Low).
- The Management- High scenario removes about the same number of large trees from all disturbances as the No Management scenario…but a considerable portion of those removed under Management – High are used for economic purposes.
- Management-High is not likely to happen. This scenario illustrates maximum potential removal. Actual treatments are aimed at retaining as many large trees as possible: Management-Low.
- Likely loss of large trees to management in Lower Joseph (about 11,000 trees, PA-Low) is a very small portion (about 0.3%) of the loss that might occur across the whole Forest in any scenario (over 4 million).

Table A. Average trees per acre by PVT-structure class from CVS/FIA plots

Structure Class Definitions

First character indicates tree size: L = Large (over 20” DBH), M = Medium (15-20” DBH), S = Small (10-14” DBH), P = Pole (5-9” DBH), Y = Seedling/Sapling (less than 5” DBH), GF = Grass/Forb/Shrub. Second character indicates canopy closure: c = closed (over 60% canopy closure), m = medium (40-60% canopy closure), o = open (less than 40% canopy closure). Third character indicates canopy layering or post-disturbance condition: 1 = single canopy layer, 2 = multiple canopy layers, p = post-disturbance.

	Forested Potential Vegetation Type							
Structure Class	**Cold, Dry**	**Cool, Moist**	**Dry Douglas-Fir**	**Douglas-fir/Grand Fir**	**Dry Ponderosa Pine**	**Subalpine Woodland**	**Xeric Ponderosa Pine**	**Average for all PVTs**
Lc2	18.3	20.8	N/A	N/A	N/A	N/A	N/A	20.5
Lc1	17.2	20.8	N/A	N/A	N/A	N/A	N/A	20.3
Lm2	13.6	14.7	11.6	12.8	13.1	N/A	12.9	13.1
Lo2	N/A*	N/A	8.4	8.6	10.2	N/A	9.5	9.2
Lm1	11.7	7.9	7.7	3.7	5.0	N/A	10.8	8.3
Lo1	N/A	N/A	5.5	5.1	10.3	N/A	6.7	6.7
Mc2	6.3	8.6	N/A	N/A	N/A	N/A	N/A	7.9
Mm1	6.9	5.5	3.8	3.4	5.0	N/A	5.5	5.5
Mm2	6.4	5.6	3.7	4.8	6.6	N/A	6.9	5.4
Pc2	3.0	4.1	N/A	N/A	N/A	N/A	N/A	3.5
Sc2	3.0	4.1	N/A	N/A	N/A	N/A	N/A	3.5
Mo2	N/A	N/A	2.5	1.7	2.9	N/A	3.0	2.8
Pm2	2.2	2.6	1.8	2.1	3.7	3.5	3.4	2.6
Sm2	2.2	2.6	1.8	2.1	3.7	3.5	3.4	2.6
Mo1	N/A	N/A	2.0	2.2	2.0	N/A	2.4	2.2

	Forested Potential Vegetation Type							
Structure Class	**Cold, Dry**	**Cool, Moist**	**Dry Douglas-Fir**	**Douglas-fir/Grand Fir**	**Dry Ponderosa Pine**	**Subalpine Woodland**	**Xeric Ponderosa Pine**	**Average for all PVTs**
Sm1	2.8	0.1	3.6	1.8	3.1	N/A	5.1	1.9
Pc1	1.2	1.6	N/A	N/A	N/A	N/A	N/A	1.3
Sc1	1.2	1.6	N/A	N/A	N/A	N/A	N/A	1.3
So1	N/A	N/A	0.8	1.3	1.5	N/A	1.4	1.3
Po2	N/A	N/A	0.6	1.1	0.7	1.5	1.5	1.2
So2	N/A	N/A	0.6	1.1	0.7	1.5	1.5	1.2
Pm1	0.5	0.1	0.4	0.0	4.3	N/A	2.1	0.8
GF	0.5	1.3	0.4	0.5	0.5	0.1	1.1	0.8
Po1	N/A	N/A	0.8	0.0	0.6	N/A	0.6	0.5
Ym	0.4	0.0	0.4	0.0	4.3	N/A	N/A	0.5
Yo	0.1	0.1	0.8	0.0	0.4	0.0	0.2	0.1
GFp	0.0	0.0	0.0	0.0	0.0	N/A	0.0	0.0
P1p	0.0	0.0	0.0	0.0	0.0	N/A	0.0	0.0
P2p	0.0	0.0	0.0	0.0	0.0	0.0	N/A	0.0
S1p	0.0	0.0	0.0	0.0	0.0	N/A	N/A	0.0
S2p	0.0	0.0	0.0	0.0	0.0	0.0	N/A	0.0
Yop	0.0	0.0	0.0	0.0	0.0	N/A	N/A	0.0

*N/A – class does not exist in this Potential Vegetation Type.

Table B. Target annual acres treated by Potential Vegetation Type and Management Area, Wallowa-Whitman NF.

Data for 15 years (2000-2014) supplied by BMRT GIS specialist. Acres have been rounded to nearest whole number. A key to management area codes is provided following the table.

Forested Potential Vegetation Type	Management Area	Transition Type	15 year acres treated	average annual acres
Cold, Dry	5	AllPartialHarvest	8	1
Cold, Dry	5	AllPCT	18	1
Cold, Dry	5	AllPFire	34	2
Cool, Moist	5	AllPartialHarvest	9	1
Cool, Moist	5	AllPCT	4	0
Cool, Moist	5	AllPFire	43	3
Dry Douglas-Fir	5	AllPartialHarvest	465	31
Dry Douglas-Fir	5	AllPCT	159	11
Dry Douglas-Fir	5	AllPFire	200	13
Dry Douglas-Fir	5	Plant	38	3
Douglas-Fir/Grand Fir	5	AllPartialHarvest	29	2

Forested Potential Vegetation Type	Management Area	Transition Type	15 year acres treated	average annual acres
Douglas-Fir/Grand Fir	5	AllPCT	19	1
Douglas-Fir/Grand Fir	5	AllPFire	74	5
Douglas-Fir/Grand Fir	5	Plant	5	0
Dry Ponderosa Pine	5	AllPartialHarvest	73	5
Dry Ponderosa Pine	5	AllPCT	35	2
Dry Ponderosa Pine	5	AllPFire	52	3
Dry Ponderosa Pine	5	Plant	17	1
Subalpine Woodland	5	AllPCT	33	2
Subalpine Woodland	5	AllPFire	2	0
Xeric Ponderosa Pine	5	AllPartialHarvest	176	12
Xeric Ponderosa Pine	5	AllPCT	15	1
Xeric Ponderosa Pine	5	AllPFire	153	10
Cold, Dry Forest	1A	AllPFire	66	4
Cold, Dry Forest	1A	Plant	1	0
Cool, Moist Forest	1A	AllPCT	1	0
Cool, Moist Forest	1A	AllPFire	114	8
Dry Douglas-Fir	1A	AllPCT	0	0
Dry Douglas-Fir	1A	AllPFire	23	2
Douglas-Fir/Grand Fir	1A	Plant	4	0
Subalpine Woodland	1A	AllPFire	23	2
Cool, Moist Forest	2A	AllPartialHarvest	131	9
Cool, Moist Forest	2A	AllPCT	145	10
Cool, Moist Forest	2A	AllPFire	119	8
Cool, Moist Forest	2A	RegHarv	1	0
Dry Douglas-Fir	2A	AllPartialHarvest	178	12
Dry Douglas-Fir	2A	AllPCT	102	7
Dry Douglas-Fir	2A	AllPFire	95	6
Douglas-Fir/Grand Fir	2A	AllPartialHarvest	43	3
Douglas-Fir/Grand Fir	2A	AllPCT	46	3
Douglas-Fir/Grand Fir	2A	AllPFire	18	1
Douglas-Fir/Grand Fir	2A	RegHarv	0	0
Douglas-Fir/Grand Fir	2A	Sel	0	0
Xeric Ponderosa Pine	2A	AllPartialHarvest	3	0
Xeric Ponderosa Pine	2A	AllPCT	3	0
Xeric Ponderosa Pine	2A	AllPFire	3	0
Cool, Moist Forest	2B	AllPCT	4	0
Cool, Moist Forest	2B	AllPFire	1	0
Cold, Dry Forest	2I	AllPartialHarvest	91	6
Cold, Dry Forest	2I	AllPFire	90	6

Forested Potential Vegetation Type	Management Area	Transition Type	15 year acres treated	average annual acres
Cool, Moist Forest	2I	AllPartialHarvest	501	33
Cool, Moist Forest	2I	AllPCT	44	3
Cool, Moist Forest	2I	AllPFire	203	14
Dry Douglas-Fir	2I	AllPartialHarvest	485	32
Dry Douglas-Fir	2I	AllPCT	26	2
Dry Douglas-Fir	2I	AllPFire	512	34
Dry Douglas-Fir	2I	RegHarv	4	0
Douglas-Fir/Grand Fir	2I	AllPartialHarvest	259	17
Douglas-Fir/Grand Fir	2I	AllPCT	8	1
Douglas-Fir/Grand Fir	2I	AllPFire	214	14
Dry Ponderosa Pine	2I	AllPartialHarvest	127	8
Dry Ponderosa Pine	2I	AllPCT	7	0
Dry Ponderosa Pine	2I	AllPFire	37	2
Xeric Ponderosa Pine	2I	AllPartialHarvest	255	17
Xeric Ponderosa Pine	2I	AllPCT	53	4
Xeric Ponderosa Pine	2I	AllPFire	92	6
Cold, Dry Forest	3B	AllPartialHarvest	27	2
Cold, Dry Forest	3B	AllPCT	10	1
Cold, Dry Forest	3B	AllPFire	15	1
Cold, Dry Forest	3B	Plant	0	0
Cool, Moist Forest	3B	AllPartialHarvest	77	5
Cool, Moist Forest	3B	AllPCT	58	4
Cool, Moist Forest	3B	AllPFire	356	24
Cool, Moist Forest	3B	Plant	1	0
Dry Douglas-Fir	3B	AllPartialHarvest	25	2
Dry Douglas-Fir	3B	AllPCT	6	0
Dry Douglas-Fir	3B	AllPFire	14	1
Douglas-Fir/Grand Fir	3B	AllPartialHarvest	26	2
Douglas-Fir/Grand Fir	3B	AllPCT	8	1
Douglas-Fir/Grand Fir	3B	AllPFire	6	0
Douglas-Fir/Grand Fir	3B	Plant	0	0
Subalpine Woodland	3B	AllPFire	0	0
Cold, Dry Forest	4A	AllPartialHarvest	654	44
Cold, Dry Forest	4A	AllPCT	727	48
Cold, Dry Forest	4A	AllPFire	864	58
Cold, Dry Forest	4A	Plant	491	33
Cold, Dry Forest	4A	RegHarv	166	11
Cold, Dry Forest	4A	Sel	5	0
Cool, Moist Forest	4A	AllPartialHarvest	10681	712

Forested Potential Vegetation Type	Management Area	Transition Type	15 year acres treated	average annual acres
Cool, Moist Forest	4A	AllPCT	17702	1,180
Cool, Moist Forest	4A	AllPFire	15899	1,060
Cool, Moist Forest	4A	Plant	1947	130
Cool, Moist Forest	4A	RegHarv	2301	153
Cool, Moist Forest	4A	Sel	1281	85
Dry Douglas-Fir	4A	AllPartialHarvest	11841	789
Dry Douglas-Fir	4A	AllPCT	8358	557
Dry Douglas-Fir	4A	AllPFire	14988	999
Dry Douglas-Fir	4A	Plant	620	41
Dry Douglas-Fir	4A	RegHarv	464	31
Dry Douglas-Fir	4A	Sel	520	35
Douglas-Fir/Grand Fir	4A	AllPartialHarvest	15245	1,016
Douglas-Fir/Grand Fir	4A	AllPCT	12071	805
Douglas-Fir/Grand Fir	4A	AllPFire	20457	1,364
Douglas-Fir/Grand Fir	4A	Plant	2255	150
Douglas-Fir/Grand Fir	4A	RegHarv	1035	69
Douglas-Fir/Grand Fir	4A	Sel	344	23
Dry Ponderosa Pine	4A	AllPartialHarvest	6905	460
Dry Ponderosa Pine	4A	AllPCT	3149	210
Dry Ponderosa Pine	4A	AllPFire	14977	998
Dry Ponderosa Pine	4A	Plant	126	8
Dry Ponderosa Pine	4A	RegHarv	78	5
Dry Ponderosa Pine	4A	Sel	71	5
Subalpine Woodland	4A	AllPartialHarvest	25	2
Subalpine Woodland	4A	Plant	11	1
Xeric Ponderosa Pine	4A	AllPartialHarvest	4369	291
Xeric Ponderosa Pine	4A	AllPCT	2634	176
Xeric Ponderosa Pine	4A	AllPFire	7591	506
Xeric Ponderosa Pine	4A	Plant	117	8
Xeric Ponderosa Pine	4A	RegHarv	24	2
Xeric Ponderosa Pine	4A	Sel	211	14
Cold, Dry Forest	4C	AllPartialHarvest	0	0
Cold, Dry Forest	4C	AllPCT	6	0
Cold, Dry Forest	4C	AllPFire	40	3
Cold, Dry Forest	4C	Plant	2	0
Cold, Dry Forest	4C	RegHarv	2	0
Cool, Moist Forest	4C	AllPartialHarvest	206	14
Cool, Moist Forest	4C	AllPCT	237	16
Cool, Moist Forest	4C	AllPFire	485	32

Forested Potential Vegetation Type	Management Area	Transition Type	15 year acres treated	average annual acres
Cool, Moist Forest	4C	Plant	11	1
Cool, Moist Forest	4C	RegHarv	1	0
Cool, Moist Forest	4C	Sel	11	1
Dry Douglas-Fir	4C	AllPartialHarvest	355	24
Dry Douglas-Fir	4C	AllPCT	201	13
Dry Douglas-Fir	4C	AllPFire	818	55
Dry Douglas-Fir	4C	RegHarv	0	0
Dry Douglas-Fir	4C	Sel	0	0
Douglas-Fir/Grand Fir	4C	AllPartialHarvest	147	10
Douglas-Fir/Grand Fir	4C	AllPCT	341	23
Douglas-Fir/Grand Fir	4C	AllPFire	769	51
Douglas-Fir/Grand Fir	4C	Plant	7	0
Dry Ponderosa Pine	4C	AllPartialHarvest	92	6
Dry Ponderosa Pine	4C	AllPCT	105	7
Dry Ponderosa Pine	4C	AllPFire	199	13
Dry Ponderosa Pine	4C	Plant	0	0
Subalpine Woodland	4C	AllPartialHarvest	3	0
Xeric Ponderosa Pine	4C	AllPartialHarvest	46	3
Xeric Ponderosa Pine	4C	AllPCT	123	8
Xeric Ponderosa Pine	4C	AllPFire	230	15
Cold, Dry Forest	4D	AllPartialHarvest	119	8
Cold, Dry Forest	4D	AllPCT	570	38
Cold, Dry Forest	4D	AllPFire	592	39
Cold, Dry Forest	4D	Plant	74	5
Cold, Dry Forest	4D	RegHarv	101	7
Cold, Dry Forest	4D	Sel	10	1
Cool, Moist Forest	4D	AllPartialHarvest	3342	223
Cool, Moist Forest	4D	AllPCT	4194	280
Cool, Moist Forest	4D	AllPFire	5722	381
Cool, Moist Forest	4D	Plant	860	57
Cool, Moist Forest	4D	RegHarv	497	33
Cool, Moist Forest	4D	Sel	176	12
Dry Douglas-Fir	4D	AllPartialHarvest	6016	401
Dry Douglas-Fir	4D	AllPCT	4131	275
Dry Douglas-Fir	4D	AllPFire	13863	924
Dry Douglas-Fir	4D	Plant	205	14
Dry Douglas-Fir	4D	RegHarv	120	8
Dry Douglas-Fir	4D	Sel	74	5
Douglas-Fir/Grand Fir	4D	AllPartialHarvest	3404	227

Forested Potential Vegetation Type	Management Area	Transition Type	15 year acres treated	average annual acres
Douglas-Fir/Grand Fir	4D	AllPCT	3048	203
Douglas-Fir/Grand Fir	4D	AllPFire	5880	392
Douglas-Fir/Grand Fir	4D	Plant	117	8
Douglas-Fir/Grand Fir	4D	RegHarv	117	8
Douglas-Fir/Grand Fir	4D	Sel	42	3
Dry Ponderosa Pine	4D	AllPartialHarvest	2892	193
Dry Ponderosa Pine	4D	AllPCT	1951	130
Dry Ponderosa Pine	4D	AllPFire	7493	500
Dry Ponderosa Pine	4D	Plant	61	4
Dry Ponderosa Pine	4D	RegHarv	1	0
Dry Ponderosa Pine	4D	Sel	19	1
Subalpine Woodland	4D	AllPartialHarvest	1	0
Subalpine Woodland	4D	AllPCT	4	0
Xeric Ponderosa Pine	4D	AllPartialHarvest	1975	132
Xeric Ponderosa Pine	4D	AllPCT	1287	86
Xeric Ponderosa Pine	4D	AllPFire	7236	482
Xeric Ponderosa Pine	4D	Plant	150	10
Xeric Ponderosa Pine	4D	RegHarv	24	2
Xeric Ponderosa Pine	4D	Sel	21	1
Cold, Dry Forest	4E	AllPCT	0	0
Cold, Dry Forest	4E	AllPFire	0	0
Cool, Moist Forest	4E	AllPartialHarvest	2	0
Cool, Moist Forest	4E	AllPCT	22	1
Cool, Moist Forest	4E	AllPFire	7	0
Cool, Moist Forest	4E	Plant	15	1
Dry Douglas-Fir	4E	AllPCT	4	0
Dry Douglas-Fir	4E	AllPFire	7	0
Douglas-Fir/Grand Fir	4E	AllPartialHarvest	3	0
Douglas-Fir/Grand Fir	4E	AllPCT	6	0
Douglas-Fir/Grand Fir	4E	AllPFire	3	0
Dry Ponderosa Pine	4E	AllPCT	2	0
Dry Ponderosa Pine	4E	AllPFire	12	1
Cool, Moist Forest	4F	AllPartialHarvest	22	1
Cool, Moist Forest	4F	AllPCT	4	0
Cool, Moist Forest	4F	AllPFire	0	2
Dry Douglas-Fir	4F	AllPartialHarvest	0	0
Dry Douglas-Fir	4F	AllPFire	41	41
Douglas-Fir/Grand Fir	4F	AllPartialHarvest	0	0
Douglas-Fir/Grand Fir	4F	AllPCT	0	0

Forested Potential Vegetation Type	Management Area	Transition Type	15 year acres treated	average annual acres
Douglas-Fir/Grand Fir	4F	AllPFire	0	1
Dry Ponderosa Pine	4F	AllPFire	20	1
Xeric Ponderosa Pine	4F	AllPartialHarvest	18	1
Xeric Ponderosa Pine	4F	AllPCT	54	4
Xeric Ponderosa Pine	4F	AllPFire	517	589
Cold, Dry Forest	HCNRA	AllPCT	3	0
Cool, Moist Forest	HCNRA	AllPartialHarvest	195	13
Cool, Moist Forest	HCNRA	AllPCT	206	14
Cool, Moist Forest	HCNRA	AllPFire	368	377
Cool, Moist Forest	HCNRA	Plant	2	0
Dry Douglas-Fir	HCNRA	AllPartialHarvest	11	1
Dry Douglas-Fir	HCNRA	AllPCT	10	1
Dry Douglas-Fir	HCNRA	AllPFire	193	200
Dry Douglas-Fir	HCNRA	Plant	4	0
Dry Douglas-Fir	HCNRA	Sel	2	0
Douglas-Fir/Grand Fir	HCNRA	AllPartialHarvest	147	10
Douglas-Fir/Grand Fir	HCNRA	AllPCT	134	9
Douglas-Fir/Grand Fir	HCNRA	AllPFire	25	26
Douglas-Fir/Grand Fir	HCNRA	Plant	1	0
Douglas-Fir/Grand Fir	HCNRA	Sel	0	0

Key to Management Area Abbreviations

Abbreviation	Description
1A	Wilderness
2A	Wild and Scenic Rivers
2B	Research Natural Area
2C	Special Interest Area 2C
2D	Special Interest Area 2D
2E	Special Interest Area 2E
2H	Scenic Area 2H
2I	Scenic Area? 2I
2J	Municipal watershed
3A	Semi-primitive non-motorized
3B	Semi-primitive motorized
4A	Timber Production Emphasis
4B	Riparian area
4C	Old Growth
4D	Winter Range
4E	Wildlife emphasis

Abbreviation	Description
4F	Visual management
5	Admin and Developed

References

Baker, W. L. 1989. A review of models of landscape change. Landscape Ecology 2:111-133.

Bestelmeyer, B. T., J. R. Brown, K. M. Havstad, R. Alexander, G. Chavez, and J. E. Herrick. 2003. Development and Use of State-and-Transition Models for Rangelands. Journal of Range Management 56:114-126.

Bestelmeyer, B. T., A. J. Tugel, G. L. Peacock, D. G. Robinett, P. L. Shaver, J. R. Brown, J. E. Herrick, H. Sanchez, and K. M. Havstad. 2009. State-and-Transition Models for Heterogeneous Landscapes: A Strategy for Development and Application. Rangeland Ecology & Management 62:1-15.

Briske, D. D., S. D. Fuhlendorf, and F. E. Smeins. 2005. State-and-Transition Models, Thresholds, and Rangeland Health: A Synthesis of Ecological Concepts and Perspectives. Rangeland Ecology & Management 58:1-10.

Burcsu, T., J. Halofsky, S. Bisrat, T. Christopher, M.K. Creutzburg, E. Henderson, M. Hemstrom, M. Whitman. In Press. Dynamic Vegetation Modeling of Forested, Woodland, Shrubland, and Grassland Vegetation Communities in the Pacific Northwest and Southwest Regions of the United States. *In*

Halofsky, J.E., M.K. Creutzburg, and M.A. Hemstrom. Mid-Scale Landscape Assessment: Methods Used in the Integrated Landscape Assessment Project. General Technical Report PNW-GTR-XXX. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, Oregon.

Forbis, T., L. Provencher, L. Frid, and G. Medlyn. 2006. Great Basin Land Management Planning Using Ecological Modeling. Environmental Management 38:62-83.

Hall, F. C. 1998. Pacific Northwest ecoclass codes for seral and potential natural plant communities. General Technical Report PNW-GTR-418, U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, Oregon.

Hemstrom, M. A., J. Merzenich, A. Reger, and B. Wales. 2007. Integrated analysis of landscape management scenarios using state and transition models in the upper Grande Ronde River Subbasin, Oregon, USA. Landscape and Urban Planning 80:198-211.

Petersen, S. L., T. K. Stringham, and B. A. Roundy. 2009. A Process-Based Application of State-and-Transition Models: A Case Study of Western Juniper (Juniperus occidentalis) Encroachment. Rangeland Ecology & Management 62:186-192.

Provencher, L., G. Low, and S. Abele. 2009. Bodie Hills Conservation Action Planning: Final report to the Bureau of Land Managment Bishop Field Office. The Nature Conservancy, Reno, NV.

Rollins, M. G. 2009. LANDFIRE: a nationally consistent vegetation, wildland fire, and fuel assessment. International Journal of Wildland Fire 18:235-249.

Vavra, M., M. A. Hemstrom, and M. J. Wisdom. 2007. Modeling the effects of herbivores on the abundance of forest overstory states using a simple state-transition approach. Landscape and Urban Planning 80:212-222.

Wales, B. C., L. H. Suring, and M. A. Hemstrom. 2007. Modeling potential outcomes of fire and fuel management scenarios on the structure of forested habitats in northeast Oregon, USA. Landscape and Urban Planning 80:223-236.

Westoby, M., B. Walker, and I. Noy-Meir. 1989. Opportunistic management for rangelands not at equilibrium. Journal of Range Management 42:266-274.

Zhou, X. and M. A. Hemstrom (2010). Timber volume and aboveground live tree biomass estimations for landscape analyses in the Pacific Northwest. Gen.Tech. Rep. PNW-GTR-819. Portland, OR, U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Appendix D – Burn probability modeling methods and summary of results

The Blue Mountains Restoration Team analyzed wildland fire probability as a component of the landscape analysis for the LJCRP and surrounding lands (as a potential influence to disturbance probabilities outside the project boundary). The FSim platform was chosen since it offers the most robust modeling framework with rich inputs for weather, wind, and historic fires. The large-fire simulation system, FSim, consists of modules for weather, fire occurrence, fire growth, and fire suppression. The system is designed to simulate the occurrence and growth of fires for thousands of years in order to estimate average burn probabilities and fire size distributions. It was applied independently to 6-10 delineated areasof the landscape, called Fire Planning Units (FPUs,) in the Blue Mountains. Each model component, data inputs and outputs and FPU are described in the following sections.

Inputs

Fire Planning Units (FPU's) – Due to the large size of the Blue Mountains landscape and the associated large and cumbersome database size, the landscape was too large for FSim to effectively run. Given this modeling limitation, the landscape was broken into areas used by the Blue Mountains Forests known as FPUs. The USFS's Fire Danger Rating Areas (FDRAs) were used as the starting geography point for analysis. The FDRAs were further reduced based on vegetation condition and Forest Boundaries. The intent was to create similar sized rectangular blocks with similar vegetation, management, and fire behavior influences such as weather, topography, and assumed fire regime.

Weather – The necessary weather files for each FPU were generated from Fire Family Plus based on expert opinion and Remote Automated Weather Station (RAWS) data. In some cases the multiple RAWS data were combined for an FPU. Local expert opinion was utilized to give a weighted percent to each RAWS station so that the Fire Family Plus weather input represented the most frequent trend for each FPU.

Historical Fire Occurrences Density - The historical fire data used in this analysis was based on the Historical national fire occurrences data that Karen Short compiled for the Continental US Analysis with Mark Finney.

Fuels and topography - Spatial information on fuels and topography was obtained at 30 m resolution from 2012 LANDFIRE in a Landscape file (.LCP) and then resampled to 90 m resolution to achieve practical simulation run times.

Outputs

Each FPU was buffered 10 miles to allow for fires to burn onto the landscape and limit edge effect. The outputs from all the FPUs merged into a single landscape level output using a statistical overlay for the overlapping areas. The landscape outputs are described below, and spatial data is located in the project record.

- Burn Probability – A spatial layer with 0-100 % probability of a pixel burning in a given year.
- Fire Intensity Level (FIL) – Six spatial layers with intensity by Flame Length categories from 1 (low) to high (6). Each spatial FIL has a probability, the sum of all 6 equal the overall Burn Probability.
- Mean Fire Intensity – A spatial layer with the mean intensity values for each pixel
    - Current probability of Fire Intensity Level by forested PVG (Dry/Moist).

- Figure D-1 below shows the probability of fire intensity levels (from low (1) to high (6)) occurring within the LJCRP area for dry and moist upland forest.

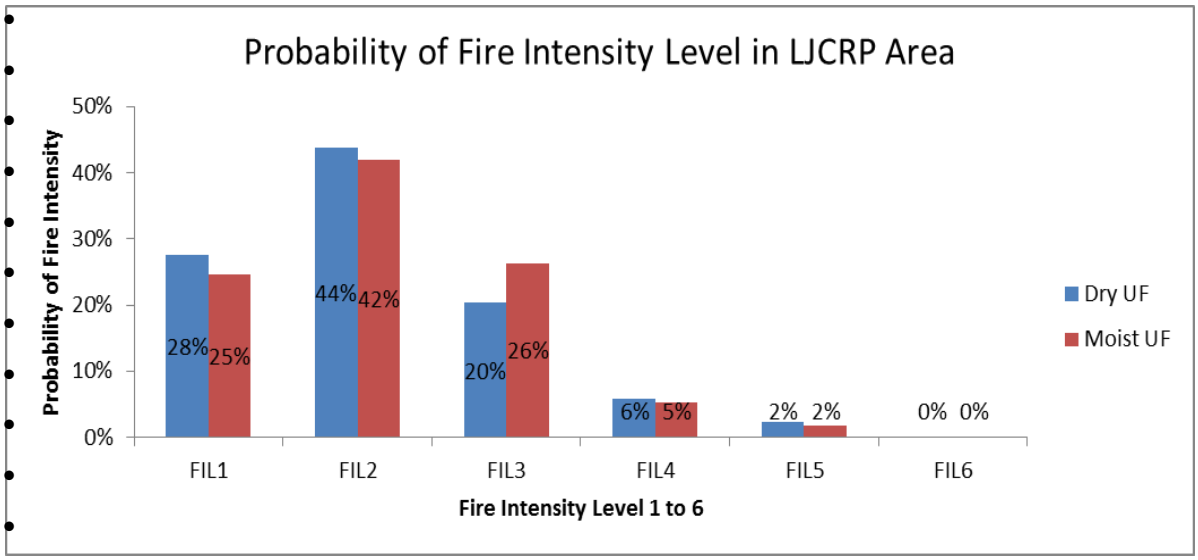


Figure D-1: Probability of Fire Intensity Level summarized by Dry or Moist Upland Forest within the LJCRP area.

- Probability of Fire Intensity Level by forested PVG and Landtype Association groups.
- Appendix C describes reference conditions by grouping of Landtype Associations, specifically Canyonlands and Incised Plateaus. Disturbance regimes and stand dynamic process differences may be evident due to the physiographic differences between these landtypes. Summarizing the probability of different Fire Intensity Levels by landtype association group helps to understand the underlying influence of topography, soils, climate, and potential vegetation on fire probability and intensity levels. Incised Plauteaus and Canyonlands represent the majority of the LJCRP area. Figure D-2 below shows the probability of fire intensity levels (from low (1) to high (6)) occurring within the LJCRP area for dry and moist upland forest in canyonlands.

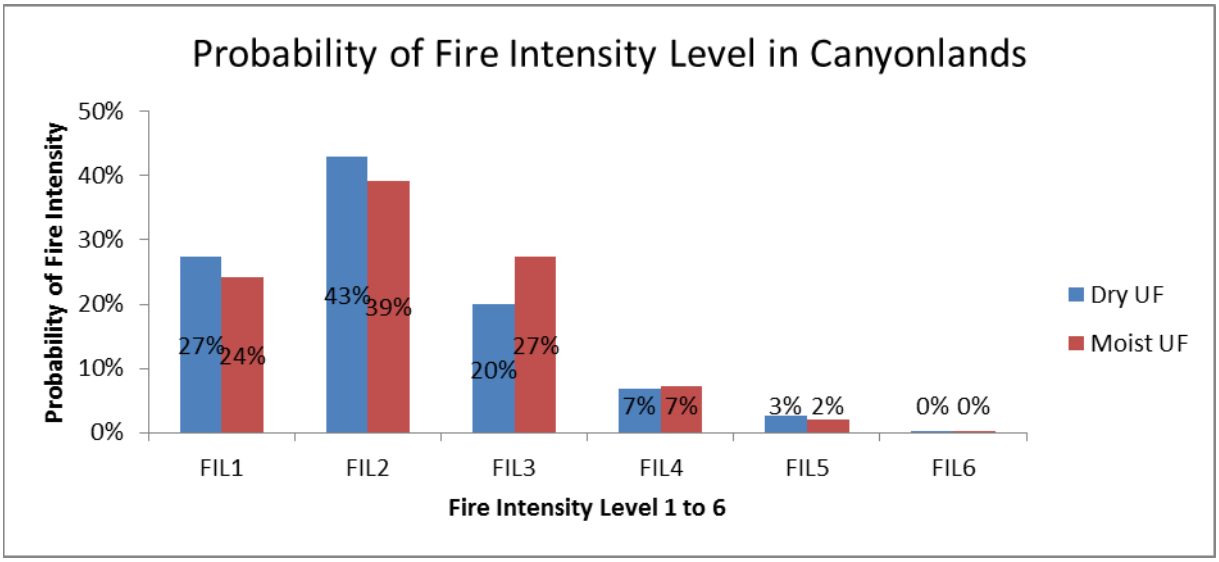


Figure D-2: Probability of Fire Intensity Level summarized by upland forest type and Landtype Association Group – Canyonlands.

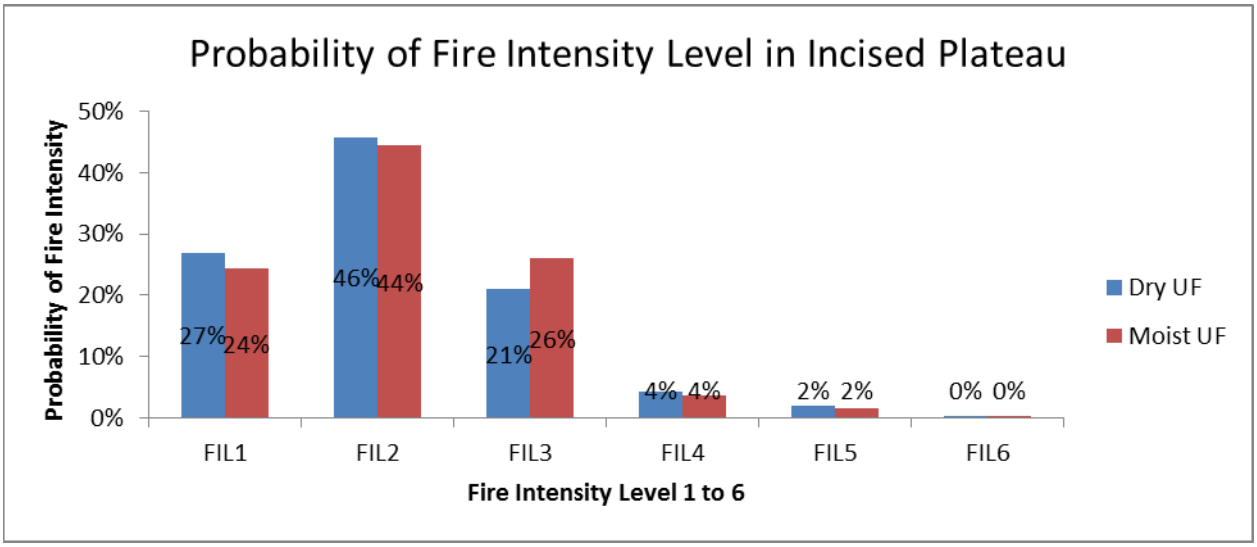


Figure D-3: Probability of Fire Intensity Level summarized by upland forest type and Landtype Association Group – Incised Plateaus.

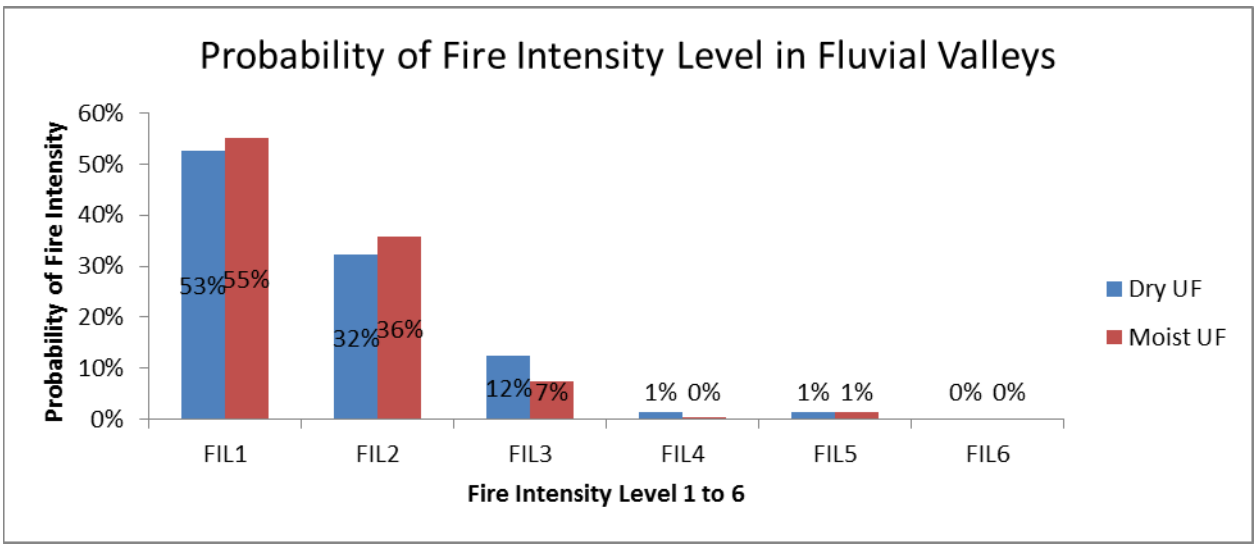


Figure D-4: Probability of Fire Intensity Level summarized by upland forest type and Landtype Association Group – Fluvial Valleys.

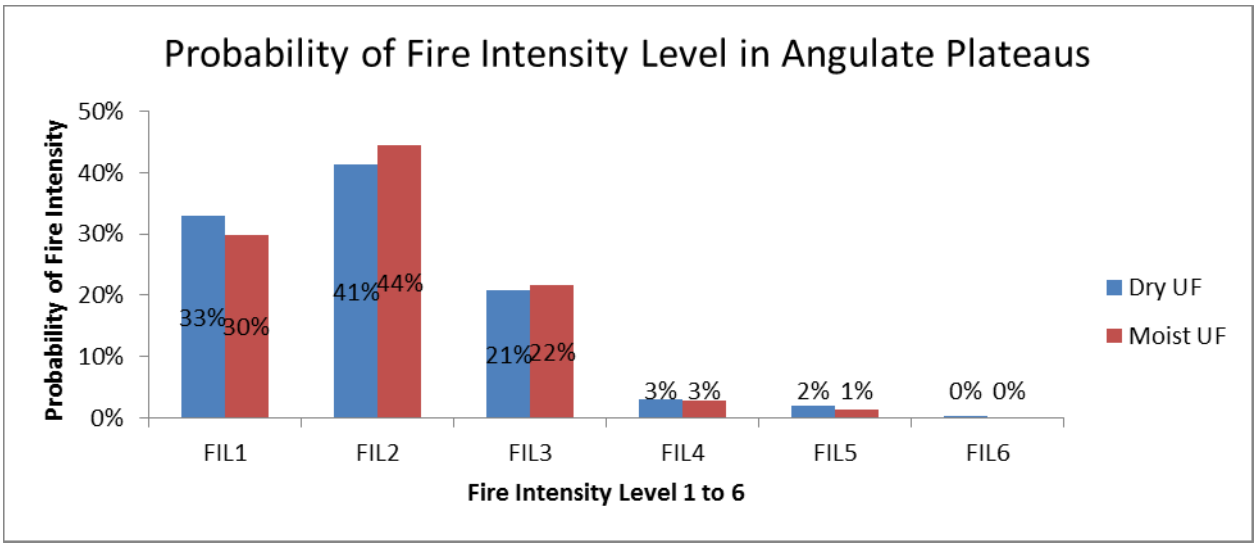


Figure D-5: Probability of Fire Intensity Level summarized by upland forest type and Landtype Association Group – Angulate Plateaus.

Appendix E – Proposed, Threatened, Endangered, Sensitive Wildlife and Aquatic Species (TES)

This appendix lists the existing conditions for proposed, threatened, endangered and sensitive wildlife and aquatic species applicable to the Lower Joseph Creek Restoration Project area. The list of federally-listed species applicable to the planning area was obtained from the U.S. Fish and Wildlife Service (USDI Fish and Wildlife Service 2011). No proposed or federally-listed terrestrial wildlife species were described for Wallowa County, Oregon. The USFS Region 6 Regional Forester's Sensitive Species List, dated January 31, 2011 (USDA Forest Service 2011) was reviewed for sensitive species potentially applicable to the Lower Joseph Project. A key to codes follows the table.

Taxon	Scientific Name	Common Name	Federal Status	Global Rank	Subspecies Rank	ORBIC State Rank	ORBIC State Breeding Rank	ODA ODFW State Status	USFS Sensitive Species Category	Wallowa-Whitman NF	LJCRP
Anadromous Fish	ONCORHYNCHUS MYKISS (MIDDLE COLUMBIA RIVER)	STEELHEAD	FT	G5Q	T2	S2		CR	FT	I	N
Anadromous Fish	ONCORHYNCHUS MYKISS (SNAKE RIVER BASIN)	STEELHEAD	FT	G5Q	T2T3	S2S3		V	FT	D	D
Anadromous Fish	ONCORHYNCHUS NERKA (SNAKE RIVER, MIGRATORY HABITAT ONLY)	SOCKEYE SALMON	FE	G5Q	T1	S1M	SXB		FE	D	N
Anadromous Fish	ONCORHYNCHUS TSHAWYTSCHA (SNAKE RIVER SPRING/SUMMER RUNS)	CHINOOK SALMON	FT	G5Q	T1	S1		ST	FT	D	N
Anadromous Fish	ONCORHYNCHUS TSHAWYTSCHA (SNAKE RIVER FALL RUNS)	CHINOOK SALMON	FT	G5Q	T1	S1		ST	FT	D	N
Non-anadromous Fish	ONCORHYNCHUS CLARKII LEWISI	WESTSLOPE CUTTHROAT TROUT		G4	T3	S3		CR	OR-SEN	D	N

Taxon	Scientific Name	Common Name	Federal Status	Global Rank	Subspecies Rank	ORBIC State Rank	ORBIC State Breeding Rank	ODA ODFW State Status	USFS Sensitive Species Category	Wallowa-Whitman NF	LJCRP
Non-anadromous Fish	SALVELINUS CONFLUENTUS	BULL TROUT	FT	G3Q	T2	S2		CR/V	FT	D	N
Bird	BARTRAMIA LONGICAUDA	UPLAND SANDPIPER		G5			S1B	CR	OR-SEN	D	N
Bird	BUCEPHALA ALBEOLA	BUFFLEHEAD		G5		S5N	S2B		OR-SEN	S	N
Bird	CENTROCERCUS UROPHASIANUS (OUTSIDE COLUMBIA BASIN)	GREATER SAGE-GROUSE	FC	G4		S3		V	OR-SEN	D	N
Bird	CYPSELOIDES NIGER	BLACK SWIFT		G4			S2B		OR-SEN	D	N
Bird	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON		G4	T4		S2B	V	SEN	D	D
Bird	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE		G5		S4N	S4B	ST	SEN	D	S
Bird	HISTRIONICUS HISTRIONICUS	HARLEQUIN DUCK		G4		S3N	S2B		SEN	D	N
Bird	LEUCOSTICTE ATRATA	BLACK ROSY FINCH		G4			S2B		OR-SEN	S	N
Bird	LEUCOSTICTE TEPHROCOTIS WALLOWA	WALLOWA ROSY FINCH		G5	T2	S2?N	S2B		OR-SEN	D	N
Bird	MELANERPES LEWIS	LEWIS' WOODPECKER		G4			S2S3B	CR	SEN	D	S
Bird	PICOIDES ALBOLARVATUS	WHITE-HEADED WOODPECKER		G4		S2S3		CR	SEN	D	S
Bird	TYMPANUCHUS PHASIANELLUS COLUMBIANUS	COLUMBIAN SHARP-TAILED GROUSE		G4	T3	S1		CR	OR-SEN	D	N

Taxon	Scientific Name	Common Name	Federal Status	Global Rank	Subspecies Rank	ORBIC State Rank	ORBIC State Breeding Rank	ODA ODFW State Status	USFS Sensitive Species Category	Wallowa-Whitman NF	LJCRP
Amphibian	ASCAPHUS MONTANUS	ROCKY MOUNTAIN TAILED FROG		G4		S2		V	SEN	D	D
Amphibian	RANA LUTEIVENTRIS (OUTSIDE GREAT BASIN)	COLUMBIA SPOTTED FROG		G4		S2S3		CR/V	OR-SEN	D	S
Mammal	CANIS LUPUS (NORTHERN ROCKY MTN.)	GRAY WOLF		G4		S1S2		SE	SEN	D	D
Mammal	CORYNORHINUS TOWNSENDII	TOWNSEND'S BIG-EARED BAT		G4		S2		CR	SEN	D	D
Mammal	EUDERMA MACULATUM	SPOTTED BAT		G4		S2		V	OR-SEN	D	S
Mammal	GULO GULO LUSCUS	NORTH AMERICAN WOLVERINE	FC	G4	T3	S1		ST	SEN	D	N
Mammal	LYNX CANADENSIS	CANADA LYNX	FT	G5		S1?			FT	D	N
Mammal	MYOTIS THYSANODES	FRINGED MYOTIS		G4G5		S2		V	OR-SEN	D	S
Bivalva: Clams, Oysters & Mussels	GONIDEA ANGULATA	WESTERN RIDGED MUSSEL		G3		S2S3			SEN	S	S
Gastropoda: Snails & Slugs	CRYPTOMASTIX POPULI	HELLS CANYON LAND SNAIL		G2		S1			SEN	S	N
Gastropoda: Snails & Slugs	FISHEROLA NUTTALLI	SHORTFACE LANX		G2		S1S2			OR-SEN	D	N
Gastropoda: Snails & Slugs	FLUMINICOLA FUSCUS	COLUMBIA PEBBLESNAIL		G2		S1			OR-SEN	D	N

Taxon	Scientific Name	Common Name	Federal Status	Global Rank	Subspecies Rank	ORBIC State Rank	ORBIC State Breeding Rank	ODA ODFW State Status	USFS Sensitive Species Category	Wallowa-Whitman NF	LJCRP
Gastropoda: Snails & Slugs	RADIODISCUS ABIETUM	FIR PINWHEEL		G4		S1			SEN	D	N
Gastropoda: Snails & Slugs	TAYLORCONCHA SERPENTICOLA	BLISS RAPID SNAIL	FT	G1					FT	D	N
Order Hymenoptera: Ants, Bees & Wasps	BOMBUS OCCIDENTALIS	WESTERN BUMBLEBEE		GU		S1S2			OR-SEN	D	S
Order Lepidoptera: Butterflies & Moths	BOLORIA SELENE	SILVER-BORDERED FRITILLARY		G5		S2			OR-SEN	D	N
Order Lepidoptera: Butterflies & Moths	CALLOPHRYS JOHNSONI	JOHNSON'S HAIRSTREAK		G3G4		S2			SEN	S	S
Order Lepidoptera: Butterflies & Moths	COLIAS CHRISTINA PSEUDOCHRISTINA	INTERMOUNTAIN SULPHUR		G3G4	T2T4	S2			OR-SEN	D	S
Order Lepidoptera: Butterflies & Moths	OCHLODES YUMA	YUMA SKIPPER		G5		S1?			OR-SEN	D	N

Key to codes

Rank and Status Information:
Global (G), National (N) and Subnational (State/Province) (S) Ranks:
1 = Critically imperiled
2 = Imperiled
3 = Rare and uncommon; vulnerable.
4 = Not rare and apparently secure
5 = Demonstrably widespread, abundant and secure
U = Unrankable
H = Possible extinct; Historical occurrence, formerly part of the native biota with the implied expectation that it may be rediscovered
X = Presumed extinct
NR = Not yet ranked
Rank Qualifiers:
? = Inexact numeric rank

Q = Questionable taxonomy

C = Captive or Cultivated only

Breeding Status Qualifiers:

B = Breeding, conservation status refers to breeding population of the species in the nation or state/province

N = Non-breeding, conservation status refers to the non-breeding population of the species in the nation or state/province.

M = Migrant, migrant species occurring regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention

Subspecies Rank (T = trinomial):

T# = Status of a infraspecific taxon (subspecies or varieties) are indicated by a T-rank following the species' global rank.

Rules for assigning T-ranks follow the same definitions for Global, National and Subnational/State ranks.

Oregon Biodiversity Information Center (ORBIC) List Rank:

1 = contains taxa that are threatened with extinction or presumed to be extinct throughout their entire range

2 = contains taxa that are threatened with extirpation or presumed to be extirpated from the state of Oregon;

these are often peripheral or disjunct species which are of concern when considering species diversity within Oregon's borders.

3 = contains taxa for which more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range

4 = contains taxa which are of conservation concern but are not currently threatened or endangered

Appendix F - Region 6 Sensitive Plants documented on the Wallowa-Whitman National Forest and effects calls the LJCRP

The Region 6 Regional Forester's Sensitive Species List was reviewed for sensitive species potentially applicable to the Lower Joseph Project. A key to codes follows the table.

Code	Scientific Name	Common Name	Global Rank	ORBIC State Rank	November 2014 SSS Category	WWNF	Presence in Planning Area	Effects Calls Alternatives 2 & 3	Habitat Category
ACWA	*Achnatherum wallowaense*	Wallowa needlegrass	G2G3	S2S3	OR-SEN	D	Documented	MIIH	Lithosol/shallow soil
ALGEG	*Allium geyeri var. geyeri*	Geyer's onion	G4G5	S1	OR-SEN	D	Suspected	NI	Moist meadows
ANMI8	*Anastrophyllum minutum*	Liverwort	G5	S1	OR-SEN	D	No habitat	NI	Subalpine/ alpine
ANJU	*Anthelia julacea*	Liverwort	G3G4	S1	OR-SEN	D	No habitat	NI	Limestone
ASVI10	*Asplenium viride*	Green spleenwort	G4	S1	OR-SEN	D	No habitat	NI	Limestone
BALY	*Barbilophozia lycopodioides*	Liverwort	G5	S1	OR-SEN	D	No habitat	NI	Subalpine/ alpine
BOHA3	*Boechera hastatula*	Hells canyon rockcress	G2	S2	OR-SEN	D	Suspected	NI	Talus, cliffs, rock outcrops
BOAS2	*Botrychium ascendens*	Upward-lobed moonwort	G3	S2	SEN	D	No habitat	NI	Cold riparian forest
BOCA5	*Botrychium campestre*	Prairie moonwort	G3G4	S1	OR-SEN	D	No habitat	NI	Cold riparian forest
BOCR	*Botrychium crenulatum*	Crenulate moonwort	G3	S2	SEN	D	Suspected	NI	Moist meadows
BOHE5	*Botrychium hesperium*	Western moonwort	G4	S1	SEN	D	Suspected	NI	Moist meadows
BOLI7	*Botrychium lineare*	Slender moonwort	G2G3	S1	SEN	D	No habitat	NI	Cold Forest

Code	Scientific Name	Common Name	Global Rank	ORBIC State Rank	November 2014 SSS Category	WWNF	Presence in Planning Area	Effects Calls Alternatives 2 & 3	Habitat Category
BOLU	*Botrychium lunaria*	Moonwort	G5	S2	OR-SEN	D	Suspected	NI	Moist meadows
BOMO	*Botrychium montanum*	Mountain grape-fern	G3	S2	OR-SEN	D	No habitat	NI	Cold riparian forest
BOPA9	*Botrychium paradoxum*	Twin-spiked moonwart	G3G4	S1	SEN	D	No habitat	NI	Cold riparian forest
BOPE4	*Botrychium pedunculosum*	Stalked moonwort	G2G3	S1	SEN	D	Suspected	NI	Moist meadows
BUAM2	*Bupleurum americanum*	Bupleurum	G5	S1	OR-SEN	D	No habitat	NI	Subalpine/ alpine
CAMAM	*Calochortus macrocarpus var. maculosus*	green-band mariposa-lily	G5	S2	SEN	D	Documented	MIIH	Grasslands
CANI	*Calochortus nitidus*	Broad-fruit mariposa-lily	G3	S1	OR-STR/WA-SEN	S	No habitat	NI	Grasslands*
CAAT8	*Carex atrosquama*	Blackened sedge	G5	S1	OR-SEN/WA-STR	D	No habitat	NI	Subalpine/ alpine
CACA12	*Carex capillaris*	Hairlike sedge	G5	S2	SEN	D	No habitat	NI	Cold riparian forest
CACA13	*Carex capitata*	Capitate sedge	G5	S2	OR-SEN/WA-STR	S	No habitat	NI	Cold riparian forest
CACO81	*Carex cordillerana*	Cordilleran sedge	G3G4	S2	OR-SEN	D	Suspected	MIIH	Coniferous Forest
CADI4	*Carex diandra*	Lesser panicled sedge	G5	S1	OR-SEN	S	No habitat	NI	Fens
CAGY2	*Carex gynocrates*	Yellow bog sedge	G5	S1	SEN	D	No habitat	NI	Subalpine/ alpine

Code	Scientific Name	Common Name	Global Rank	ORBIC State Rank	November 2014 SSS Category	WW NF	Presence in Planning Area	Effects Calls Alternatives 2 & 3	Habitat Category
CAID	*Carex idahoa*	Idaho sedge	G2G3	S1	OR-SEN	S	No habitat	NI	Moist meadows*
CALAA	*Carex lasiocarpa var. americana*	Slender sedge	G5	S2	OR-SEN	D	No habitat	NI	Fens
CAME9	*Carex media*	Intermediate sedge	G5?	S1	SEN	D	No habitat	NI	Cold riparian forest
CAMI16	*Carex micropoda*	Pyrenaean sedge	G5	S1	OR-SEN	D	No habitat	NI	Subalpine/ alpine
CANA2	*Carex nardina*	Spikenard sedge	G4G5	S2?	OR-SEN	D	No habitat	NI	Subalpine/ alpine
CAPE5	*Carex pelocarpa*	New sedge	G4G5	S1	OR-SEN	D	No habitat	NI	Subalpine/ alpine
CARE4	*Carex retrorsa*	Retrorse sedge	G5	S1	OR-SEN	D	No habitat	NI	Wet meadows and riparian*
CASA10	*Carex saxatilis*	Russet sedge	G5	S1	OR-SEN	D	No habitat	NI	Fens
CASU7	*Carex subnigricans*	Dark alpine sedge	G5	S1	OR-SEN	D	No habitat	NI	Subalpine/ alpine
CAVE5	*Carex vernacula*	Native sedge	G5	S2	OR-SEN	D	No habitat	NI	Subalpine/ alpine
CAFLR	*Castilleja flava var. rustica*	Rural paintbrush	G4G5	S1	OR-SEN	D	No habitat	NI	Subalpine/ alpine
CAFR8	*Castilleja fraterna*	Fraternal paintbrush	G2	S2	OR-SEN	D	No habitat	NI	Subalpine/ alpine
CARU8	*Castilleja rubida*	Purple alpine paintbrush	G2	S2	OR-SEN	D	No habitat	NI	Subalpine/ alpine
CHFE	*Cheilanthes feei*	Fee's lip-fern	G5	S2	SEN	D	No habitat	NI	Limestone
COTE13	*Comastoma tenellum*	Slender gentian	G4G5	S1	SEN	S	No habitat	NI	Fens
CRST2	*Cryptogramma stelleri*	Steller's rockbrake	G5	S1	SEN	D	No habitat	NI	Limestone

Code	Scientific Name	Common Name	Global Rank	ORBIC State Rank	November 2014 SSS Category	WWNF	Presence in Planning Area	Effects Calls Alternatives 2 & 3	Habitat Category
CYLUL	*Cyperus lupulinus ssp. lupulinus*	A cyperus	G5	S1	OR-SEN	D	No habitat	NI	Low elevation riparian
CYFA	*Cypripedium fasciculatum*	Clustered lady's-slipper	G4	S2	OR-SEN	D	Suspected	MIIH	Coniferous Forest
ELBR5	*Elatine brachysperma*	Short seeded waterwort	G5	S1	OR-SEN	S	No habitat	NI	Low elevation riparian
ELBO	*Eleocharis bolanderi*	Bolander's spikerush	G4	S2	OR-SEN	D	Documented	NI	Seeps, springs
ENBR2	*Encalypta brevipes*	Moss	G3	S1	OR-SEN	S	Suspected	NI	Talus, cliffs, rock outcrops
ENFA2	*Entosthodon fascicularis*	Moss	G4G5	S1	OR-SEN/WA-STR	S	Suspected	NI	Seeps, springs
ERDA3	*Erigeron davisii*	Engelmann's daisy	G3	S1	OR-SEN/WA-STR	D	Documented	MIIH	Lithosol/shallow soil
ERDI3	*Erigeron disparipilus*	White cushion erigeron	G5	S2	OR-SEN	D	Documented	MIIH	Lithosol/shallow soil
EUME17	*Eurybia merita*	Arctic aster	G5	SNR	OR-STR/WA-SEN	D	No habitat	NI	Subalpine/ alpine
GEPR3	*Gentiana prostrata*	Moss gentian	G4G5	S2	OR-SEN	S	No habitat	NI	Fens
GEROT	*Geum rossii var. turbinatum*	Slender-stemmed avens	G5	S2	OR-SEN	D	No habitat	NI	Subalpine/ alpine
HAFL9	*Harpanthus flotovianus*	Liverwort	G5	S1	OR-SEN	D	No habitat	NI	Subalpine/ alpine

Code	Scientific Name	Common Name	Global Rank	ORBIC State Rank	November 2014 SSS Category	WWNF	Presence in Planning Area	Effects Calls Alternatives 2 & 3	Habitat Category
HECU3	*Heliotropium curassavicum*	Salt heliotrope	G5	S2	OR-SEN	S	No habitat	NI	Low elevation riparian
JUTRA2	*Juncus triglumis var. albescens*	Three-flowered rush	G5	S1	OR-SEN	D	No habitat	NI	Subalpine/ alpine
JUPO3	*Jungermannia polaris*	Liverwort	G4	S1	OR-SEN	D	No habitat	NI	Limestone
KOMY	*Kobresia myosuroides*	Bellard's kobresia	G5	S1	OR-SEN	D	No habitat	NI	Subalpine/ alpine
KOSI2	*Kobresia simpliciuscula*	Simple kobresia	G5	S1	OR-SEN	D	No habitat	NI	Subalpine/ alpine
LIAR6	*Lipocarpha aristulata*	Aristulate lipocarpha	G5?	S1	SEN	D	No habitat	NI	Low elevation riparian
LIBO4	*Listera borealis*	Northern twayblade	G4	S1	OR-SEN	D	Suspected	MIIH	Coniferous Forest
LOER2	*Lomatium erythrocarpum*	Red-fruited lomatium	G1G2	S1S2	OR-SEN	D	No habitat	NI	Subalpine/ alpine
LOGR2	*Lomatium greenmanii*	Greenman's desert parsley	G1	S1	OR-SEN	D	No habitat	NI	Subalpine/ alpine
LOGI3	*Lophozia gillmanii*	Liverwort	G5	S1	OR-SEN	D	No habitat	NI	Limestone
LYCO3	*Lycopodium complanatum*	Ground cedar	G5	S2	OR-SEN	D	No habitat	NI	Coniferous Forest*
MIHY	*Mimulus hymenophyllus*	Membrane-leaved monkeyflower	G2	S1S2	OR-SEN	D	Suspected	NI	Talus, cliffs, rock outcrops
MIMA2	*Mirabilis macfarlanei*[FT]	Macfarlane's four o'clock	G2	S1	FT	D	No Habitat	No Effect	Grasslands*
MUMI2	*Muhlenbergia minutissima*	Annual dropseed	G5	S2	OR-SEN	S	Suspected	NI	Moist meadows

Code	Scientific Name	Common Name	Global Rank	ORBIC State Rank	November 2014 SSS Category	WWNF	Presence in Planning Area	Effects Calls Alternatives 2 & 3	Habitat Category
OPPU3	*Ophioglossum pusillum*	Adder's-tongue	G5	S1	SEN	D	No habitat	NI	Wet meadows and riparian*
PAPO12	*Packera porteri*	Porter's butterweed	G4	SH	OR-STR/WA-SEN	S	No habitat	NI	Subalpine/ alpine
PEBR5	*Pellaea bridgesii*	Bridges' cliff-brake	G4	S2	OR-SEN	D	No habitat	NI	Cold Forest
PEQU7	*Peltolepis quadrata*	Liverwort	G4	S1	OR-SEN	D	No habitat	NI	Limestone
PHMI7	*Phacelia minutissima*	Dwarf phacelia	G3	S1	SEN	D	Suspected	NI	Moist meadow
PHMU3	*Phlox multiflora*	Many-flowered phlox	G4	S1	OR-SEN	D	Suspected	NI	Talus, cliffs, rock outcrops
PIAL	*Pinus albicaulis* FC	Whitebark pine	G3G4	S3	SEN	D	No habitat	NI	Subalpine/ alpine
PIFL2	*Pinus flexilis*	Limber pine	G4	S2?	OR-SEN	D	No habitat	NI	Subalpine/ alpine
PLOB	*Platanthera obtusata*	Small northern bog-orchid	G5	S1	SEN	D	No habitat	NI	Fens
PLOR3	*Pleuropogon oregonus*	Oregon semaphoregrass	G1	S1	OR-SEN	S	Suspected	NI	Wet meadows and riparian
PODI	*Potamogeton diversifolius*	Rafinesque's pondweed	G5	S1	OR-SEN	S	No habitat	NI	Wet meadows and riparian*
PRQU2	*Preissia quadrata*	Liverwort	G5	S2	OR-SEN	D	No habitat	NI	Limestone
PSTR5	*Pseudocalliergon trifarium*	Moss	G4	S1	OR-SEN	S	No habitat	NI	Fens
PTPU2	*Ptilidium pulcherrimum*	Liverwort	G5	S1	OR-SEN	D	Suspected	MIIH	Coniferous Forest

Code	Scientific Name	Common Name	Global Rank	ORBIC State Rank	November 2014 SSS Category	WWNF	Presence in Planning Area	Effects Calls Alternatives 2 & 3	Habitat Category
PYSC4	*Pyrrocoma scaberula*	Rough pyrrocoma	G2	S1	OR-SEN	D	Documented	MIIH	Grasslands
ROCO3	*Rorippa columbiae*	Columbia cress	G3	S3	SEN	S	Suspected	NI	Wet meadows and riparian
RORA	*Rotala ramosior*	Lowland toothcup	G5	S2	SEN	S	Suspected	NI	Wet meadows and riparian
RUBA	*Rubus bartonianus*	Bartonberry	G2	S2	OR-SEN	D	No habitat	NI	Low elevation riparian
SAFA	*Salix farriae*	Farr's willow	G4	S2	OR-SEN	D	No habitat	NI	Cold riparian forest
SAWO	*Salix wolfii*	Wolf's willow	G5?	S2	OR-SEN	D	No habitat	NI	Cold riparian forest
SAADO2	*Saxifraga adscendens ssp. oregonensis*	Wedge-leaf saxifrage	G5	S1	OR-SEN	D	No habitat	NI	Subalpine/ alpine
SCCI5	*Schistidium cinclidodonteum*	Moss	G2G3	S2	OR-SEN	D	Suspected	MIIH	Coniferous Forest
SISP2	*Silene spaldingii*[FT]	Spalding's catchfly	G2	S2	FT	D	Suspected	May Effect – NLAA	Grasslands
SUVI	*Suksdorfia violacea*	Violet suksdorfia	G4	S1	OR-SEN	S	Suspected	NI	Talus, cliffs, rock outcrops
TEGE	*Tetraphis geniculata*	Moss	G3G5	S1	OR-SEN/WA-STR	S	Suspected	MIIH	Coniferous Forest
THAL	*Thalictrum alpinum*	Alpine meadowrue	G5	S2	OR-SEN	D	No habitat	NI	Subalpine/ alpine
THEU	*Thelypodium eucosmum*	Arrow-leaf thelypody	G2	S2	OR-SEN	S	No habitat	NI	Low elevation riparian
TOMU70	*Tortula mucronifolia*	Moss	G5	S2	OR-SEN	S	Suspected	NI	Talus, cliffs, rock outcrops

Code	Scientific Name	Common Name	Global Rank	ORBIC State Rank	November 2014 SSS Category	WWNF	Presence in Planning Area	Effects Calls Alternatives 2 & 3	Habitat Category
TOMO	*Townsendia montana*	Mountain townsendia	G4	S1	OR-SEN	D	No habitat	NI	Subalpine/ alpine
TOPA2	*Townsendia parryi*	Parry's townsendia	G4?	S1	OR-SEN	D	No habitat	NI	Subalpine/ alpine
TRDO	*Trifolium douglasii*	Douglas' clover	G2	S1	SEN	D	Suspected	NI	Moist meadows
TRLAA2	*Trollius laxus ssp. albiflorus*	American globeflower	G5	S1	OR-SEN	D	Suspected	NI	Wet meadows, riparian
UTMI	*Utricularia minor*	Lesser bladderwort	G5	S2	OR-SEN	D	Documented	NI	Fens

Key to codes

* based on expert opinion, species is not expected in LJCRP.

FC = federal candidate
FT = federal threatened

Rank and Status Information:
Global (G), National (N) and Subnational (State/Province) (S) Ranks:
1 = Critically imperiled
2 = Imperiled
3 = Rare and uncommon; vulnerable.
4 = Not rare and apparently secure
5 = Demonstrably widespread, abundant and secure
U = Unrankable
H = Possible extinct; Historical occurrence, formerly part of the native biota with the implied expectation that it may be rediscovered
X = Presumed extinct
NR = Not yet ranked
Rank Qualifiers:
? = Inexact numeric rank

Q = Questionable taxonomy

C = Captive or Cultivated only

Breeding Status Qualifiers:

B = Breeding, conservation status refers to breeding population of the species in the nation or state/province

N = Non-breeding, conservation status refers to the non-breeding population of the species in the nation or state/province.

M = Migrant, migrant species occurring regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention

Subspecies Rank (T = trinomial):

T# = Status of a infraspecific taxon (subspecies or varieties) are indicated by a T-rank following the species' global rank.

Rules for assigning T-ranks follow the same definitions for Global, National and Subnational/State ranks.

Oregon Biodiversity Information Center (ORBIC) List Rank:

1 = contains taxa that are threatened with extinction or presumed to be extinct throughout their entire range

2 = contains taxa that are threatened with extirpation or presumed to be extirpated from the state of Oregon;

these are often peripheral or disjunct species which are of concern when considering species diversity within Oregon's borders.

3 = contains taxa for which more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range

4 = contains taxa which are of conservation concern but are not currently threatened or endangered

Effects Determinations for Alternatives 2 and 3

NI – No Impact; MIIH- May Impact Individuals and Habitat but will not likely contribute toward federal listing or loss of viability to the population or species;

NLAA – Not Likely to Adversely Affect;

Appendix G - Nez Perce Tribe (NPT) Consultation and Coordination Record

Key to acronyms: TRL = Tribal Relations Liaison; NPT = Nez Perce Tribe; NPTEC = Nez Perce Tribes Executive Counsel; THPO = Tribal Historic Preservation Officer

Date	Contact/Consultation Type	Topic	Parties Involved	Outcome/Actions
08-28-13	Field Tour Information sharing	LJCRP existing condition and restoration treatment needs	W-W collaborative, FS, NRAC, NP staff, public	TRL met NPT Acting Fisheries Program Director. Received information on who to work with to begin LJCRP staff to staff coordination
09-30-13	Phone call	Request to coordinate briefing regarding 3 Blue Mountains Landscape Restoration projects i.e. LJCRP, Strategic Fuels Reduction and Dry Forest Restoration Projects	TRL and NPT Acting Fisheries Program Director	Received names and contact information for NPT Legal Counsel and NPT Natural Resource Director
11-05-13	Formal Letter	From 4 Blue Mountains Forest Supervisors i.e. Wallowa-Whitman, Ochoco, Umatilla and Malheur National Forests requesting coordination to initiate Govt-Govt consultation regarding 3 Blue Mountains projects	Forest Supervisors, TRL, NPTEC, NPT Directors and Staff	Received
11-06-13	Email/phone calls	Schedule briefing for 3 Blue Mountains Landscape Restoration projects i.e. LJCRP, Strategic Fuels Reduction and Dry Forest Restoration Projects	TRL, NPT Legal Counsel and NPT Natural Resource Director	Check calendars and NPTEC Sub Committee agenda and get back later.
11-19-13	NPTEC Natural Resource Sub-Committee Meeting	Team Leader and TRL briefing for Blue Mountain projects i.e. LJCRP, Strategic Fuels Reduction and Dry Forest Restoration Projects	NR Committee, NR Director and staff	Agreement to review and initiate Govt-Govt consultation in near future
01-08-14	Staff to Staff meeting	Wallowa-Whitman NF SOPA review including LJCRP	District Ranger ,staff, LJCRP IDT members and NPT staff	LJCRP briefing, issues and concerns shared, introductions and discussion of how NPT staff and IDT will work together
01-22-14	Wallowa-Whitman Collaborative Meeting. La Grande RD	Review and discuss status of LJCRP environmental analysis	Members of public and collaborative. Nez Perce staff joined via con call	Tribal staff concerned about apparent lack of understanding of trust responsibilities

Date	Contact/Consultation Type	Topic	Parties Involved	Outcome/Actions
02-12-14	Conference call	NPT THPO cultural resource interest in conducting archaeological survey for LJCRP	Forest Archaeologist, District Archaeologist, TRL and NPT THPO	TRL look into contract authorities
02-21-14	Conference call	LJCRP planning update; discuss historic range of variability and alternative development	IDT Lead, TRL, NPT staff i.e. THPO, Botanist, Biologist and Planner	Information sharing
03-03-14	IDT meeting Conference call	LJCRP analysis update i.e. proposed indicators and measures and themes for alternatives	Wallowa County NRAC, IDT, Wallowa- Whitman Forest Collaborative lead, NPT planner	Info requests for maps showing land allocations, RCHAs relative to units, wildlife corridors, heritage, wildlife, botany surveys.
03-04-14	Conference call	NPT THPO interest in sole source contracting for cultural resources inventories	FS Contract Officer, TRL and NPT THPO	No agreement
03-04-14	Conference call	Follow up with tribal staff per 01-013-14 meeting. Roads, IRAs, Old growth issues, RCHAs	IDT members and NPT THPO, planning and biology staff	Agreed to meet face to face to move forward with coordination
03-13-14	Video Tele-conference and face to face meeting in Clarkston	Look at alternatives and explore options. Discuss how work together	IDT members and NPT THPO, planning, botany and wildlife staff	NPT staff want IDT to address tribal interests and sensitivities
03-14-14	Follow up on NPT staff 3/13 request for copies of LJCRP public comments	LJCRP public comments	NPT planning staff	FedEx 2 copies to NPT staff
03-17-14	IDT Conference call	Updates on data collection, models, HRV, effects	NPT botanist	Continue consultation/IDT participation
03-27-14	IDT meeting conference call	Finalize alternatives	Wallowa County NRAC, IDT, Wallow- Whitman Forest Collaborative lead,	Alternatives developed to compare outcomes of varying levels of treatments per resource concerns

Date	Contact/Consultation Type	Topic	Parties Involved	Outcome/Actions
			NPT planner, biologist and botanist	
04-15-14	Email	Government-Government consultation scheduling	Deputy Forest Supervisor and NPT legal counsel	Pending schedules
04-29-14	Conference call	June 24 staff to staff LoJo field trip. NPT staff concerned why no recent engagement	IDT members and NPT planning, wildlife and botany staff	Identified field trip locations and next face to face meeting for May 12 in Joseph
05-12-14	Staff to staff meeting at Tribal Fisheries office in Joseph	Field trip planning, status of analysis, Alternatives themes and comparison discussion	IDT members and NPT planning, fisheries and botany staff	Ongoing
05-27-14	Phone conversation	Heritage Resource Inventory/NHPA Compliance	TRL and Guy Moura, Confederated Tribes of Colville THPO	TRL to share inventory results with THPO when complete
06-16-14	Field Trip	Reviewed and discussed cultural and other traditional resources in the LJCRP	THPO, NPT ethnographer, TRL, Zone Archaeologist	Ongoing coordination
06-24-14	Field Trip	Reviewed proposed actions in the LJCRP	IDT and tribal staff	Agreement to continue coordination
07-08-14	Meeting	Government to Government consultation to discuss LJCRP tribal issues and concerns	Forest Supervisor, IDT lead, TRL and NPTEC	Continue staff to staff coordination. Address interests in EIS
09-24-14	Field Trip	Review types of treatments proposed in RCHA's	Tribal staff and IDT	Ongoing coordination
10-24-14	Field Trip	Review types of treatments in Inventoried Roadless areas and MA15	Tribal staff and IDT	Ongoing coordination
January 2015 to June 2015	Phone calls & meeting (04-10-15)	Several calls and meetings regarding ethnographic study and participating agreement	TRL, Forest Arch, Zone Arch, THPO, NPT Cultural Director	Ongoing coordination

Date	Contact/Consultation Type	Topic	Parties Involved	Outcome/Actions
02-05-15	Phone conversation	Reviewed LJCRP Cultural Resource Inventory findings and effects.	THPO, TRL	Some concerns regarding survey strategy
03-04-15	Phone conversation	Staff to staff coordination to plan the DEIS response to comments meeting	TRL and NPT NEPA	Done
03-18-15	Meeting	Consult regarding traditional cultural values associated with LJCRP	TRL, Forest Arch, NPT Cultural Resource Staff	Ongoing coordination
03-26-15	Meeting	Held at Hells Canyon office to review and discuss team's response to Tribes DEIS comments	Blues IDT and NPT Staff	Blues IDT to revise responses based on issues/edits discussed
04-09-15	Formal Letter	Formal consultation via letter from Tom Montoya to Tribal Chairman Silas Whitman responding to Tribe's comments as discussed at 3/26 meeting	Forest Supervisor and Tribal Chairman	ongoing
05-14-15	Phone conversation	Coordination to plan and prepare for June 9 Forest Service-NPTEC government to government meeting regarding response to Tribes comments and concerns	TRL and NPT NEPA	No intermediate meeting needed. More info to come regarding meeting time
06-09-15	Meeting	Formal government to government consultation regarding LJCRP	NPTEC, NPT legal counsel, resource staff, Forest Supervisor, District Ranger and Blues IDT members	Consultation ongoing
06-15-15	Meeting	Review of NPT FEIS to ensure IDT and decision maker understands issues and concerns. NPT staff requests review of latest FEIS	Blues IDT and NPT Staff	IDT leader shares latest FEIS to NPT staff via email on 6-23-15
06-23-15	Phone conversations and email	Ethnographic Study Participating Agreement ready to review and sign	NPT admin staff and Forest province grants and agreement staff	Delivered via email 06-29-15
07-30-15	Email	Ethnographic Study signed by Tribe and Forest		

Appendix H. Non-native Invasive Plants Documented in LJCRP area

Scientific Name	Common Name	ODA [1]	Wallowa County[2]	utilization response [3]	fire adaptations[4]	Wetland Status[5]	Habitat Type	High Priority? [6]	Acres [7]
Aegilops cylindrica	jointed goat grass	B	A	IU	invader	UPL	Open areas	No	0.01
Arctium minus	common burdock		B	IU	invader	FACU	Open Areas	No	S
Bromus tectorum	cheatgrass			IU	invader	FACU	Rangeland	No	S
Cardaria draba	white top	B		IU	invader, sprouter	UPL	Open Areas	Yes	0.01
Centaurea cyanus	bachelor button		W	IU	invader	FACU	Open Areas	No	S
Centaurea diffusa	diffuse knapweed	B	B	IU	sprouter	UPL	Open Areas	No	173
Centaurea maculosa	spotted knapweed	B	A	IU	sprouter	FACU	Open Areas	No	126
Centaurea solstitialis	yellow starthistle	B	A	IU	invader	FACU	Rangeland	No	66
Chondrilla juncea	rush skeletonweed	B	A	IP	invader, sprouter	UPL	Rangeland	Yes	0.4
Cichorium intybus	chicory		B	IP	invader	FACU	Open Areas	No	S
Cirsium arvense	Canada thistle	B	B	IU	invader, sprouter	FACU	Mesic Openings	No	54
Cirsium vulgare	bull thistle	B	B	IU	invader	FACU	Open Areas	No	284
Conium maculatum	hemlock	B	A	IU	avoider	FACW	Mesic Openings	No	S
Convolvulus arvensis	field bindweed	B	B	IU	invader	UPL	Open Areas	No	S
Crupina vulgaris	common crupina		A	IU	invader	UPL	Rangeland	No	S
Cynoglossum officinale	hounds tongue	B	B	IU	invader	FACU	Open Areas	No	S
Dipsacus fullonum	teasel		B	IU	sprouter	FAC	Open Areas	No	S
Hieracium aurantiacum	orange hawkweed	A	A	IU	sprouter	FACU	Mesic Openings	Yes	10
Hieracium pratense	meadow knapweed		A	IU	sprouter	FACU	Mesic Openings	Yes	2385

Scientific Name	Common Name	ODA [1]	Wallowa County[2]	utilization response [3]	fire adaptations[4]	Wetland Status[5]	Habitat Type	High Priority? [6]	Acres [7]
Hypericum perforatum	St. Johnswort	B	B	IU	sprouter	FACU	Open Areas	No	S
Kochia scoparia	kochia	B	B	IP* toxic	invader	FAC	Open Areas	No	S
Linaria dalmatica	Dalmation toadflax	B	B	IP	sprouter	UPL	Rangeland	No	S
Onopordum acanthium	Scotch thistle	B	A	IU	invader	FAC	Mesic Openings	No	440
Phalaris arundinacea	reed canary grass		B	IP	avoider	OBL	Mesic Openings	No	S
Potentilla recta	sulfur cinquefoil	B	A	IU	sprouter	FACU	Open Areas	No	7
Ranunculus acris	tall buttercup		B	IU	sprouter	FACW	Mesic Openings	No	S
Ranunculus testiculatus	bur buttercup		B	IU	invader	UPL	Open Areas	No	S
Rosa eglanteria	sweet briar rose		B	IU	sprouter	FACU	Open Areas	No	S
Rubus discolor	blackberry	B	B	IU	sprouter	FACU	Open Areas	No	S
Senecio jacobaea	tansy ragwort	B	A	IU	sprouter	FACU	Mesic Openings	No	5.5
Silene alba	white campion		B	IU	invader	UPL	Open Areas	No	S
Taeniatherum caput-medusae	medusahead rye	B	A	IU	invader	UPL	Rangeland	No	0.5
Ventenata dubia	ventenata		B	IU	invader	UPL	Rangeland	No	S
Verbascum thapsus	mullein		B	IU	seeder	FACU	Open Areas	No	S

1/ Oregon Department of Agriculture codes: A = a weed of known economic importance which occurs in the state in small enough infestations to make eradication or containment possible; or is not known to occur, but its presence in neighboring states make future occurrence in Oregon seem imminent; B = a weed of economic importance which is regionally abundant, but which may have limited distribution in some counties

2/ Wallowa County Codes: "A" Designated Weed – a weed of known economic importance which occurs in the county in small enough infestations to make eradication or containment possible; or is not known to occur, but its presence in neighboring counties make future occurrence in Wallowa County seem imminent.

"B" Designated Weed – a weed of economic importance which is regionally abundant, but which may have limited distribution in some areas. "W" Watch List - Weeds that are known or are likely to occur in Wallowa County that have economic or ecological importance but, for whatever reason have not been given the emphasis of rating as an A or B Noxious Weed are listed in the Watch List. (Wallowa County Weed Board 2010).

3/ The Blue Mountain Ecology program, NRCS Plants, and the Oregon Department of Agriculture (ODA) databases were queried for information on utilization response, fire adaptations, and wetland status. Utilization response (response to grazing): IU = increases with utilization and is unpalatable, IP increases and is palatable.
4/ Fire adaptations: invader = comes in after fire and thrives in post fire conditions, sprouter = survives and resprouts after fire, seeder = regenerates from copious seed after fire, avoider = occupies habitats rarely visited by fire.
5/ Wetland Status: UPL = upland, FACU = faculatative upland, FACW = facultative wetland, OBL = obligate wetland
6/ This column refers to whether the species is considered a high priority for eradication by the Wallowa Mountains District of the Wallowa-Whitman National Forest.
7/ Species without acres listed have been observed in the project area but not documented in the NRM database

Appendix I – Response to Comments on the DEIS

As per Section 102 (c) of NEPA and FSH 1909.15 Chapter 20, Section 25, this appendix includes a summary of all specific written, substantive comments received on the DEIS. Comments that are pertinent to the same subject have been aggregated by categories. The project record includes responses to each individual comment received on the DEIS.

This appendix also includes copies of the full text of all comments received on the DEIS from Federal, State, and local agencies and elected officials.

Content Analysis Process

Public responses on the LJCRP were documented and analyzed using a process called content analysis. This is a systematic process of compiling and categorizing all public viewpoints and concerns submitted on a plan or project. Content analysis is intended to help the planning team clarify or adjust the FEIS. Information from public meetings, letters, emails, and other sources are all included in this analysis.

In the content analysis process, each response is assigned a unique number. This number allows analysts to link specific comments to original responses. All respondents' names and addresses are entered into a project-specific database program, enabling creation of a complete list of all respondents.

The project planning team read and coded responses using the coding structure. Each comment is coded by subject. Then all coded comments are entered verbatim into a comment database. Database reports track all input and allow analysts to identify public concerns and to analyze the relationships among them. Each public concern statement is composed of one or more sample excerpts from original comments. Unique commenter identification numbers corresponding to summary comments and responses are noted. A key to commenter identities is available in the project record.

This appendix does not replace responses in their original form. Rather, they provide a map to the responses and other input on file at the Wallowa Mountains Office, Wallowa-Whitman National Forest.

It is important to recognize that the consideration of public comment is not a vote-counting process in which the outcome is determined by the majority opinion. Relative depth of feeling and interest among the public can serve to provide a general context for decision-making. However, it is the appropriateness, specificity, and factual accuracy of comment content that serves to provide the basis for modifications to planning documents and decisions. Further, because respondents are self-selected, they do not constitute a random or representative public sample. The National Environmental Policy Act (NEPA) encourages all interested parties to submit comments as often as they wish regardless of age, citizenship, or eligibility to vote. Respondents may therefore include businesses, people from other countries, children, and people who submit multiple responses. Therefore, caution should be used when interpreting comparative terms in this appendix. Every substantive comment and suggestion has value, whether expressed by one respondent or many. All input is read and evaluated and the analysis team attempts to capture all relevant public concerns in the analysis process.

Coding Structure

Presented below is the list of categories or "codes" used to sort and analyze public comments on the LJCRP.

Code	Definition	Code	Definition	Code	Definition	Code	Definition	Code	Definition
101	Code TBD/Pending	122	Effects Analysis	141.04	Chemical Veg. Treatment	150.03	Transportation Analysis	165.09	Rec. in Wilderness, Roadless, etc.
102	No Further Response Required	122.01	Cumulative Effects Analysis	141.05	Structural Stages	151	Roads Management	170	Land Ownership, Uses
102.01	Beyond Scope	123	Technical, Editorial	141.06	Use of HRV	151.01	Road Construction, Maint.	170.01	Special Use Authorizations
102.02	Position, No Rationale	123.01	Adeqacy of Info Provided (Maps)	141.07	Methods (eg. Heavy equip)	151.02	Road Closure, Decomm.	170.02	Land Use Changes
102.03	Already Addressed	130	Resource & Area Mgmt	142	Timber Mgmt	152	Trails Management	170.03	Land Acquisition and Exchanges
110	Decision Process	130.01	Monitoring	142.01	Timber Sales (Green)	152.01	Trails Construction, Maint.	170.04	Landlines, Boundary Fences
110.01	Roles, Authorities	130.02	Inventories, Mapping, GIS	142.02	Timber Sales (Salvage)	152.02	Trails Closure, Decomm.	171	Land Designations/Mgmt
110.02	Coordination, Consultation	130.03	Enforcement	142.03	Harvest Levels (Actual)	153	Road/Trail Structures, Signs	171.01	Roadless Areas
110.03	Trust, Credibility	131	Physical Elements	142.04	Harvest Methods	160	Recreation Mgmt	171.02	Designated Wilderness Areas
110.04	Laws, Policies	132	Water, Watershed Mgt, Stream Restoration	142.05	Suitability Determinations	160.01	Rec. Opportunity Spectrum	171.03	Wilderness Study, Recommend.
110.05	General Use of Science, Analyses	132.01	Riparian Area Mgmt	142.06	Allowable Sale Quantity (ASQ)	160.02	User Education	171.04	Biosphere Reserve
110.06	Land Mgmt Emphasis, RHCAs	132.02	Water Infrastructure Mgmt	142.07	Biofuels	160.03	User Fees	171.05	Research Natural Areas/ACECs

Code	Definition	Code	Definition	Code	Definition	Code	Definition	Code	Definition
110.0601	Multiple Use Mgmt	132.03	Wetlands, Springs	142.08	Other Uses	160.04	Visual Resource Mgmt	171.06	Scenic Roads & Trails
110.0602	Preservation Mgmt	133	Air and Climate	142.09	Biomass Utilization	161	Recreation Use Permits	171.07	Wild and Scenic Rivers
110.0603	Adaptive Mgmt	133.01	Air Quality Mgmt	142.1	Silvicultural Methods	161.01	Commercial Permits	180	Econ. & Soc. Actions, Analyses
110.0604	Ecosystem Restoration	133.02	Climate Change	143	Wildlife/Animals Mgmt	161.02	Non-commercial Permits	181	Econ. Actions, Analyses
110.0605	Forest Health	134	Soils Mgmt	143.01	Stock, Breed, Reintroduce	162	Recreational Access	181.01	Estimating Costs/Values
110.0606	Sustainablity	134.01	Slope or Erosion Control	143.02	Animal Disease Mgmt	162.01	Rec. Access Restrictions	181.02	Comparing Costs/Benefits
110.07	Appeals, Objections, Litigation	135	Minerals & Geology Mgmt	143.03	Invasive Animal Mgmt	162.02	Seasonal Closures/Access	181.03	Community Econ. Effects Analysis
111	Public Involvement	135.01	Minerals & Rock	143.04	Chemical Animal Treatment	163	Developed Rec. and Facilities	181.04	Local Timber Industry
111.01	Outreach/Education	135.02	Oil & Gas	143.05	Wildlife Harvest Levels, Methods	163.01	Campgrounds/Picnic Areas	181.05	Fire adapted ecosystems
111.02	Collaboration, Meetings	135.03	Plan of Operation, Processes	143.06	Wildlife Structures (barriers, etc.)	163.02	Restrooms	182	Social Actions or Analyses
111.03	Comment Period	135.04	Reclamation, Cleanup, Bonding	144	Domestic Livestock, Grazing Mgmt	163.03	Trailheads, Signs, Parking	182.01	Cultural, Hist., Anthro. Mgmt
112	Agency Organization	135.05	Mineral Uses, Alternatives	144.01	Grazing Permits, Allotments	163.04	Water Activities	182.02	Public Health, Safety
112.01	Funding, General	136	Fire and Fuels Mgmt	144.02	Fences, Structures	164	Motorized Recreation Mgmt	182.03	Env. Justice, Civil Rights Analysis

Code	Definition	Code	Definition	Code	Definition	Code	Definition	Code	Definition
112.02	Staffing	136.01	Suppression	144.03	Rangeland Veg. Improvements	164.01	OHV use		
112.0202	Volunteers	136.02	Fuel Treatment, Reduction	144.04	Monitoring (Livestock Effects)	164.0101	Full size vehicle use		
112.03	Outsourcing, Contracting	136.03	Prescribed Burns	144.05	Water developments	164.0102	Single-track motorcycle use		
120	Proposed Action, Decision	136.04	Unit Fire Plans	149	Other Activities Mgmt	164.0103	4- and 3-wheeler use		
120.01	Purpose and Need	136.05	Safety, Risk Mgmt.	149.01	Utility Corridors, Facilities	164.02	Over-snow vehicle use		
120.02	Analysis type (CE, EA, EIS)	136.06	Wildland/Urban Interface	149.02	Research Facilities, Projects	164.03	Motorized Watercraft use		
121	Issues, Alternatives	136.07	Smoke Mgmt	149.03	Military Activities	165	Dispersed Recreation Mgmt		
121.01	Alts. Not Analyzed In Detail	136.08	The role of fire	149.04	Hydroelectric	165.01	Hiking, Backpacking		
121.02	Alternatives (comparing, range)	136.09	Fire Regime Condition Class	149.05	Permits (excl. rec. & grazing)	165.02	Dispersed Camping		
121.0201	Preferred Alternative	136.1	Amount or Scale of Prescribed Fire	149.06	Valid Existing Rights	165.03	Hunting, Shooting		
121.0202	No Action Alternative	140	Biological Resources Mgt, Ground Disturbing Activities	149.07	Special Forest Prod. Collection	165.04	Fishing		
121.0203	Alternative X	141	Vegetation Mgmt	149.08	Firewood	165.05	Equestrian/Pack Animals		

Code	Definition	Code	Definition	Code	Definition	Code	Definition	Code	Definition
121.03	Suggested New Alternative	141.01	Introduction, Planting, Seeding	150	Trans. Sys. Mgmt (& non-rec. access)	165.06	Bicycling		
122	Effects Analysis	141.02	Insects and Disease Treatment	150.01	Rights-Of-Way	165.07	Canoeing, Kayaking, Rafting		
122.01	Cumulative Effects Analysis	141.03	Invasive Vegetation Treatment	150.02	Non-System, User-Created	165.08	Spelunking		

Organized Response Report

Organized responses represented 98% of the total responses received during the public comment period for the LJCRP. Five or more responses received from different individuals but containing identical text, or identical text plus brief additional comments similar in content, are defined as organized response campaigns. One organized response campaign was received for the LJCRP.

Once an organized response campaign letter is identified, a “master” is entered into the database with all of the content information. All responses with matching text are then linked to this master within the database with a designated number.

Summary of Comments and Responses by Category

Category	Commenter ID#	Summary of comments	Summary Response
Vegetation Management: Eastside Screen amendment	244, 262, 264	Harvesting trees over 21” dbh is a necessary component to implement this project—to accomplish all the stated resource objectives, including restoring the project area toward the historic range of variability; promoting resilience, economic values, and habitat management; reducing fuels and enhancing the health of the residual trees in this particular watershed; and reducing mistletoe disease problems. Furthermore, we urge you to change the proposal to expand the 21”-plus limit—to include harvest of some additional large trees beyond the currently-defined specs—at the Silviculturist’s professional discretion and written prescription. There are trees subject to imminent mortality, forest health problem, or safety issue, which would warrant removal. This area is moisture limited with regards to growing capacity and we are concerned that leaving too many trees on the landscape will contribute to the susceptibility of the forest to insects, disease and wildfire.	The design of prescriptions for cutting of any trees ≥21” would be based on the desire to restore forest structure and composition toward reference ranges of variation (RV), particularly to increase the abundance of shade-intolerant tree species (ponderosa pine and western larch), reduce the risk of uncharacteristically severe fire and insect and disease outbreaks, and increase resiliency to natural disturbance and climate change (FEIS Chapter 1). Trees that are deemed a safety concern to forest operations may be removed, although those subject to imminent mortality and are not a safety concern would be left as wildlife habitat trees and will contribute to the future snag pool. Trees that are considered a forest health problem (i.e. mistletoe infection) would be managed per the design recommended for the LJCRP by the USFS Forest Health Protection Program. For example, establishment of non-host or an unstocked buffer of at least 50' between infected trees and uninfected residuals wherever trees infected with mistletoe are left (See FEIS Apendix J, Project Design Criteria, Silviculture Design).
Vegetation Management: Eastside Screen amendment	284	While the DEIS makes clear the intent behind the removal of trees ≥21" dbh, it does not fully disclose the circumstances under which those trees would be removed. The EPA recommends including a marking guide in the FEIS, as well as clarifying the way in which old trees will be identified.	With the intent to conserve all old trees, the project would adopt scientifically-derived guidelines (similar to Van Pelt (2008)) to assess tree age regardless of the diameter of individual trees. The FEIS has updated project design criteria (Appendix J) that illuminate specific treatment designs to meet the objectives of improving forest resiliency and conserving old forest structure.

Category	Commenter ID#	Summary of comments	Summary Response
Vegetation Management: Eastside Screen amendment	243	We can support a carefully defined amendment allowing removal of some (not all) large-young trees that are in direct competition (crowns touching) with more desired larger older trees. This activity should be exceptional and applied to a subset of the project area. This exception should not be used to “de-clump” natural clumps of trees. The FS should consider girdling the large-young trees to better meet objectives. This would reduce cone production, competition, and achieve other stated objectives while helping to provide large snag habitat in a way that commercial removal will not.	Treatment design concerning releasing old trees has been updated in the FEIS (Appendix J, Silviculture Design) and states: "Remove young trees within 1 to 2 drip-lines (the line extending vertically from the exterior edge of a tree’s live crown to the ground) of old ponderosa pine, western larch and Douglas-fir. Occasional individual large, vigorous trees may be left when they do not interfere with the objective to reduce crown competition and increase growing space adjacent to old trees". Forest thinning prescriptions would follow a practical, science based approach intended to restore characteristic functionality, and resistance and resilience to disturbance. Known as “ICO” (individuals, clumps and openings), this approach uses historical information at the stand- and landscape-level to design restoration strategies and prescriptions for restoration (e.g., see Franklin et al. 2013). For example, the pattern of old trees, stumps and snags currently on the landscape provide indicators of natural tree clumping and spacing, and thus the degree of horizontal spatial heterogeneity. In places where legacies of historic forest patterns are absent (e.g., young, post-fire forests), information is used from similar habitats. The decision-maker has been informed of the option to girdle rather than cut and remove large trees, and he could add this to the Record of Decision.

Category	Commenter ID#	Summary of comments	Summary Response
Vegetation Management: Eastside Screen amendment	225, 266	Eastside screens include direction that stands should move towards LOS (late old structure) conditions and also that large diameter trees over 21" should be retained and protected. This project follows neither of these Forest Plan directions, as tree species composition in many areas will be shifted towards early seral stages, and large diameter trees will be logged. The Tribe does not support the amendment to harvest trees greater than 21' due to significant impacts to stand structural characteristics, snag recruitment, etc.	Alternative 3 does not include a proposal to amend the forest plan to cut trees ≥21", and could be selected by the decision-maker. In Alternative 2, only under certain circumstances would trees ≥21" dbh be cut. Any proposed harvest is designed to move the landscape toward RV for all habitats. The effects analysis in Chapter 4 of the FEIS shows no net loss of old forest structure (OFSS or OFMS) in either of the action alternatives. It also shows the treatments would result in positive movement toward the desired condition for the larger tree size classes. Alternative 2 proposes a Forest Plan amendment to cut trees ≥21" dbh where appropriate (FEIS Chapter 3). The Eastside Screens were adopted as interim direction in 1993, amending the WWNF Forest Plan in 1994 (Regional Forester's Amendment #1) and with minor changes in 1995. In 2003, after nine years of implementation, the Regional Forester for the Pacific Northwest Region examined whether the Eastside Screens were functioning as intended (Goodman 2003). It was found that interpretation of screens direction, including 21-inch diameter limitations, no harvest in stands below HRV, and prescriptive connectivity corridors, at times limits the ability to meet policy objectives of providing late, old forest structure (LOS), particularly in dry single-story ponderosa pine or western larch stands. Restoring species composition toward HRV can at times require removing larger, but younger (<150 year) shade-tolerant species, many of which germinated as anindirect result of decades of fire suppression, to favor shade-intolerant species, such as ponderosa pine and western larch. Alternative 2 effects analyses show effects on structural characteristics, snag recruitment, and cultural resources given this forest plan amendment. The importance of large trees for many wildlife species is described in the FEIS in chapter 2, Wildlife Habitat section.

Category	Commenter ID#	Summary of comments	Summary Response
Vegetation Management: Project scope	4	Your insane proposal to log 47.1 square miles in an area sacred to Chief Joseph Band of the Nez Perce Tribe will certainly be stopped.	Government-to-government, and staff-to-staff meetings and field trips were held with Nez Perce tribal members and staff throughout the development of the LJCRP (see FEIS, Appendix G, Tribal Consultation Record). The FEIS considers concerns raised directly by the tribe. The FEIS discloses the effects of the No Action and action alternatives to tribal resources (FEIS chapter 4, Tribal).
Vegetation Management: General	243, 263	[We] support many of the silvicultural design features described in the Lower Joseph Creek Draft EIS (pp. 385-388). We support the use of ICO (individuals, clumps opening) method, but it must be recognized that this is a new and largely untested method and it must be carefully implemented and monitored to ensure that it is achieving desired objectives (such as variability and adequate retention of trees for future recruitment of large trees, and future snags and down wood), and avoiding undesired objectives (such as large gaps lacking live trees and or dead wood structure).	The planning team worked with Wallowa-Whitman National Forest, Wallowa Mountains Ranger District, and Regional Office staff to develop an implementation guide that will bridge the project vision presented in the EIS to implementation on the ground. The team is also consulting with ICO experts to present a LJCRP specific ICO training to the implementation crews, and bring silviculture staff and prescriptionist up to speed on ICO techniques and prescription development. The silviculture design in Appendix J of the FEIS has been updated from the version in the DEIS and contains design specific to large trees, snags, down wood and openings (gaps). These project design criteria serve as the foundation for the implementation guide.

Category	Commenter ID#	Summary of comments	Summary Response
Vegetation Management: Treatment extent	242, 243, 263	Commercial treatments in MA-15 (Old Growth Preservation Areas) could be more acceptable if the Forest Service identified alternative sites to protect, or dropped all moist forest treatments in MA-15. HCPC does not support: The logging and removal of trees > 21 inches dbh to create canopy gaps or to reduce seed sources; commercial harvest in Inventoried Roadless Areas, Potential Wilderness Areas or other ecologically significant unroaded areas; commercial harvest in Riparian Habitat Conservation Areas (RHCA) or Old Growth Management Areas (MA-15). Ongoing discussions within the (Wallowa Whitman Forest) collaborative may facilitate limited agreement for specific treatments in these areas. In old growth dry forests, some commenters support low-impact restoration through removal of small and some mid-sized trees (<12 inch dbh), and restoration of fire if proper preparations are made.	All of the action alternatives conserve the existing amount of old forest on the landscape, and increase the amount of large-tree and old forests (FEIS Chapter 4, tables 52, 54, 71, 73). One way to conserve old forest structure is to improve the resiliency of old trees to insects, fire and climate change. We have designed all treatments including those treatments that would occur within designated old growth areas (Management Area 15) with this in mind. Proven techniques for improving resiliency include reducing crown competition and increase growing space adjacent to old trees. Alternative 3 does not propose harvest activties in MA15, IRAs, and PWAs, nor the cutting of trees ≥21" dbh, and could be selected by the decision-maker. Canopy gaps are used to encourage regeneration of shade-intolerant species, and create landscape heterogeneity, relative to the range of natural variability. Franklin et al. (2013) specify that creation of gaps should in-part be determined by the landscape context, and need to shift species composition toward desired conditions. It could be ineffective to create canopy gaps to encourage shade-intolerant species without considering the landscape context, and taking advantage of the opportunity and need for gaps to also reduce seed sources of shade-tolerant tree species. Scientific analyses of forest patterns in the Blue Mountains concluded that early seral (stand initiation) gaps historically ranged in size (on ecological contexts including the Lower Joseph Creek landscape) up to about 180 acres (Hessburg 1999). The FEIS analyzes the effects of a range of alternatives that include cutting versus not cutting trees ≥21", and harvest versus no harvest in IRAs, PWAs, RHCAs, and MA15 . The relative effects disclosed in the FEIS will be used to inform the final decision. The FEIS includes updated project design criteria (Appendix J) that illuminate specific treatment design to meet the objectives of improving forest resiliency and conserving old forest structure.

Category	Commenter ID#	Summary of comments	Summary Response
Vegetation Management: Designated Old Forest (MA-15)	225	Treatments in old growth areas is fairly aggressive and leaves very little opportunity for recruitment of the next generation, retards snag development and destablize the stand. The Tribe proposes a more moderate approach that retains more larger trees and all trees over 21 regardless of species. The tribe recommends the district or forest wildlife biologist review and approve the prescriptions and marking prior to treatment. A robust monitoring and evaluation plan should be required.	The FEIS was improved to clarify how the treatments are designed to meet Forest Plan desired conditions for wildlife, and the intent of the implementation plan. Specific to MA15 treatment design - Alternative 3 foregoes treatment in MA-15 and would leave the existing condition intact. Treatments proposed in MA-15 under Alternative 2 were designed to be conservative. For example: no trees 21" and larger would be removed; changes in density would be low to moderate (none of the treatments would result in a low density class where it doesn't already exist). Leaving an overall denser condition increases the number of replacement trees available when the old trees complete their life cycle. These treatments are also designed with improving resiliency of the old trees and old forest structure to insects, fire and climate change in mind. Proven techniques for improving resiliency of old trees include reducing crown competition and increase growing space adjacent to the old trees. Collaborators and the Forest Service are working together using the stated goals and objectives in the project DEIS, and the resulting decision, to develop specific monitoring questions and implement monitoring strategies. Key issues currently being considered for multi-party monitoring by the Wallowa-Whitman Forest Collaborative's monitoring subcommittee include effectiveness of treatments in designated old growth preservation areas (MA 15), among others. The deciding official has been made aware of desires for specifically monitoring treatments in designated old forest in the LJCRP area, which can be made a part of the Record of Decision.

Category	Commenter ID#	Summary of comments	Summary Response
Vegetation Management: Moist Forest	243, 265, 266	We ask that all commercial logging and roading in moist forest types be dropped as this is evidently a less abundant forest type in the project area and is important as source habitat for American marten and for foraging and potential nesting habitat for Pileated woodpecker. Further, densities of large snags (>20 inches dbh) in moist forest are below reference conditions in the snag density classes that provide habitat for American marten, and snag habitat is likely to be a limiting factor for marten in these habitat types. Harvesting on 3,423 acres will add to a reduction in snag habitat, further declining potential and future habitat quality for marten in this area. There is not nearly the same consensus on moist forest treatments or the need for restoration as in dry forests. The Forest Service should consider non-commercial treatments or no treatment in moist forests.	Most of the DEIS Alternative 2 proposal to treat the moist forest potential vegetation group within MA-15 was dropped due to wildlife habitat concerns. The remaining moist forest areas (about 50 acres) did not meet marten habitat criteria and they remain as part of Alternative 2 planned treatments to move toward the desired conditions in terms of forest composition, structure and density. We recognize that large tree, closed canopied, moist forests (also described as 'marten habitat') are at the low end of desired conditions (range of variation; RV). The design criteria for the proposed harvest within moist forests overall (including 800 and 700 acres in Alternatives 2 and 3, respectively) is to maintain >60% canopy closure, and multi-story conditions; and no trees ≥ 21” would be harvested. It is assumed that post-harvest, these stands would be maintained as marten source habitat. Vegetation treatments in both action alternatives are assumed to modify fire behavior and reduce the likelihood of a stand replacement event, thereby potentially retaining source habitat in the long-term. Treatment units remain outside a larger block of moist forest with larger tree structure within and adjacent to the MA-15 located along Peavine Creek, perhaps providing some protection to this area by lessening the risk for high severity fire. In Alternative 3, there would be no harvest of trees ≥ 21" dbh, which would likely provide higher quality habitat for species associated with these larger tree structures. Effects of harvest on habitat quality are expected to be short-term as the forests continue to grow.

Category	Commenter ID#	Summary of comments	Summary Response
Vegetation Management: Treatment extent	265	We are concerned by the proposed 5,500 acres of thinning after a stand replacement wild fire... The Forest Service fails to disclose this recent scientific finding or to analyze the impacts of not leaving naturally recovering forest alone after a stand replacement fire in the Lower Joseph Creek DEIS. The Forest Service fails to recognize and analyze the biodiversity created by stand replacement fire and its necessary role in the ecosystem, which evolved with fire.	We are not certain of which stand replacement fire, or the"recent scientific findings" that this commment refers to. Stand improvement treatments in areas recovering from stand replacement fire thin small diameter trees to provide for spatial heterogeneity and accelerate tree growth toward stands dominated by larger diameter trees, which are far below RV in this landscape. Many of the stand replacement fires that occured in this landscape were located within IRAs, the majority of which would continue to develop without human intervention under any alternative. In Alternative 2, stand improvement treatments would reduce the abundance of stands dominated by trees less than 5" in diameter by 4 and 5% in dry and moist upland forests, respectively (FEIS table 54). In Alternative 3, stand improvement treatments would reduce the abundance of stands dominated by trees less than 5" in diameter by 1% in both dry and moist upland forests (FEIS table 73).

Category	Commenter ID#	Summary of comments	Summary Response
Vegetation Management: Treatment in LOS	265	The rationale of increasing “resiliency to climate change and the safety and effectiveness of prescribed fire applications” (DEIS p.28) is a landscape scale objective, not significantly influenced by 31 acres of stand structure manipulation in existing late-old structure (LOS). Even if logged stands continue to meet Forest Service definitions of LOS, habitat quality has been lost and persistence as LOS over time may have been diminished due to the loss of future large live trees, snags, and logs. Any concerns about uncharacteristic understory density in a dry Ponderosa pine OFSS stand could otherwise be addressed with “non-commercial” size (e.g. up to 8” dbh) thinning or prescribed burning, as most trees in an uncharacteristic understory (assuming there is anything uncharacteristic about a young understory) would be small.	Our RV analysis has shown that in the dry forests we currently have less old forest single story (OFSS) habitat, and more old forest multistory (OFMS) habitat than would be expected. Moving stands from an OFMS condition toward OFSS, is expected to increase the resiliency that is more characteristic of dry, frequent-fire forests. The vast majority of trees removed woud be relatively small diameter. Additionally, wildlife species associated with OFSS habitats, which are far below RV, would benefit from these treatments (FEIS chapter 4, WIldlife Habitat). The rationale for treating 31 acres of existing old forest single story structure is to conserve the only representative of this structure left on the LJCRP landscape. This stand structure was much more abundant prior to the implementation of fire suppression, and project objectives include to increase the abundance of OFSS forests. Hence, it is prudent to maintain what currently exists by removing smaller diameter ladder fuels, and reducing the risk of loss of this rare structure to fire, insects and disease.

Category	Commenter ID#	Summary of comments	Summary Response
Vegetation Management: Treatment intensity	225, 243, 265	The structural benefits of all large trees outweighs any concern over the specific species or age of that tree. The presence of large trees in general (which tend to be older trees, regardless of species) increases resiliency to natural disturbance (including insects) and climate change, as evidenced by their persistence. Large trees are not the trees to cut to increase resiliency to natural disturbance and climate change. This is well established in the science. It's smaller firs that are more abundant on the landscape since heavy logging, not large firs. For several reasons (sensitive wildlife species that depend on dense forests; snag and down wood habitat; the moderating effects of dense canopy on winds, temperature, moisture, and in-turn fire behavior; carbon storage; etc), tree removal should be modest. How does extensive logging removal of existing large trees (already scarce compared to the historical range of variability) increase the abundance of "large tree dominated forests"? The Forest Service does not give any site-specific evidence that there is an overabundance of large "late seral" tree species (e.g. firs) or that there is any scientifically sound reason to remove large trees or any trees with old growth characteristics. There is no well documented, scientifically field-verified, significant threat from large grand fir or Douglas-fir regarding their "outcompeting" or killing old Ponderosa pine. The Tribe recommends retention of all tress older than 150 years regardless of species.	Old forest structure was more widespread throughout the Blue Mountains historically. This old forest condition was dominated by fire tolerant species such as ponderosa pine and western larch, and is true of the remaining old forest within the LJRCP area. Conserving old forest structure regardless of where it exists, and retaining all old trees (>150 years) are project objectives. Project Design Criteria common to all action alternatives (FEIS Appendix J, Silviculture Design) includes "retain and release old trees" and "reduce stand densities and increase mean diameter", as well as specific treatment designs to accomplish these. All alternatives retain trees greater than 150 years of age. The desired conditions for forest density include a range of conditions from low to high (FEIS table 13). The effects analysis indicates that post treatment condition for density is moving toward desired conditions, and contains a range of low to high density classes (see FEIS tables 53 and 72). Currently the forested landscape is deficient in open-canopied forests, and has an abundance (above RV) of closed-canopied forests. No alternative results in closed forest conditions that fall below the RV. Large numbers of snags are not expected to decline, and closing roads (Alternative 2) would reduce the risk to continued loss of snags. Project Design Criteria (FEIS Appendix J) are designed to protect all large snags during implementation of burning or harvesting, and harvest prescriptions should benefit snag-associated species of open canopied habitats. State and transition modeling was used to estimate the relative abundance of tree size classes (in 5" increments) given historical disturbance regimes, and the alternatives (e.g., see FEIS Appendix C). This modeling indicates that areas dominated by trees >20", <5" and 5 to 10" are underrespresented while areas dominated by trees 10 to 15" and 15 to 20" are overrepresented. The effects analysis shows the treatments would result in movement toward the desired condition for the larger tree size classes.

Category	Commenter ID#	Summary of comments	Summary Response
Vegetation Management: Treatment intensity	265	For the Forest Service to imply there is a restoration need to turn the forest into more ponderosa pine and western larch and omit saying they would do this even in moister areas where grand fir and Douglas-fir naturally grow large and old, such as riparian areas, canyon bottoms, north-facing slopes, and higher elevation mixed conifer sites, is misleading and inaccurate use of the science through omission. Notably the Lower Joseph Creek area encompasses a lot of canyons, which usually contain streams and have moister micro-climates which typically have more fir naturally growing on north to northeast facing slopes and canyon bottoms.	Alternative 2 of the LJCRP proposes treatments in only 10% of the project area RHCAs, and Alternative 3 does not propose treatments in any RHCA. All RHCA treatments in Alternative 2, except for 31 acres in Swamp Creek, are in Category 4 RHCAs, which in most cases, due to topography and moisture availability, have vegetation dynamics very similar to the adjacent uplands. Further, the LJCRP landscape is composed of a mosaic of dry and moist forests, where pockets of moist forests are surrounded by dry forests. Due to this site-specific landscape pattern, the composition of moist forests is strongly influenced by the naturally frequent fire dynamics of adjacent dry forests, which favor fire-tolerant tree species such as ponderosa pine and western larch. Nonethless, forest treatments have been designed to be specific to the RV of the respective potential vegetation group (i.e, dry, moist).
Vegetation Management: Treatment rationale	Form email	I urge you to do more than facilitate the logging of Joseph Canyon--please fulfill your mission as the trustee of our multi-value public forests and protect this rare resource, and allow only minimum-impact methods for thinning and fuels reduction.	Forest Plan standards and guides are designed to meet the multiple resource mission of National Forest System lands. This project will meet the objectives outlined in the Forest Plan and Hells Canyon National Recreation Area Comprehensive Management Plan except where noted through amendment. FEIS Appendix J contains a list of project design criteria and best management practices that must be followed during implementation to mitigate or reduce impact to multiple resources.
Vegetation Management: Treatment rationale	226	We suggest that you elaborate on the effects of competition between the younger, less desirable trees with the older, more desirable trees in the project area. Specifically, please elaborate on how in the project area the competition negatively affects forest resilience and how the use of the amendment will benefit desirable trees and accomplish the purpose and need of the project.	The FEIS includes a discussion related to forest resiliency and competition specific to the range of variation (RV) in the Vegetation and Disturbance Regimes discussion in Chapter 2 (Affected Environment). The FEIS also includes detailed analysis of the need and desired outcomes of the proposed Forest Plan amendment to the Eastside Screens (FEIS chapter 3).

Category	Commenter ID#	Summary of comments	Summary Response
Vegetation Management: Treatment rationale	243	The problem that needs addressing is the seedlings, which can and should be controlled by restoring fire to its natural role.	The FEIS analyzes up to 90,000 acres of prescribed fire in the action alternatives, which can be used along with stand improvement treatments to restore heterogeneity in younger stands.
Vegetation Management: Treatment intensity	225	The Tribe urges caution in the application of the Franklin et al. 2013 methodology.	In general, the Franklin et al. (2013) approach most appropriately achieves the desired conditions similar to other approaches taken in the Blue Mountains that attempt to achieve variable density. We will clarify how the approach we're taking meet Forest Plan desired conditions for vegetation and wildlife habitat.
Vegetation Management: Gap creation	243	We are opposed to removing large trees for purposes of creating canopy gaps or to reduce seed sources. We do not support “group selection” resulting in large gaps up to 4 acres. This does not mimic natural processes. It removes far too much structure from the forest. Fire does not result in large clearings. It leaves snag patches which are not only an important habitat type, but they help jump-start late-successional habitat development by retaining legacies of the past in the stands of the future. We urge the FS to modify group selection prescriptions to “share the bounty” of the forest, by removing some of the trees and leaving others (either live or dead) to better mimic natural disturbance processes.	The design of prescriptions for cutting of any trees ≥21” and/or creating canopy gaps would be based on the desire to restore forest structure and composition toward reference conditions, or the range of variation (RV), particularly to increase the abundance of shade-intolerant tree species (ponderosa pine and western larch), reduce the risk of uncharacteristically severe fire and insect and disease outbreaks, and increase resiliency to natural disturbance and climate change. The expressed purpose of the canopy gaps (regeneration openings) is to regenerate and culture ponderosa pine and or western larch and the design is specific to that purpose. The treatment design and guidance for creating canopy gaps and reducing seed sources has been updated in the FEIS (Appendix J, Silviculture Design) and states: "Create canopy gaps of appropriate orientation and size to facilitate natural regeneration of ponderosa pine and western larch" and "reduce grand fir, lodgepole pine and Douglas-fir seed sources adjacent to canopy gaps to minimize regeneration potential of these species". Another design specific to the regeneration groups within the group selection treatments is "leave old trees and available ponderosa pine and western larch seed trees within regeneration groups".

Category	Commenter ID#	Summary of comments	Summary Response
Vegetation Management: Salvage	265	We are opposed to post-fire logging, including logging of forest in natural recovery after stand replacement fire.	There is no post-fire logging (salvage) proposed in the LJCRP area.

Category	Commenter ID#	Summary of comments	Summary Response
Vegetation Management: Estimation of the range of variation	265	While we don't take issue with the importance of ecological resilience, we do take issue with how HRV and the concept of restoring ecological resilience are being mis-used in the Lower Joseph DEIS by omitting analysis and acknowledgement of the ecological impacts of the planned logging, roading, and heavy human manipulation of a land area that is now providing significant ecological wildlife, fish, recreational, and carbon-storing values. Localized state-and-transition simulation modeling is inherently flawed due to over-generalizing highly variable conditions (e.g. variable moisture regimes, solar aspect, elevation, soil type, and other micro-climate differences) and generally being based on insufficient or inaccurate data that cannot reflect such important variations that determine forest structure, tree species composition, plant community type, wild fire severity and frequency, and associated wildlife species use. The Forest Service's project does not adequately account for climate change.	The range of variation estimates used in the analysis of the LJCRP were based primarily on the locally-recognized USFS standard (Powell 2012), and validated against local, spatially-explicit ecological modeling and empirically derived estimates from historical aerial photography completed for the ecological subregion (see FEIS Appendix C, and Hessburg et al. 1999). Powell 2012 compiled the best available science on estimated ranges of variation with the intent to reflect ecosystem properties free of major influence by Euro-American humans, providing insights into ecosystem resilience. The range of variation estimates were used to help us understand what an ecosystem is capable of, how historical disturbance regimes functioned, and inherent variation in ecosystem conditions and processes. Hence, the RV estimates used in the LJCRP are in no way "artificially biased toward more heavy logging, roading, and heavy-handed management"; they are based on natural ecological processes. By moving the forested landscape toward the estimated range of variation, the treated landscape will be more resilient in the case of a changing climate (warmer/less snow). Compared to local conditions, Powell (2012) ranges actually represent conservative estimates of historical conditions for dense forests since the LJCRP landscape is influenced by frequent fires that originate from grassland communities at lower elevations, and has experienced higher fire frequencies than moister and cooler systems in the Blue Mountains. Localized, spatial, climate-informed state-and-transition modeling, which projected the interacting effects of the LJCRP propsoed action, and the best available science on projected climate change effects (considering four climate change emission scenarios), was used to evaluate potential future effects on key forest values, such as the abundance of large, fire resilient trees (FEIS Appendix C).

Category	Commenter ID#	Summary of comments	Summary Response
Vegetation Management: Estimation of the range of variation	265	What project area-specific field work went into the determination of historic versus existing forest patch size distribution patterns? Were changes in forest patch size distribution due to past logging, roading, and livestock grazing taken into account? What are the implications of these management associated forest patch changes and for planned similar management in the Lower Joseph project? Why is this critical issue not analyzed in depth? How did past management practices affect HRV for forest and riparian plants, wildlife habitat, water quality and quantity, and natural disturbance regimes, and what does that suggest for developing and ecologically sound restoration plan that is at odds with planned actions for the Lower Joseph project? Why is this key component of sound restoration planning not addressed in the DEIS? These significant issues are not addressed yet these “ranges in reference conditions” in conjunction with the Forest Plan and other policies and collaboration (notably not project area-specific data) “were used as the primary basis for developing the desired conditions for the LJCRP.” (DEIS p.6) This results in inherent significant flaws in the foundational assumptions of the analysis.	A description of the existing biological environment including a characterization of disturbance regimes and current and historical stand patterns can be found in the FEIS, chapters 2 anad 3, Vegetation and Disturbance). Forest patterns are easily determined from remote imagery, and field-based surveys in this regard would add little to the analysis. Desired stand-level patterns are based on the "individuals, clumps, and openings" (ICO) approach described in Franklin et al. 2013, which uses site-specific evidence to determine appropriate treatment designs and prescriptions (see FEIS, Project Design Criteria, Appendix J). Based on spatially-explicit analysis and modeling, patch sizes in the current conditions are much smaller than those in the reference condition. In both canyonland and incised plateau landofrms, all current patches were less than 32 acres in size, and patches were considerably larger for the reference condition. More than 50% of incised plateau patches exceeded 256 acres in size while those in canyonlands were somewhat smaller (half exceeded 128 acres). This decrease in patch sizes from reference condition to current condition is due to a combination of management activities that tend to generate relatively small patches and somewhat smaller wildfires under the current fire suppression regime. Canyonlands have smaller patches than incised plateaus under reference conditions due to natural fragmentation by ridges and areas that do not burn. Hessburg et al. 1999 also summarizes historical patch sizes for the ecologial subregion that includes the project area, providing an indicator of patch sizes that preceded the effects of forest management practices on foret patterns since that period (1950s).

Category	Commenter ID#	Summary of comments	Summary Response
Vegetation Management: Estimation of the range of variation	265	How is the percentage of a type of forest “highly susceptible” to defoliating insects or mistletoe determined, and what does this assessment really mean? “Highly susceptible” does not necessarily mean that insects are at epidemic levels or that the forest is in an unnatural condition at all.	Ecosystem management and restoration strives to maintain an endemic level of insects and disease disturbance consistent with historical levels of activity within the range of variability for those plant communities, thus providing for resilience and adaptability of those systems. A description of insect and disease susceptibility and specific references that support the information can be found in the FEIS chapter 2, Vegetation and Disturbance (e.g., table 10).
Vegetation Management: Effects of past management	265, Form email	The Forest Service fails to acknowledge the historical context that the National Forests were originally created as Forest Reserves (e.g. the Wallowa Forest Reserve) in order to protect these lands and forests from heavy private logging and unregulated livestock grazing, as well as from associated other environmental impacts. Ecologically sound restoration cannot be planned without fully acknowledging the root causes of the ecological destruction to be remedied, in order to avoid repeating the same mistakes and further damaging, rather than healing, the ecosystem. Thus the assumptions behind the purpose and need for the Lower Joseph project are flawed and it is grossly misleading to the public to call it a “restoration” project. (See DEIS p.5). As someone who values our National Forests, it is important that we learn from the mistakes of the past and restore landscapes abused by decades of mismanagement that included aggressive logging, livestock grazing, roadbuilding, and other destructive development.	We agree that we should learn from the mistakes of the past. Forest management practices have been evolving substantially over the past few decades to be more ecologically appropriate, and based on achieving more natural structure and function. The purpose and need for this project is based on sound scientific comparisons of existing forest conditions against a widely accepted reference condition. This comparison demonstrated a need to reduce forest density, and increase the abundance of seral tree species such as ponderosa pine and western larch toward more natural conditions. The design of silvicultural prescriptions are based on ground-based evidence of native patterns of tree establishment and successional growth. The "root causes" of ecosystem degradation that are mentioned, including heavy logging and unregulated livestock grazing, have been abated to some degree. See the purpose and need and affected environment sections (FEIS chapters 1 and 2) characterizing how this project is aimed an ecological restoration versus timber production, road building, and widespread development. No alternative proposes system road construction, and management of domestic livestock grazing is outside the purpose and need of this project.

Category	Commenter ID#	Summary of comments	Summary Response
Vegetation Management: Snags	225, 243, 248, 266	The enclosure to the 2003 Eastside Screen guidance says "These findings reinforce the importance of retaining and recruiting large, old trees in the eastside landscape, ... It is critical that silvicultural prescriptions provide for large snags in adequate numbers (as indicated by DecAID and other tools) through time to provide habitat for these species." This indicates not only that retention of large trees continues to be important, but also indicates that the FS must use quantitative methods (such as DecAID) to determine when adequate numbers of large snags and large green recruitment trees are available. Any amendments proposed for removal of large trees must consider these functions and disclose whether and how the needs of species will be met over time. We urge the FS to limit cutting of hazard trees to those that pose an imminent hazard to well-travelled roads or other high use areas. In areas that are used infrequently by people, hazard should be managed by keeping workers out of the hazard area. This will help retain large old trees and help ensure future recruitment of snags and down wood habitat.	There is no prescribed harvest of snags >_12" dbh. Project design criteria (FEIS Appendix J, Wild-1-Wild-16) include mitigation measures for the protection of large trees, large snags, and down-logs during harvest and burning activities. Snags > 12" are only to be removed due to safety considerations. Alternative 3 does not propose harvest of trees_> _21" dbh, which would likely support more large snags in the future. A DecAid analysis was completed for the project, which showed that dry forests are currently within the RV for large and small snags, while moister forests are at the lower end of the RV. Because we would not be harvesting snags, and design criteria would be in place to protect large snags, large snag densities would be provided within the RV. The removal of trees ≥ 21" dbh (Alternative 2 only) may reduce large snag density at localized locations. At the broadscale, both action alternatives would move the landscape toward RV. Habitats that are well below RV include large tree, and open habitats. Species associated with these limitied habitas would benefit from the action alternatives. No alternative is anticipated to reduce habitats below RV for any structural stage. Over the longer term, creating a more resilient landscape would help provide habitat for all species, including those associated with large trees and snags. Cutting of hazard trees is expected to be minimized (FEIS Appendix J).

Category	Commenter ID#	Summary of comments	Summary Response
Vegetation Management: Mistletoe	243	We urge the Forest Service to adopt an ecological approach to managing mistletoe. Large trees infected with mistletoe are ecologically valuable, maybe even more valuable than large trees not hosting mistletoe. Mistletoe brooms provide unique, limiting, and perhaps irreplaceable habitat values to a wide variety of wildlife, including species of concern in the project area identified by the Forest Service and other agencies. Mistletoe seeds provide food for birds. Removal of mistletoe trees is not a benefit but a harm to the ecosystem. Attempting to isolate mistletoe patches won't work either. Mistletoe can easily spread across gaps. It is unlikely that the FS can afford to eliminate all host trees and maintain that condition over the long term. The cumulative habitat consequences of maintaining those host-free gaps is not acceptable.	Recognizing that mistletoe is a historic component of the landscape, the LJCRP treatment design for mistletoe infected trees is a "discrimination" approach rather than a "sanitation" approach. This is accomplished by discriminating against dwarf mistletoe infected trees, and host species for Douglas-fir mistletoe, and creating conditions that minimizes potential for spread to uninfected trees. Silvicultural designs specific to mistletoe (FEIS Appendix J, Silviculture Design) includes: retention of mistletoe infected trees that are old regardless of infection level; retention of young trees with the lowest mistletoe infection rating when needed to meet stocking objective; and the establishment of non-host or unstocked buffer of at least 50' between infected trees and uninfected residuals, wherever trees infected with mistletoe are left. The establishment of a non-host or unstocked buffer of at least 50' between infected trees and uninfected residuals is a recommendation provided by the local (La Grande) office of the Forest Service Forest Health Protection group (see Schmitt 1997). Eliminating all host trees is not included as an the objective of this project. Creating openings (gaps) is in sync with the "individuals, clumps and openings" (ICO) approach, which is intended to restore characteristic functionality, and resistance and resilience to disturbance.
Vegetation Management: Wildlife habitat	243	The NEPA analysis must take a hard look at the habitat needs of primary cavity excavators over the long term. It is not enough to meet the needs of woodpeckers for a few years after harvest. Maintaining viable populations of primary cavity excavators will require retention of virtually all the overstory trees so that there is a long-term supply of snags and dead wood.	At the scale of the project, both action alternatives would move the landscape toward RV. Habitats that are well below RV include large tree, open habitats. Species associated with these limitied habitats would benefit. Over the longer term, creating a more resilient landscape will help to provide for all species, including those associated with large trees and snags.

Category	Commenter ID#	Summary of comments	Summary Response
Vegetation Management: Heterogeneity	226	Landscape heterogeneity is incredibly important for both the wildlife and overall vegetation resilience in the moist mixed conifer landscape. A critical feature of wildlife habitat in mixed-conifer landscapes in eastern Washington and Oregon is the multi-scale (landscape and stand) diversity and juxtaposition of patch types of differing composition and structure (Perry et al. 2011). While somewhat counterintuitive, it is important to note that a landscape can be highly fragmented or patchy, as is commonly the case in landscapes with mixed-severity fire regimes, and still be highly connected for a variety of ecological processes (Stine et al).	The Forest Service agrees and incorporates these concepts by using "individuals, clumps, and openings" (ICO) informed marking and treatment in moist mixed conifer as well as dry upland forest. In reference to Stine et al 2014, the commenter highlighted the glossary definition of connectivity in the context of a mixed severity fire regime. This points to the necessity to utilize evidence based management to help retain structures and openings within this landscape to support disturbance processes that create representative connectedness in the LJCRP landscape.
Vegetation Management: Large trees, snags, hazard trees	243	We urge the FS to limit cutting of hazard trees to those that pose an imminent hazard to well-travelled roads or other high use areas. In areas that are used infrequently by people, hazard should be managed by keeping workers out of the hazard area. This will help retain large old trees and help ensure future recruitment of snags and down wood habitat.	Public safety is the highest priority, and Forest Plan standards and guidelines, agency policy, and project design criteria (Appendix J) provide guidance to ensure public safety, while also considering needs for habitat. Selection of hazard trees is best done during implementation, and on a case-by-case basis. Though we recognize that some snags will be lost due to logging operations, the goal is to minimize loss of these important habitat features. Project design criteria are designed to protect all large snags during implementation of burning or harvesting (FEIS Appendix J). Closing roads in Alternative 2 would reduce the risk to continued loss of snags.

Category	Commenter ID#	Summary of comments	Summary Response
Riparian Habitat Conservation Area (RHCA) treatments	243	The cows and lack of beaver are what have allowed lodgepole encroachment on Swamp Creek. While cutting lodgepole may be fine ecologically, it would better fit the purpose and need to exclude cows and return beavers rather than cut trees. Beavers do exist in the system but are routinely trapped out. Treatments are described as “meadow restoration” and appear to be more about protecting/improving grazing than ecological restoration. Rather than “meadow restoration” the FS should be working to restore the historic wetlands from which the creek gained its name. Historically, the area was beaver swamp, not meadows (or bluegrass). What are the impacts of equipment? Does this really – or best – meet the purpose and need?	It is difficult to definitively establish a cause and effect relationship between domestic grazing, lack of beaver, and lodgepole encroachment in Swamp Creek. All of these factors, and possibly others, likely all play a role. Management of domestic grazing and reintroduction of native animal species is outside the scope of this project. The allotment management planning process, and related environmental assessment (EA) is the appropriate venue to address the need to manage domestic livestock grazing for the purposes of ecosystem and watershed improvement. Meadow restoration is intended to restore the ecological function of the floodplain in Swamp Creek, and wetland function would be restored to the specific area of Swamp Creek. The purpose and need for this project is primarily restoration of forest vegetation to improve structure and composition relative to more natural ranges of variation. Broadscale restoration of native wetlands project wide, and improvement of forage for domestic grazing were not primary purposes of this project, although both would experience ancillary benefits. Management activities, including vegetation treatments in Swamp Creek would follow Forest Plan Standards and Guidleines, as well as national best managemet practices, which are designed to ensure protection of soil and water resources.

Category	Commenter ID#	Summary of comments	Summary Response
Riparian Habitat Conservation Area (RHCA) treatments	225, 226, 243, 244, 246, 247, 262, 263, 264, 284	Logging in RHCAs should be carefully planned and implemented to protect soil, water, wildlife habitat, carbon, and avoid the spread of weeds. Heavy equipment must be excluded from the Swamp Creek floodplain, wet meadows, and tributaries. Livestock grazing practices should be modified to better protect that natural and cultural resource. It is important to recognize that high-severity fire is by no means certain to occur in the absence of thinning. Data on wildfire shows a healthy mix of fire effects across the federal landscape. We should not feel compelled to treat sensitive areas based on an unwarranted fear of fire. RHCAs are often capable of carrying greater basal areas, so they should not be treated the same as uplands. It is critical to recognize that commercial removal in RHCAs comes at the expense of future recruitment of wood (and this is a long-term adverse effect), so it is important to maintain medium and large trees in order to ensure adequate recruitment of future large trees and dead wood that is essential to riparian function, both instream and uplands. A “25 foot variable width buffer” for logging next to streams makes no sense. AFRC fully supports work in all categories of RHCAs and strongly encourages that activity. The EPA is pleased to note that RHCA treatments are proposed in the higher gradient Category 4 RHCAs.	Forest treatments in RHCAs in Alternative 2 would move the RHCAs, in concert with the adjacent forest vegatation to a more resilient lanscape condition. Category 4 RHCAs are the primary target for riparian area treatment because they are intermittant, non-fish bearing streams, and are more similar to upland conditions relative to forest structure than perennial streams. Although there may be situations where Category 4 RHCAs are carrying greater basal areas today, they developed under very similar disturbance regimes as the uplands and therefore the forest RV for density is an appropriate desired range. Protection measures would maintain riparian management objectives (RMOs) in the short term while providing for resiliency in the longer term. Forest thinning in RHCAs under Alternative 2 would move toward attainment of RMOs for large woody debris, and restoration of native fire regimes. Silvicultural treatments in RHCAs are designed to cut from all tree size classes, as guided by natural forest patterns, and would release growing space, nutrients and water for increased growth rates in the residual trees. Increased growth in residual trees would support future recruitment of large downed wood. The project landscape is fire-adapted, and naturally experienced low, moderate, and high severity fires at different rates. About 50-80% of all fires landscape-wide were naturally low severity (FEIS table 8). Today, only about half of all fires or less are low severity. The FEIS provides rationale for a 25 foot "no equipment" buffer, and layout on the ground would follow landform and large tree location. Twenty five feet is considered to be a minimum, and additional restrictions on equipment within the 25 to 100 foot RHCA would limit sediment delivery. The Physical Environment supporting documentation includes results of sediment modelling that showed no appreciable sediment delivery to the channel from the alternatives. Alternative 3 does not propose commerical RHCA treatments, and could be selected by the decision-maker. Management of domestic livestock grazing is outside the purpose and need of this project.

Category	Commenter ID#	Summary of comments	Summary Response
Riparian Habitat Conservation Area (RHCA) treatments	225	The Tribe recommends that the Blue Mountain PDCs be used for the forest treatments in Category 4. There is a disconnect between the determination in the Blue Mountain PDCs and the DEIS.	The use of the Blue Mountains Project Design Criteria (BM PDC) for stand improvement is recommended for use for all category streams in the FEIS and in the aquatic Biological Assessment (BA). The determination of effect for the BM PDCs is consistent in the FEIS and the BA. Use of forest treatments for CAT 4 streams utilizes the same effects analysis in the FEIS and the BA. The determination of effect for the BA is consistent with other forest treatment analysis in the Blue Mountains. The determination language for an EIS and a BA are not similar.
Sediment	225, 239, 263, 267	There is concern regarding the production of sediment from management activities and the delivery of that sediment to waterways. There is also concern about the assumptions around DEIS analyses regarding sediment, sediment delivery and stream function.	We conducted a robust analysis with regard to sediment production and sediment delivery to waterways. The conclusions from this analysis are disclosed in the FEIS (chapter 4, Physical Environment). The details associated with this analysis are in the Physical Environment Supporting Documentation. We improved the discussion in the FEIS to clarify the process. Sediment inputs to waterways can be a problem for many upland aquatic systems.The Lower Grande Ronde TMDL, 2010 cites sediment as an issue for streams within the LJCRP analysis area. However, there are no 303(d) listings for sediment within the analysis area. There is a large body of literature (see References Cited) that point to grazing and roads as chronic sources of sediment. Furthermore, direct field observations during the LJCRP field reconnaissance revealed roads and grazing as sources of fine sediment. Our analysis indicates that with implementation of Best Management Practices and Project Design Criteria (FEIS Appendix J), sediment delivery to waterways from temporary road construction, the haul system and vegetation management activities are unlikely to have adverse or measurable effects to the aquatic systems within the subject watersheds.

Category	Commenter ID#	Summary of comments	Summary Response
Soil Productivity	225, 242, 263, 267	The DEIS analysis and disclosures are inadequate regarding potential effects to soils productivity as a result of the proposed management activities. Concerns include disclosures regarding how we were evaluating existing and projected Detrimental Soils Conditions (DSC), the cumulative effects to soils productivity, and other general effects to soils productivity.	Upon reviewing these comments, we expanded the discussion in the FEIS and the Physical Environment Supporting Documentation accordingly. Between the DEIS and FEIS, we conducted a very detailed stand by stand evaluation of legacy effects on soil productivity (Detrimental Soils Conditions), and projected additional possible effects from the proposed management. These surveys were conducted in a manner consistent with Forest Service regional guidelines. The Forest Service will be consistent with all Forest Plan Standards and Guidelines, including those pertaining to soils and Detrimental Soils Conditions (DSC). Details about our DSC surveys and effects to soils productivity can be found in Chapter 4 of the FEIS and in the Physical Environment Supporting Documentation. As prescribed in the Best Management Practices, potential sediment delivery to streams will be monitored during implementation (FEIS Appendix J).

Category	Commenter ID#	Summary of comments	Summary Response
Ash Soils	242, 263, 266	Did you consider effects to ash/ashy soils in the LJCRP Analysis Area? The DEIS didn't adequately address the effects to this resource.	We used the latest soils survey data (SSURGO, 2014), which happens to be amongst the most detailed soils surveys in the country, to map and characterize the soils in the LJCRP, specifically ashy soils. We also reviewed the commenters suggested literature pertaining to ashy soils and effects to soils resources. A co-author to one of their citations was a key collaborator for the LJCRP project design, specific to the management practices associated with ash/ashy soils. Upon reviewing the literature, conducting our analyses, performing field investigations and employing professional judgement, we feel that our analysis adequately discloses effects to ashy soils and describes appropriate methods and conditions to mitigate adverse effects to ash soils and soils resources in general. We also took a hard look at the Ash-Grande Fir Series as mentioned by one commenter and felt that it was appropriate to analyze in the context of other ashy soils, combined with other soils properties, because management practices would not differ from the Ash-Grande Fir specifically. We improved the discussion pertaining to ash soils in the FEIS and in the Physical Environment Supporting Documentation.

Category	Commenter ID#	Summary of comments	Summary Response
Wildlife Corridors	242, 243, 245, 265, 266	For most animals and plants, all of these types of movement require a well-connected natural landscape. TheDEIS states that Alternative 2 would reduce the quality of connectivity corridors on 4,155 acres by reducing the canopy closure and structural complexity. The Forest Service does not seem to address the significant corridor functions of the canyonlands travel corridor for wildlife with sufficient in-depth analysis or remedies to avoid significant impacts to these corridor functions for wildlife migration, dispersal, and security. Did the FS analyze impacts on factors like habitat connectivity (including, but not limited to elk), hardwood recruitment, thermal refugia, livestock exclusion, structural complexity, etc.?	Any reduction in quality of connectivity corridors as a result of the action alternatives is a short-term effect, resulting in longer-term beneficial effects relative to the development of large tree structure and reduction in risk to their disturbance from stand replacement fire or insect and disease outbreaks. Any treatments proposed in connectivity corridors have been designed to meet Forest Plan standards and guidelines, and provide functional, suitable habitat for the purpose of connectivity between older forest stands. Connectivity corridors were developed with a large emphasis along many of the RHCAs. In Alternative 2, where some RHCAs are proposed for harvest, if the area is within a connectivity corridor the harvest prescription would be modified appropriately for wildlife concerns. The harvest prescription for connectivity corridors is to maintain a minimum canopy closure of 40% in the dry forests, and 50% in the moist forests. It is expected that these prescriptions would allow for more and better habitats regarding wildlife cover, structural complexity and recruitment of snags. Closing roads in Alternative 2 would reduce the risk to continued loss of snags and other adverse impacts to most wildlife species. Alternative 3 includes no activities in the roadless canyonlands travel corridor. Harvest is proposed in this area only in Alternative 2. The FEIS provides a better description of the affects of the proposed project specifically relating to the roadless area (FEIS chapter 4, Social Environment).

Category	Commenter ID#	Summary of comments	Summary Response
Wildlife Habitat	242, 243, 266	We are very concerned that terrestrial species, including listed and at-risk species, that depend on snags, riparian habitats, and wet meadows, or are sensitive to high road densities and human disturbance, will be negatively impacted by this project. The project will significant degrade critically important wildlife habitat, and adversely impact interior forest dependent wildlife species including ESA and Oregon State listed species such as bald eagles, peregrine falcons, wolves, lynx, wolverine, salmonid species, and others; regional species of concern including American marten, Northern goshawk, Neotropical migrant and native birds, bats, butterflies, and others; and management indicator species including pileated, three-toed, downy and other woodpeckers and MIS species.We are concerned that Wildlife Emphasis areas, which are supposed to be managed for high quality fish and wildlife habitat, will have their populations and habitats negatively impacted by logging. Maintaining viable populations of primary cavity excavators will require retention of virtually all the overstory trees so that there is a long-term supply of snags and dead wood. Here are a few suggested design elements and mitigation: Maintain stocking in order to ensure sufficient dead wood and recruitment potential; work hard to improve hardwood understory (this will probably require seriously addressing grazing); restore beavers and beaver habitat.	Although some short-term effects may occur, the long-term the benefits of project treatments would result in a more resilient landscape structure. Large number of snags are not expected to decline due to harvest activities, and closing roads in Alternative 2 would reduce the risk to continued loss of snags and other adverse impacts to most wildlife species. Project design criteria are designed to protect all large snags and downed wood during implementation of burning or harvesting (FEIS Appendix J). Currently, the forested landscape is deficient in open-canopied forests, and has an abundance (above HRV) of closed-canopied forests. Although treatments would reduce closed-canopied forests, they would not push the abundance of closed canopied forests below RV. Harvest prescriptions should benefit species that are associated with open canopied habitats, which across the landscape habitats are below the RV. The project would follow all Forest Standards and Guidelines, except where a forest plan amendment is proposed. The prescriptions in MA-15 have been crafted to be fairly conservative to maintain all older forest characteristics (e.g. no harvest of trees $\geq$21"), yet also move the stand to a more resilient state. The analysis regarding the effects on wildlife has been tiered to the Forest level. Recently a wildlife viability analysis was completed for the Wallowa-Whitman NF. Tiering to this report helps give a multi-scaled approach to analyzing likely changes in different habitats. Habitat viability determinations for each MIS species is addressed in the FEIS (chapter 4, WIldlife Habitat). Management of grazing and re-introduction of beaver are outside the scope of this project.

Category	Commenter ID#	Summary of comments	Summary Response
Wildlife Habitat	5, 226, 244, 265	Forage in the overstocked timbered areas is now shaded out forcing deer and elk to places like Zumwalt Prairie that is essentially locked up to hunting resulting in fewer elk and hunters on public land. I am happy to see that the HEI has been met and will continue to be met during the project implementation, however, please review the newer elk model that discusses summer forage as the main driver of elk health (Lehmkuhl et al. 2013; John Cook 2005). Hunting and tourism are major draws for the local area. The forest should focus on creating more forage for the large ungulates within the area. We are concerned by ongoing cumulative impacts to Rocky Mountain elk across the National Forests we monitor, including the Wallowa Whitman National Forest, from timber sale reduction of satisfactory and hiding cover and construction and re-opening of roads across elk habitat.	Recent research shows that providing for nutrition availability, and providing access to this nutrition (away from roads) is important. The proposed harvest may increase forage availability for ungulates especially in the spring (Long 2008). Closing roads (Alternative 2) would also benefit elk, as numerous studies have shown. Elk use of forage areas often depends on their proximity to cover areas (to forest stands with overhead canopy cover 40% or higher) and the distance to roads and trails open to motorized uses. Forage areas within 100 yards of cover areas are most heavily used by elk, as are forage areas farther than 1000 yards from roads or trails open to motorized uses. In addition, maintenance of adequate cover areas provides security for elk during hunting seasons and reduces elk vulnerability to harvest, such that harvest goals for elk can be met but not exceeded. Whether cover areas provide security for elk during hunting seasons, however, often requires motorized closures of large networks of roads and trails during hunting seasons. The need for motorized closures of many road and trail networks to provide effective security for elk during hunting seasons is higher on landscapes dominated by flat, open terrain, and lower in areas of steep, convex topography with more cover. Alternative 2 proposes to close 69 miles of road (relative to existing conditions) in areas with currently higher road densities. These road closures would help mitigate the potential loss of cover in areas where nutrition is increased due to opening up the canopy and allowing for understory vegetation development. Proposed harvest (in Alternative 2 or 3), would likely improve forage production due to the opening up of the canopy. We are hopeful that with improved conditions for elk, the abundance of elk on public lands would improve (see FEIS chapter 4, Wildlife).

Category	Commenter ID#	Summary of comments	Summary Response
Wildlife Habitat	267	The relationship of Johnson's Hairstreak butterfly with host plants makes no sense.	Butterfly species life cycles are usually tied to specific plant species. With these butterflies, pupae overwinter, then adults are present as early as mid-April until early July, and eggs are laid singly directly on host plants (James and Nunnallee 2011). Larvae feed from early to mid-summer. The Johnson's hairstreak larvae feed exclusively on the aerial shoots of dwarf mistletoe plants (*Arceuthobium* spp.) (LaBonte et al. 2001). The Johnson's hairstreaks found in northeastern Oregon have been found feeding on western dwarf mistletoe (*A. campylopodum*) on ponderosa pine (McCorkle, pers. com.). Other dwarf mistletoes occurring in the Blue Mountains include dwarf mistletoes on lodgepole pine, western larch, and Douglas-fir, and these are also possible hosts.
Wildlife Habitat	267	Cover is over rated as a need for elk (see the vast numbers in the Zumwalt). There is still plenty of cover and feed in the area.	Cover is described and addressed as required by the Forest Plan, and it is an important habitat attribute for elk.
Wildlife Habitat	266	Potential impacts to the Columbia spotted frog were not adequately addressed. The DEIS (pg. 12) mentions Columbia spotted frogs, but fails to analyze impacts to them in relation to this project, even though they are listed as sensitive.	The proposed harvest along Swamp Creek (31 acres) is the only area that may affect habitat for Columbia spotted frogs. All other areas of proposed harvest are outside of these frogs habitats, as they rely on a close proximity to water, and there are no additional treatments proposed within 200 feet of these habitats. The treament along Swamp Creek includes a 25' variable widt,h no-equipment buffer. The potential effects of this treatment on spotted frogs is minimal. The effects to this species have been better described and evaluated in the FEIS.

Category	Commenter ID#	Summary of comments	Summary Response
Wildlife Habitat	243	We ask the Forest Service to disclose full details of where the recent goshawk studies were conducted, what they found, what they did not find, and with whom they consulted. Especially given the loss of records in a recent fire, it is important that previous researchers were consulted. MA-15 slated for commercial logging in southern portions of the Western edge of project area were originally designated to support goshawks (which prefer complex forests and are unlikely to benefit from density reduction). These stands are now surrounded by heavily logged Hancock Timberlands (formerly Boise Cascade) that may have compromised alternative sites making this old-growth area even more valuable.	Goshawk surveys were completed in the summer of 2014. Six gowhawk nest areas were located along with several other individual sightings/responses (see the project record). As per direction in the Eastside Screens, protection measures for nests and the surrounding post-fledgling areas (PFA) would be taken. Specifically in Alternatives 2 and 3, all PFAs have been identified, and among other criteria, no harvesting of large tree closed canopied forests, or harvest of trees ≥ 21" (Alternative 2 only) would occur within these PFAs. If additional nests are located during project implementation, PFAs would be developed and the goshawk PDCs would be followed. A goshawk nest was located in the area near the beginning of the Chico trail, which is adjacent to an MA 15 area. In this particular PFA, the area within the MA15 that meets the criteria of large tree closed canopied forest would not be harvested.
Wildlife Habitat	244	There are a number of errors in the wildlife presence table including, but not limited to: white-headed woodpecker sightings have occurred in the Elk Creek area; numerous bald eagle observations; spotted bats have been documented (audio) by FS personnel at McGraw Lookout (docs may have burned up with FS building). There are flammulated owl colonies in the Swamp Creek-Roberts Butte-Miller Ridge area.	We would appreciate any information you may have on these wildlife sightings and we will update this information in the FEIS. We are not aware of data existing on known locations of white-headed woodpeckers in the project area, except for 1 audio call collected in the summer of 2014. We are aware of sightings of a flammulated owl nest in the area though we have no documentation/explanation beyond a mapped location. We are aware of sightings fo bald eagles in the project area, although we have no records of nesting. We are not aware of any documented sightings of spotted bats. If known nesting sites of these species are located, the project design criteria (FEIS Appendix J) ensure that any known/discovered nest tree for any of these species is protected from harvest and prescribed fire-only treatments. Additionally, we provide a guideline to conduct prescribed fire treatments within these stands outside the nesting season (after July 31), when possible, unless the nest tree is known to be unoccupied.

Category	Commenter ID#	Summary of comments	Summary Response
Wildlife Habitat	226, 267	Please explain if the marten source habitat described in the DEIS was historically marten habitat or if it has become marten habitat due to increased densities and lack of fire in the ecosystem. It needs to be pointed out that even though we are removing some of these larger trees, the treatment is opening up the sites, reducing competition which will increase the rate of growth on the remaining trees thereby producing better, healthier and more fire resistant sites and marten habitat. The analysis needs to identify the tradeoff of some short term concerns for good long term results.	We defined source habitat for this species as moist forests with a structural stage of large trees ≥ 21" dbh and >60% canopy closure. This definition of source habitat is based on several different research studies, many completed in northeast Oregon (see Wales et al. 2012). The habitat analysis found that the current amount of source habitat for marten was at the lower range of the RV. The FEIS acknowledges that in the short-term at least some marten habitat may be adversely affected by harvest. The overall goal of the project is to move the landscape to a more resilent landscape. Although some short-term effects may occur, in the long-term the benefits of these treatments will result in a more natural a resilient landscape structure.
Wildlife Habitat	244	It is important to create more old forest single story (OFSS). These treatments will benefit our local economies, and increase habitat for the whiteheaded woodpecker.	We agree that restoring the landscape toward RV will benefit species such as white-headed woodpeckers, whose habitat is below HRV.

Category	Commenter ID#	Summary of comments	Summary Response
Wildlife Habitat	242, 243, 244, 265	Under NFMA and the implementing regulations, the WWNF is required to manage wildlife habitat to maintain viable populations of Management Indicator Species (MIS). A diversity of insects are favored by a wide variety of bird species, each with different requirements to complete their life cycles. Other animals, both resident and migratory, require a range of conditions not available in a forest with simplified structure and frequent disturbance. These tradeoffs are not adequately addressed in the DEIS. Modeling is no substitute for ground-based intensive field surveying and long-term species population studies, both of which the Forest Service usually lacks for the full range of sites involved and the listed and MIS thought to exist in the project area habitat. In general the Lower Joseph Creek DEIS fails to adequately analyze cumulative effects of the action alternatives, including cumulative effects of many similar timber sale projects to wildlife species. We ask the Forest Service to drop all source habitat for northern goshawk from commercial logging due to ongoing declines and timber sale elimination of habitat for this MIS across the Blue Mountains National Forests.	The wildlife MIS analysis has been tiered to the viability analysis completed for the Wallowa-Whitman NF (WWNF), which found goshawks to be at an “A” outcome, which is described as ‘suitable environments are broadly distributed and of high abundance across the historical range of the species.’ Management Indicator Species (MIS) are discussed in Chapters 2 and 4 of the FEIS (Wildlife). All activities associated with the action alternatives have been found to be consistent with the Forest Plan, as amended, for this category of species. Additionally, the alternatives would not result in a long-term reduction in the number of acres of available habitat for any of the MIS, and does not contribute towards a negative trend in viability on the WWNF. For more detailed information and effects disclosures, see Chapter 4 of the FEIS (Wildlife), and the Wildlife specialist’s report and aquatics biological assessment in the project record. The action alternatives would increase diversity of forest structure, composition, and density within both moist and dry potential vegetation groups and move the landscape toward the desired conditions. Six gowhawk nest areas were located in the project area along with several other individual sightings/responses. As per direction in the Eastside Screens, protection measures for nests and the surrounding post-fledgling areas (PFA) would be taken. Specifically, no harvesting of large tree closed canopied forests, or harvest of trees $\geq$ 21" (Alternative 2 only) would occur within these PFAs. If additional nests are located during project implementation, post-fledling areas would be developed and the project design criteria would be followed. Although we described the adverse effects of harvesting on the quality of goshawk habitat, the amount of habitat would remain within the RV, and in the long-term the benefits of treatment would result in a more resilient landscape structure. Additionally, by protecting known goshawk nests and the PFAs surrounding them, goshawk habitat would further benefit. The cumulative effects analyses have been improved between the DEIS and FEIS (FEIS chapter 4, Cumulative Effects sections).

Category	Commenter ID#	Summary of comments	Summary Response
Wildlife Habitat	263	The DEIS fails to adequately analyze impacts to wildlife from development in unroaded areas. In the Lower Joseph Creek DEIS, the Forest Service inadequately analyzes impacts to both listed species and regionally sensitive species from development in unroaded areas. The roadless areas within the Lower Joseph Creek Restoration Project area make up a key travel corridor for many wildlife species. They connect the remote Hells Canyon National Recreation Area and the Wenaha-Tucannon Wilderness. While the discussion of effects of the proposed action alternatives acknowledges that the proposed activities would negatively affect wildlife, it does not discuss how these impacts may be amplified by the loss of roadless habitat.	Alternative 3 includes no activities in the roadless areas. Harvest is proposed in this area only in Alternative 2, and none of the alternatives propose road construction in IRAs. The description of effects on roadless characteristics has been improved between the DEIS and FEIS. The FEIS discloses the comparative effects on wildlife habitat of the no action and action alternatives in IRAs, other undeveloped lands, and throughout the project area (FEIS chapter 4, wildlife).
Wildlife Habitat	243	Korol et al (2002) found that large snag habitat is below the historic range of variability across the Interior Columbia Basin and they estimated that even if the agencies apply enlightened forest management on federal lands in the Interior Columbia Basin for the next 100 years, we will still reach only 75% of the historic large snag abundance, and most of the increase in large snags will occur in roadless and wilderness areas. Wisdom et al (2008) found that snag abundance in the Pacific Northwest forests is inversely related to past harvest and proximity to roads.	We used the existing data available (GNN) to complete a snag analysis using the DecAID data (Mellen-Meclean et al. 2012) (p. 6-8, 88-90). Large numbers of snags are not expected to decline due to harvest activities. Closing roads in Alternative 2 would reduce the risk to continued loss of snags. Project design criteria are designed to protect all large snags during implementation of burning or harvesting. Harvest prescriptions should benefit snag associated species that are associated with open canopied habitats, which are below the RV across the project landscape.

Category	Commenter ID#	Summary of comments	Summary Response
Wildlife Habitat	243, 265	Wildlife species, including many bird species and cavity denning mammals such as Pacific Fisher and American marten, require cavities and disease induced rot for foraging, nesting, or denning. It is important to recognize that the deficit in large tree structure has been well established for the region by the Interior Columbia Ecosystem Basin Management Project science and other science and that wildlife are specifically noted in the scientific literature to require large structure far more than any need for old structure is recognized. Thus the definition of “desirable” leave trees appears to be driven by Forest Service and timber industry desire to grow better trees for lumber, not by any implied ecological or site specific need to remove the other trees.	Trees ≥ 21" are not proposed for harvest in Alternative 3. In Alternative 2, only under certain circumstances would trees ≥ 21" dbh be harvested. The importance of large trees for many wildlife species is described in the FEIS chapters 2 and 4, WIldlife.
Wildlife Habitat	243, 265	Alternative 2 would log trees over 21” dbh over 47% of the area subject to management activities (DEIS p.190), posing a large threat to Pileated woodpeckers and to other species needing large snags and down wood such as Lewis woodpeckers, White-headed woodpeckers, American marten, and Pacific Fisher. Species requiring large live trees would also be negatively affected by Alternative 2 logging of large trees, including Northern goshawk and Bald eagle. The DEIS also admits that the “Group selection-moderate” logging proposed in Alternative 2 will also likely harm American marten.	The FEIS effects of harvesting trees ≥ 21" dbh on management indicator species (MIS) are disclosed in the FEIS (chapter 4, Wildlife). Also in the FEIS, we acknowledge that the Wallowa-Whitman NF considers the Pacific fisher to be extirpated on the Forest, thus no effects to this species are expected to occur. Harvesting of trees ≥ 21" or within MA-15 areas are not proposed in Alternative 3. The FEIS acknowledges that in the short-term at least some marten habitat may be adversely affected by harvest. The overall goal of the project is to move the landscape to a more resilent landscape, although some short-term effects may occur, in the long-term the benefits of these treatments would result in a more natural a resilient landscape structure.

Category	Commenter ID#	Summary of comments	Summary Response
Wildlife Habitat	265	We are opposed to prescribed burning during the spring reproductive season, in Pileated woodpecker foraging habitat, and in American marten and Pacific fisher (which is not discussed at all in the DEIS) source habitat. We are also opposed to prescribed burning in moist and cold, naturally denser forest types, including high elevation forest.	A more comprehensive description of prescribed fire effects to wildlife and other habitat was added between the DEIS and FEIS (FEIS chapter 4). Additional information has also been added to the FEIS regarding prioritization for prescribed fire (FEIS Table 9).
Wildlife Habitat	265	We are concerned by potential impacts of the Lower Joseph Creek Restoration Projectto Neotropical songbirds, particularly to those species that are associated with large tree and interior forest habitat, and denser or multilayered canopy habitat and old growth.	The relative effects of the alternatives on landbird and migratory bird habitat are disclosed in chapter 4 of the FEIS. The effects to wildlife habitats is driven by the assumption that habitat can serve as a proxy for poulation. Additionally our assumption is that if habitat structural conditions are within the RV, populations of different wildlife species will also be within RV.
Wildlife Habitat	267	The DEIS states that, to reduce disturbance to big game on winter ranges, timber sale activities, including log haul, would be implemented in ways to minimize activities during periods of low temperatures and accumulated snow depths, typically from December 15 through March 31st. This has not been agreed to, in fact we have discussed winter logging as a preferred alternative to reduce soil damage, compaction etc. We are over MO in Chesnimnus and even though we are below numbers we want on forest lands, these small disturbances are acceptable in this area.	Winter logging as an alternative to reduce soil damage, and compaction is not precluded by the FEIS. During the implementation of the project, attention would be made to minimize activities during winter, especially on elk winter ranges. Communication with the District Wildlife Biologists and Biologists with ODFW would be needed and anticipated.
Wildlife Habitat	265	The Forest Service fails to recognize and analyze the biodiversity created by stand replacement fire and its necessary role in the ecosystem, which evolved with fire.	Post-fire habitat plays an important role for some wildlife species (and many other values). Table 19 in the FEIS describes some species that are associated with stand replacement fires, Chapter 4 (Wildlife) analyzes the effects of the alternatives on relevant wildlife species, and the Wildlife specialist's report in the project file provides more information.

Category	Commenter ID#	Summary of comments	Summary Response
Watershed Condition	225, 265	We are concerned that Forest Service lands surrounding the project area are acknowledged to have watershed function classified as “functioning at risk.” (DEIS p.4) This makes it all that more important to fully protect watershed functioning within the project area, which is not protected, but further degraded, by heavy and extensive logging as proposed, including logging of more pristine headwater areas such as Inventoried Roadless Areas and Potential Wilderness Areas, and commercial logging of RHCAs, Dedicated Old Growth Management Areas (OGMAs), and LOS below HRV.	The proposed forest treatments in the action alternatives would not result in a change in Watershed Condition Framework class, which was not a purpose and need of this project. This watershed condition classification is based on integration of aquatic and terrestrial scores that are weighted toward aquatic parameters. These aquatic perameters are being protected in the proposed treatments analyzed in the EIS.
Watershed Condition	267	On DEIS p.20, there is a great problem of using "functioning properly" here. If this is in the sense of "properly functioning condition", it is misused.	The use of "proper functioning condition" is displayed relative to the Forest Service's Watershed Condition Framework, which uses this term. This can be confused with the Proper Functioning Conditon assessment used for range analysis and Proper Function Condition assessment used for consultation under ESA.
PACFISH stream buffers	265	Why are full size INFISH or PACFISH buffers not proposed for Category 1 and 2 streams? INFISH and PACFISH buffers of 150 feet on each side is required for Category 2 streams and buffers of 300 feet on each side (horizontal distance) are required for Category 1 streams, so this is an undisclosed violation of the Forest Plan and the EastsideScreens (See DEIS p. 184) We are opposed to the violation of INFISH and PACFISH buffers.	PACFISH buffers are being proposed for all Category streams. The proposed forest treatments in only some of the Category 4 and one Category 1 stream retain the buffer width, but propose treatment within the defined PACFISH buffer. PACFISH allows this treatement with site specific data to support the treatment, in consultation with NOAA Fisheries.

Category	Commenter ID#	Summary of comments	Summary Response
Water Storage	266	It is not clear how moving the vegetation towards the historic range of variation and creating a more fire resilient landscape will mitigate some of the effects of a seasonal reduction in water storage (DEIS pg. 47). The mechanisms for this conclusion and its assumptions need to be disclosed, and the statement needs to be clarified.	A more resilient landscape will have a lower probability of uncharactistic wildfire and associated effects. High intensity wildfires can adversly effect soil productivity, increase erosion and increase runoff.
Stream Temperature	266	Stream temperatures in Swamp Creek far exceed rearing and migration temperature standards; disclosure of compliance with seasonal spawning and rearing standards was not included in the DEIS. Removal of trees from the RHCA in Swamp Creek is likely to exacerbate stream temperature violations and water quality degradation in this stream. What are the population trends for fish stocks in these streams? It is highly likely that canopy removal will have significant negative impacts to diurnal temperature fluctuation regimes, thus affecting steelhead and redband survivability and overall viability. Negative impacts to stream temperature could have larger implications for habitat degradation to important and critical habitat than was considered in the DEIS.	The analysis of the effects of treatment of the 0.5 miles of Swamp Creek is displayed in the FEIS. The use of a 25 foot buffer and the limited treatment along Swamp Creek would not produce a measurable increase in stream temperature. According to the Northeast Oregon Snake River Spring and Summer Chinook and Steelhead Recovery Plan, the Joseph Creek steelhead population currently meets the viablity criteria. The population's overall viablity is "highly viable", with an abundance and productivity rating of "very low risk" and a spatial structure and diversity rating of "low risk". The 10-year gometric mean abundance of natural spawners is 2,186 which is 4.4 times the minimum abundance threshold of 500 spawners. The 10-year geometric mean productivity (1.94 redds) per spawner is above the 1.49 redds per spawner required at the minimum abundance threshold for a risk of extinction less than 1 percent over 100 years. There are no other RHCA treatments proposed for and Category 1 or 2 streams that would increase stream temperature in the project area.
Stream Temperature	266	It is our understanding that while the year-round temperature standard for the basin is indeed 64.4 degrees Celsius based on salmon and steelhead rearing and migration, there is a second temperature standard in certain creeks with designated spawning and rearing habitats.	The Oregon temperature standard for the Lower Grande Ronde is 64.4 degrees F for salmon and trout rearing and migration. For the Lower Grande Ronde the standard is the same 64.4 degrees for spawning and rearing.

Category	Commenter ID#	Summary of comments	Summary Response
Water Quality	266	We are concerned that water quality will be degraded, and that water quality impacts were not adequately addressed or analyzed, and that relevant information was not accurately portrayed.	The FEIS (chapter 4, Water Quality and Temperature) analyzes the effects of the alternatives on water quality. A few corrections to inaccurate or conflicting information was corrected between publication of the DEIS and FEIS.
Water Quality	267	Any idea what stream modification has been done? To our knowledge Davis Creek has had very limited modifications. What evidence do you have that there are degraded streambanks from grazing? Also, isn't flow modification usually due to irrigation or dams? Where do we have stream flow modification?	The Oregon Department of Environmental Quality manages Oregon's Water Quality Assessment and current list of all water quality impairments, including those pertaining to flow modifications for all listed waterways. Please consult the latest 303(d) listings for all information pertaining to water quality impaired waters at http://www.deq.state.or.us/wq/assessment/assessment.htm Regarding evidence for streambank degradation from grazing; we directly observed grazing related impacts during field investigations for the LJCRP at multiple sites. Evidence included: hoof shear at streambanks and within channels, loss of riparian vegetation by trampling or browsing which reduced stability and stream crossings by livestock.
Best Management Practices	266	Many of the BMPs are so flexible as to be unenforceable.-Most BMPs carry multiple conditions and loopholes such as “when practical” or direction to “avoid” or “minimize”, all of which result in the BMP becoming subject to personal interpretation and convenience. It is possible that many BMPs could not be implemented as intended, based on practicality and convenience, and that this would be perfectly legal, but it would not protect water quality. Without clear and fixed goals, standards, guidelines that are quantified and guaranteed to be implemented, BMPs do not provide adequate mechanisms of enforceability and they cannot be assumed to protect water quality parameters.	The Forest Service was given guidance in April of 2012 to use standardized framework for Best Management Practices to meet applicable water quality standards and other Clean Water Act requirments (FS-990a). In the EIS, we adopted these standards and used them through project design so that all alternatives are consistenet with local water quality management plans, the Clean Water Act and all other policies, rules, laws and regulations. BMPs are evealutated at multiple levels starting at the site specific level and then aggregated up to the Forest level.

Category	Commenter ID#	Summary of comments	Summary Response
Aquatic Species and Habitat	225, 265, 266	the DEIS does not adequately consider the negative impacts from logging, nor does it disclose or consider that fish are able to recover from high severity fires relatively quickly, and that long-term impacts from roads, logging, and grazing far outweigh impacts from fire on listed fish. All action alternatives should ensure an upward trend in fish habitat condition. Alternative 2 is likely to adversely affect listed species.	The FEIS displays the effects on aquatic resources from the treatment of forest vegetation through silvicultural and fuel reduction (fire) treatments. It also displays the effects on aquatic resources of the transporation system.The potential impacts from any alternative are disclosed fully in the FEIS, Chapter 4. The FEIS also describes protection and mitigation measures that would protect listed fish and their habitat. The forest treatments and the RHCA treatments in concert would lead to a more resilent landscape to prevent adverse effects at the landscape scale and allow the restoration of Snake River steelhead and their designated critical habitat over the long term at the subwatershed scale.
Aquatic Species and Habitat	225, 266	We are concerned that the Lower Joseph Creek DEIS did not adequately analyze the impacts of the proposed action on either species (Pacific Lamprey, Western Brook Lamprey), and that it does not provide for their continued viability. Because of the restoration potential for Pacific Lamprey habitat in Lower Joseph Creek and its tributaries, the Tribe would recommend adding a fisheires monitoring plan to determine presence or absence in the LJCRP prior to initiating activies.	Potential habitat for Pacific lamprey is located outside the project area; in Lower Joseph Creek. Hence, this is outside the scope of the project. However, the discussion of downstream cumulative effects of the project relative to Pacific lamprey have been improved in the FEIS (Chapter 4, Aquatic Habitat). Further, if during monitoring this species is found in the project area, protection measures would be put in place.
Aquatic Species and Habitat	243	Road-stream crossings are high-risk hotspots of aquatic and hydrologic impacts and should be rigorously avoided.	No new road construction is proposed, and there would be no increase the road stream crossings. Temporary Roads would be located to avoid road stream crosssings.
Aquatic Species and Habitat	225, 266, 267	The discrepancy in the level of fine sedment in critical aquatic habitats defines the need for quantitative surveys to determine the level of impact from sediment in any proposed alternative.	This was an inadvertent contradiction and has been corrected in the FEIS. We are using the best available information, and modeling indicates that the alternatives would not adversely affect sediment levels. Aquatic inventory survey results are displayed in the FEIS, and in-channel fine sediment is at an acceptable level.

Category	Commenter ID#	Summary of comments	Summary Response
Aquatic Species and Habitat	266	The DEIS only included information regarding the Joseph Creek steelhead population, without taking into account or analyzing the importance of this population in the context of the entire Snake River DPS.	The FEIS addresses only land management activities on federally administered lands. As such, the analysis of effects for listed fish extends to the appropriate scale of the population; in this case the independent population of Joseph Creek steelehead within the major population group of the Grande Ronde River.
Aquatic Species and Habitat	266	There are many studies suggesting that increased temperatures, fine sediment, and other water-quality related impacts and riparian habitat impacts related to land management activities can and do affect downstream reaches. In addition, it was not clear if there is designated Bull trout habitat within the project area, even though the project area is not currently occupied by Bull trout. If so, then project impacts to Bull trout habitat need to be analyzed.	The FEIS addresses only land management activities on federal administered lands. As such the analysis of effects extends to the appropriate scale for the analysis area. There are no bull trout or designated critical habitat in the analsysis area.
Aquatic Species and Habitat	266	If no surveys have been done for Redband trout in the project area, and they are sensitive to changes in water quality and habitat, how can it be assumed that their populations are doing well when taking into account the excessively high stream temperatures in the area?	The proposed PACFISH buffers implemented for category 1 and 2 streams for the project would provide protection from any change in water quality or habitat values for redband trout.
Aquatic Species and Habitat	266	The DEIS (pg. 189) states that Western ridge mussels may be negatively affected, but that these effects would not contribute towards listing. What about the cumulative effects on Western ridge mussels from other projects in the area?	A more complete cumulative effects analysis has been completed for the FEIS (chapter 4, Cumulative Effects).
Aquatic Species and Habitat	267	The DEIS states that Alternative 1 (No Action) of the LJCRP may impact individual Snake River steelhead and their habitat, but will not likely contribute toward loss of viability to the population or species (MIIH). If you do nothing, how is it impacting anything?	"Doing nothing" does not necessarily equate to "no effects". Doing nothing can have indirect effects, such as continuation of uncharacteristic fire severities, which can in-turn indirectly effect sedimentation. Alternative 1 has potential effects that are described in chapter 4 of the FEIS.

Category	Commenter ID#	Summary of comments	Summary Response
Cultural Resources	225	Cultural resource concerns of the Nez Perce Tribe remain unaddressed in the document. Overall, the DEIS asserts that large-scale, catastrophic, stand replacing, intense, or uncharacteristic fires are the greatest threat to all resources, including all cultural and heritage resources. As a result, any measures expected to reduce the threat of these fires is predetermined to be beneficial. Cultural Resource Program staff agrees that large scale fires threaten many resources, but many resources, especially precontact archaeological sites and traditional cultural properties, have burned many times in the past, and yet remain deeply significant to the Tribe and Tribal members.	The variable effects of stand replacement fire on cultural resources has been clarified in the FEIS. For example, historic wooden structures are vulnerable to high severity fire, but a buried archaeological site would likely be less vulnerable. The FEIS addresses differential effects of fire on fire sensitive versus fire tolerant cultural resources (FEIS Chapter 4, Heritge). Effects analyses revealed that the no action alternative poses the most risk to cultural resources. The FEIS also discloses that there is a paucity of information regarding traditional cultural properties and other traditional use areas for the LJCRP area. We will continue to consult with the Nez Perce Tribe to better understand values and potential effects to archaeological sites and traditional cultural resources.
Cultural Resources	225	There is disagreement or confusion regarding the process to determine of effect with the State Heritage Preservation Office (SHPO), Tribe and Forest Service. The DEIS promises that the Forest will consult with the Tribe, "should specific concerns arise regarding potential effects to Nez Perce traditional use areas and resources (p 142)," and that the Tribe will be consulted before project implementation to identify "historically significant traditional use areas, or other areas of interest (p 142)." These statements and guidelines suggest that the Forest only has an obligation to Nez Perce Tribe for traditional cultural places and "historically significant" use areas, and that archaeological and historical resources should be resolved between the between the FS and SHPO without Tribal input.	The FEIS acknowledges the Federal-Tribal trust responsibility and tiers to laws and Executive Orders that call for government to government consultation. Language used in the DEIS was not intended to exclude the Nez Perce Tribe's interest in archaeological or historic resources. The Heritage IDT member and Forest Archeologist are currently coordinating with the Nez Perce Cultural Director in an effort to move forward on agreements and consultation designed to address the Tribe’s interest in the protection of both traditional and archeological sites and values. The Programmatic Agreement (PA) does require tribal consultation (PA Stipulation I.1, II.A). In preparation for the FEIS, we followed every step of the National Historic Preservation Act Section 106 compliance process, including determination of effects on cultural resources. The cultural inventory report for the LJCRP was shared and discussed with the Nez Perce Tribe’s THPO.

Category	Commenter ID#	Summary of comments	Summary Response
Tribal	225	There appears to be a definition disagreement over the Nez Perce's "aboriginal territory". The comment suggests inaccuracy of source material coming from Sahaptin speakers because that is not consistent with the Nez Perce Tribe homeland; and suggests that we should replace believes/beliefs with recognize to avoid confusion about the perception of insensitivity. It is also unclear why the DEIS suggests that the precontact resources may be from "Sahaptin speakers," when the entire project is located in the homeland of the Nez Perce Tribe	The aboriginal territory definition was a clerical error that has been corrected in the FEIS. The reference to Sahaptin speakers has been removed. Wording has been changed in the FEIS to stress importance of tribal positions instead of tribal beliefs. "Sahaptin speakers" is a linguistic title that covers a broad area of tribal territory. We acknowledge the Tribe's concern and will remove it for the FEIS.
Tribal	225	The DEIS states that the Nez Perce Tribe has not shared information or locations of traditional cultural properties, sacred sites, and other traditional use areas (p 168). The Cultural Resource Program staff has repeatedly requested funding to conduct a traditional use study of the project area to gather the information requested, but no funding has been made available.	We are currently consulting with the Nez Perce Tribe's Cultural Director to conduct an ethnographic inventory and traditional use study that will better inform potential effects to traditional cultural places and values.

Category	Commenter ID#	Summary of comments	Summary Response
Tribal	242, 243, 265	We are concerned LJCRP activities will degrade the cultural, historical, and natural values of the traditional homeland of the Chief Joseph Band of the Nez Perce tribe, degrading or eliminating spiritual and cultural values and treaty rights associated with this historical sense of place. The area is a rich ecological and cultural laboratory to explore and share with others. In fact the Joseph Canyon Roadless Area has one of the highest cultural site densities of all the RARE 2 study areas including lithic scatters, rock shelters, peeled trees, log structures, cairns, and corrals, some of which may be proto-historic. Nearly all the high ground in the area contains shellfish middens. In addition to impacts from operations, increased grazing that results from treatment could cause further damage and should be fully analyzed.These sites are extremely vulnerable to damage from logging and motorized vehicles.	A lot is known about the types, integrity, and locations of cultural sites in the LJCRP. 40 cultural resource inventories have been conducted between 1980 and 2014 within the analysis area resulting in the coverage of ~26,000 acres and the identification of hundreds of cultural sites. Compliance procedures set forth in Section 106 of the National Historic Preservation Act (NHPA) are being followed including tribal consultation and the development of site protection measures designed to protect or avoid cultural resources during project implementation. The amount of forage depends on many factors, such as annual variations in precipitation, heat, soil, and competing vegetation. The indirect grazing effects of reduced forest canopy cover as a result of the project have been improved between DEIS and FEIS (FEIS chapter 4, Rangelands)
Tribal	225	The DEIS provides a limited background of the heritage resources in the project area. It is unclear why the DEIS refers to documents from Wallowa County to describe the heritage resources and values in the project area.	Wallowa County's Watershed Assessment (2014) provided a useful chronology and summary of the history of European settlement for the county and the LJCRP area. We did not use the Watershed Assessment to describe or consider the pre-contact era or archaeology of the LJCRP.
Tribal	4	Why is it more important to you to increase forest health than protecting a sacred Native American religious site?	Proposed treatments would improve forest heath and protect cultural values. Tribal consultation regarding protection of traditional or spiritual values is ongoing.

Category	Commenter ID#	Summary of comments	Summary Response
Tribal	225	The DEIS states that Nez Perce cattle herds in the Wallowa Valley peaked in 1875-1876, but it is unclear exactly where the information came from. The reference appears to be cited incorrectly, but the document that we believe is referenced (Williams and Melville 2005) is highly opinionated and conclusions disputed.	Thanks for pointing out a potentially controversial reference. This has been considered in development of the FEIS.
Cultural History	226	Cultural history is important to many of the residents of Northeast Oregon. Historically, this area has been a hub for timber production and activity in the woods. This should be addressed in the EIS as a major portion of the analysis. The amount of timber harvest and management on the ground is extremely important to the cultural history of the local communities.	The Socioeconomics section of FEIS chapter 2 and the Socioeconomic Specialist report provide descriptions of the values, beliefs, and attitudes of people in the area as they relate to livelihood, cultural and biological values. The history of the timber industry and how it relates to cultural values is also summarized. The social and economic sections of the FEIS analyze the effects of the alternatives on timber volume outputs, and this analysis will be a consideration in the final decision.
Cultural Resources	267	The greatest threat to heritage resources is ground disturbing activities associated with mechanical treatments. DEIS Tables 66 and 89 don't answer the issue.	Between the DEIS and FEIS, we added the number of acres treated, in addition to the the percentageto these tables. Further, given uncertainty in the estimation of logging systems, and to provide more flexibility during implementation to select the best logging system to fit site-specific conditions, individual resource effects were assessed by stand relative to the estimated logging system, as well as the potential effects if a more impactful logging system were used (e.g., if a ground based system were implemented instead of an estimated helicopter or skyline system) (see FEIS tables 50 and 69).

Category	Commenter ID#	Summary of comments	Summary Response
Cultural Resources	225	Given the significance of elk resources to the cultural and economic vitality of the local communities and the magnitude of the proposed LJCRP, more in depth analysis using the best available science is warranted…..use of distance band analysis is recommended.	The IDT recognizes the high value of elk as a Nez Perce tribal treaty resource. The FEIS clarifies how the treatments are designed to meet forest plan desired conditions for wildlife, and the implementation plan clarifies how this intent would be implemented. Our experience with running HEI using the distance band analysis does not show a substantial change in the HEI values, and HEI values would still meet Forest Plan Standards. The more recent research shows that providing for nutrition, and providing access to this nutrition (away from roads) is important. Nonetheless, a distance band analysis was conducted between the DEIS and FEIS. Alternative 2 proposes to close nearly 70 miles of road, and these road closures would help mitigate the potential loss of cover in areas where nutrition increases with canopy cover reduction. Implementation of project design criteria (FEIS Appendix J) would contribute to hiding cover through small inclusions of no treatment ("skips") within each treatment unit, and intermittently along open roads, where necessary. The FEIS includes a better description of these issues compared to the DEIS.

Category	Commenter ID#	Summary of comments	Summary Response
Economics	5, 226, 244, 261, 262	The Forest Service should focus on the economic analysis and make this a priority in the current EIS. Restoration should be ecological, but it should also contribute to the socio-economic status of the local communities. It is important to create more old forest single story (OFSS); these treatments will benefit our local economies. Economic factors are critical to accomplish a viable forest management project. Optional removal of un-merchantable material from the sale area; sawlog timber volume per acre harvested; a practical forest road network; and optimizing the sawlog harvest of trees over 21" dbh are the economic means to help pay for the thousands of acres of non-merchantable thinning in this project. Without cost-effective sawlog revenue included, the non-commercial treatments become infeasible. Economic assessment must identify timber contributions. The economic analysis understate the benefits of the proposed timber harvest operations . Please delineate the proposed treatments by commercial and non-commercial as well as by logging system in the EIS.	The LJCRP purpose and need includes to contribute to the socioeconomic vitality of local communities, and the proposed stand treatments would result in economic contributions to the local economy. We have improved the clarity of the FEIS relative to logging systems (e.g., Tables 50 and 69), and commercial versus non-commercial treatments (chapter 4 of the FEIS). The socioeconomic analysis addresses social and economic effects to the local area by alternative (FEIS chapter 4, Socioeconomics). The action alternatives would increase the abundance of old forest single story OFSS in the short and long term. The Socioeconomic analysis is meant to serve as a comparison tool amongst alternatives. However, the financial efficiency analysis does not include non-market values that are difficult to quantify, therefore the benefits may be underestimated. Additionally, there are tools, and other economic means available to cover the costs of treating un-merchantable material, including stewardship contracting and other sources of revenue to pay for treating these treatment needs. The FEIS chapter 4 (Socioeconomics) identifies the economic impacts of timber harvest.

Category	Commenter ID#	Summary of comments	Summary Response
Economics	3, 5, 226, 264	Timber production in the area has gone down 70% and associated infrastructure jobs 80%, according to the background data in the new Forest Plan. What percent of the harvest will be sawlog material? The higher this percentage is, the more options the Forest Service will have to complete non-economical work (such as culvert replacement and helicopter treatments). The biomass created after a forest thinning can be converted to valuable timber and generates energy. What were historic management outputs compared to today and the effect on community socio economic factors?	FEIS table 32 lists acres by treatment type for the action alternatives. All cutting treatments listed with the exception of stand improvement include a chance for harvest of sawlog material. The FEIS shows that the action alternatives would provide approximately 7-10 million cubic feet of timber volume (FEIS chapter 4, table 33). This is far greater than has been produced from projects on the Wallowa-Whitman National Forest over the past several decades. Changes to timber harvest and associated infrastructure in the area is summarized on page 22 of the Socioeconomics Specialist report. The Socioeconomics report (page 14) assumes that 75% of the commercial product volume would be sawtimber; the remainder pulpwood. The relevant socioeconomic effects of the management alternatives for this EIS are analyzed in the Socioeconomics section of chapter 4 of the FEIS. It is beyond the scope to analyze socioeconomic effects of historic management.
Economics	226	Please enumerate the number of jobs both created and maintained specifically for the job but also include jobs created and maintained in the local communities. Normally the accepted multiplier is 2.81 per every one job created.	In the economic impact tables, direct jobs to complete the work are reported along with the indirect and induced jobs in the local community (the ripple effects) (FEIS tables 63 and 76). We used the economic software IMPLAN to model the multiplier effect within the impact area.
Economics	267	Table 84 depicts employment and specialization in logging and wood products manufacturing. Where are these? I do not find the tables present showing that information.	This reference to Table 84 in the DEIS has been corrected in the FEIS.
Economics	267	Financial efficiency Page 195 Table 83 summarizes the financial efficiency for Alternative 2. These are not the numbers that came from the Eric White report. Where did these come from?	Table 62 in the FEIS details the financial efficiency analysis for Alternative 2, which uses current Forest Service assumptions about the stumpage rates and costs of treatments. Economic impacts are detailed in Table 63.

Category	Commenter ID#	Summary of comments	Summary Response
Economics	226	In discussing the social environment, please include a discussion of local county government and how the Forest Service's activities in the forest will affect the revenue sharing of this project. This project will also have an impact on local schools and roads funding as well because the Forest Service is required by law to share 25% of the timber sale revenue with the county. I'm concerned that this was not taken into account during the design of this project and with the amount of non-economical units in the project area; it could detrimentally affect the local communities through reduced revenues.	The Socioeconomic specialist's report now describes how payments to counties might vary depending on the mechanism used for the commercial timber sales and how this project might affect road and school funding in Wallowa County. The commercial timber volume sold in this project could be sold as traditional timber sales or using stewardship authorities. In traditional timber sales, the Forest Service returns approximately 25% of the revenues back to states, which is then distributed to the counties. The returned revenues are used to fund roads and schools. In selling commercial timber using stewardship authorities, all of the revenue from the project remains with the selling National Forest (rather than going to the treasury or the counties) to be reinvested in other forest restoration projects.
Economics	265	When the DEIS states that local communities "remain natural resource dependent to some degree"(DEIS p.5), the Forest Service fails to disclose that local economies have diversified and that the degree of local and regional economic dependence on natural resource extraction from the National Forests has diminished significantly as eco-tourism, residential, and recreational uses threatened by such extraction have increased significantly. Local socio-economic context is not the only relevant social context.	The social effects of the project are addressed in the Socioeconomic section of chapter 4 of the FEIS. The social analysis area was chosen based on the area with likely social impacts from this project, which includes Wallowa County and the Nez Perce Reservation. Chapter 1 of the FEIS clearly states that the purpose and need of this project is to restore forest resiliency and contribute to social and economic vitality of local communities. Chapter 2 of the FEIS summarizes available socioeconomic data, concluding that agriculture, forestry, fishing and hunting; government; and retail trade sectors contain the largest shares of employment in Wallowa County.

Category	Commenter ID#	Summary of comments	Summary Response
Economics	265	The “desirable” tree species preference listing given on DEIS pages 27-28 is clearly the same order as timber industry species preference for logging in eastern Oregon: ponderosa pine, western larch, Douglas-fir, Englemann spruce, grand fir, lodgepole pine, and juniper. The Forest Service is evidently trying to clear out less desired, but still merchantable tree species in order to plant the preferred timber industry tree species lost in abundance to past logging selection. Large trees are worth more to the timber industry and Forest Service revenues.	The post treatment species composition for the project area is disclosed for each alternative in Chapter 4 of the DEIS. Our analysis shows that the action alternatives would increase diversity of forest composition within both moist and dry potential vegetation groups and move the landscape toward the desired, and ecologically resilient forest conditions.
Economics	266	Currently, economic short-term benefits of logging and grazing do not adequately consider long term costs, impacts, or externalities associated with the environmental degradation taking place.	The physical, biological, and socioeconomic effects analyses (FEIS chapter 4, Socioeconomics) include cumulative effects analysis that considers multiple projects in the analysis area over the long term. The estimated economic impacts and costs are estimated to occur over a ten year period, which is the approximate time span of the project. Beyond this timeframe, it is too difficult to estimate actions and corresponding costs and impacts.
Economics	267	The estimated volume to be removed under Alternatives 2 and 3 is grossly conservative based on the treatments to be implemented on the ground. Wallowa County’s Watershed Assessment gives a much closer estimate of volume to be removed 17,680,000 cubic feet (105mmbf) and 11,220,000 cubic feet (66mbf) respectively. Wallowa County believes that their closer estimate of volume to be removed should be used in the LJCDEIS to avoid future objections to the process.	The volume estimates used in the FEIS are based on estimates derived from the best available Forest Inventory and Analysis Program data, and modeling (Zhou and Hemstrom 2010), and are used to compare the relative effects between alternatives. Other methods may deliver differing estimates, but it is the relative volume between alternatives that are the focus of this decision criteria.

Category	Commenter ID#	Summary of comments	Summary Response
Economics	264	I am concerned about a change in values under the no action alternative, and salvage value and availablity after a wildfire. There is a need to address cumulative effects for socioeconomics.	The FEIS, chapter 4, social environment and socioeconomics specialist's report addresses socioeconomic impacts from wildfire, cumulative effects and changes in values under the no action alternative.
Economics	226	I'm concerned about the prevalence of skyline and helicopter logging in both alternatives. Both of these types of logging systems are extremely expensive and will need to be packaged appropriately in order to ensure that there is an economic benefit derived from these treatments.	We recognize that the various logging systems differ in cost, and the local District staff can package treatments for implementation in various ways. The stumpage rate estimate is based on previous appraisals for ground-based logging systems. However, if the Lower Joseph timber harvest were to include skyline and/or helicopter logging, the harvest costs would increase and therefore the stumpage rate would decrease. According to specialists on the Forest, skyline logging costs are about 55 to 60 percent higher than ground-based logging costs and helicopter logging usually costs 3-4 times that of ground-based logging. For both of these cases, the stumpage values would likely be negative, meaning that the FS is paying to have the timber harvested rather than collecting revenue. However, due to uncertainty in costs and volumes for the logging systems and how the harvest would be implemented, the stumpage rates for each logging system are not provided. There is the potential for the costs to increase depending on the logging system employed and this would reduce the PNV.

Category	Commenter ID#	Summary of comments	Summary Response
Economics	226, 266	Economic cost and benefits analyses should take a broader and more in-depth approach in order to give an accurate portrayal of true costs and benefits. The DEIS discusses socio-economics and only discusses the logging sector in Wallowa County. While these are important jobs, this focus should be expanded regionally and should include the entire supply chain as well as non-logging forest contractors that assist in forest restoration, such as roads and non-commercial thinning contractors. Not only that, but these jobs have a ripple effect that tends to create additional economic activity and jobs in the local communities.	The socioeconomic effects analysis in chapter 4 of the FEIS details the financial efficiency of the project (costs and benefits to the FS), as well as the economic impacts (jobs and labor income contributed to local economy) from the alternatives. Many benefits cannot be quantified in economic terms, and are analyzed qualitatively. Wallowa and Union counties comprise the economic analysis area for the economic impact analysis. Together, the two counties contain many of the businesses that will likely complete the contracted restoration work, the facilities that will process much of the commercial timber material removed, and represent the functional economy for many of the individuals residing and working in the area. In the economic impact tables, direct, indirect, and induced contributions are included in the estimated impacts
Economics	226	Many times the analysis is skewed toward the ecological benefits. Please ensure that social and economic benefits are outlined properly to ensure a balanced project that will not only benefit the ecology of the project area but also the socio-economic needs of the communities.	Social and economic effects of the alternatives are discussed in the Socioeconomic effects section of the FEIS (Chapter 4).

Category	Commenter ID#	Summary of comments	Summary Response
Economics	267	Over the 10-year treatment period, the LJCRP is expected to cost the Forest Service between approximately $6.4 and $7.9 million. This is the discounted cost to the government of the project. The anticipated revenue from the timber harvest (benefits) is expected to range from approximately $10.2 to $16 million. Therefore, the positive PNVs are $8. 1 million for the Proposed Action and $3.8 million for Alternative 3. The DEIS displays the PNV to the Federal Government. The overall economic benefit to Wallowa County and northeast Oregon is over $100 million as shown in the Wallowa County Lower Joseph Creek Watershed Assessment and should be identified in the document.	The estimated PNV revenue is $1.9 million for Alternative 2 and $1.2 million for Alternative 3 (tables 62 and 75) based on the assumptions outlined in the Socioeconomics methodology section. Present net values are -$5.9 and -$5.2 million for Alternatives 2 and 3, respectively. The efficiency analysis uses current Forest Service assumptions about the stumpage rates and costs of treatments. There are two economic analyses completed in the FEIS: the financial efficiency analysis and the economic impact analysis. The “over $100 million” figure in the Wallowa County Lower Joseph Creek Watershed Assessment is comparable to the economic impact analysis in the FEIS. The economic impact analysis for Alternative 2 shows that it is projected to support 55 jobs and $2.9 million in labor income in Wallowa and Union counties annually over 10 years, which is comparable to the analysis reported in the Wallowa County Watershed Assessment. Financial efficiency measures are calculated in this analysis to provide a means of comparing the financial efficiency of alternatives. The economic impact analysis estimates jobs and labor income changes in the analysis area resulting from the alternatives.

Category	Commenter ID#	Summary of comments	Summary Response
Economics	264	The DEIS states that “under the No Action alternative, initial impacts to livelihood, cultural values, and biological values would not change from the present”. Are you sure about that? This section goes on to discuss wildfire and the potential for lowering timber values because of the sudden pulse of burned wood on local markets. It is unclear to me where these burned logs might be produced from – salvage off Forest Service lands had generally been pretty nominal lately. And salvage is a short term enterprise and not likely to affect anything much in the long term.	Under the no action alternative, the initial direct impacts are not expected to change from the present condition. For example, no new harvest would be provided under the no action alternative, therefore, the jobs contributed to the local economy are not expected to change. However, if the incidence of wildfire increases as a result of not completing restoration treatments, large fires could damage existing forest stocks and increase the amount of salvaged wood on the market, leading to decreases in delivered log prices. This is an example of a potential impact to the timber market because of more severe fire events that might occur under the no-action alternative but should not be seen as a direct impact of the no action alternative. Whether salvage does or does not actually occur following fire in the future cannot be predicted through this analysis; however, considering these potential effects has value withni the context of comparing the relative effects between alternatives.
Recreation	264, 265	We are concerned by negative effects of the Lower Joseph Creek Restoration Project to recreational values (barely discussed in the DEIS) and scenery, and to indigenous people’s treaty rights, cultural plants, and traditional use sites. We are opposed to logging or roadbuilding in Wild and Scenic River corridors. What are the socioeconomic benefits or losses to recreation within the project area if objectives for reducing fuels and restoring the area to hisitoric conditions are met or not met?	No tree cutting or road building is proposed in the Wild and Scenic River corridor in any alternative. Recreational opportunites would not change greatly, though depending on the alternative, either non-motorized or motorized opportunities would vary with the amount of popen and closed raods. The amount of forage for ungulates would likely increase toward the RV, potentially providing better habitat conditions for elk and potentially benefit hunting opportunities.

Category	Commenter ID#	Summary of comments	Summary Response
Recreation	243	The project area has unique potential to be a major driver in fueling interest and growth in the tourism, retail, and recreation sectors, as well as a magnate for retirees and entrepreneurs. Major attractions like the Eagle Cap Wilderness are popular in part because of the explicit protections they enjoy but are largely inaccessible or inhospitable for much/most of the year. The project area is much more accessible and could play a role in supporting the many local businesses that shut down in winter. If values on these lands (including wilderness potential) are compromised, the economic growth potential of the area will also suffer.	Impacts to recreational values are addressed in the Socioeconomics section of chapter 4 of the FEIS, and the Socioeconomic Specialist report. Under Alternative 2, the positive effects to recreation uses for fishing, gathering special forest products, and hunting are greater in the long term since there will be more restoration treatments and a corresponding lower risk of uncharacteristically severe wildfire, which adversely. The link between recreation and its effects on tourism has now been made in the FEIS, chapter 4, Socioeconomics. Effects regarding the resiliency of forest lands in the project area can be found in FEIS chapter 4, Vegetation and Disturbance. Restoring and maintaining resilient forests would maintain aesthetic values (FEIS, chapter 4, Scenery), and opportunities for recreation industry growth.
Recreation	226	On page 138 the DEIS discusses dispersed recreation and states that " .... proposed treatments such as harvesting trees, reducing slash or altering canopy cover displace or discourage certain types of recreational activities (i.e. studying nature, viewing wildlife)." I disagree with this statement as it is prejudicial and incorrect. Treatments do not degrade nature as they are designed to enhance the ecological status of the forest as well as improve habitat. Stating that those studying nature and wildlife will be adversely affected is wrong and this should be re-written. Please also explain that many of these treatments will result in temporary slash piles, dust, smoke and noise.	We agree that the statement in the DEIS did not capture the whole story, and appeared biased. We have changed the FEIS (chapter 4, Effects Common to All Action Alternatives) to better describe the effects, including that in some cases, the changing landscape would displace or change the appearance of certain types of dispersed recreational activities (i.e. studying nature, viewing wildlife, big game hunting, photography).

Category	Commenter ID#	Summary of comments	Summary Response
Social Values	Form email	Public lands belong to everyone. They are valuable for clean water, clean air, wildlife habitat, recreational opportunities, as places to find solitude, and where natural processes can play their role. The proposed Lower Joseph project risks many of these values by pushing controversial and aggressive actions like commercial logging in roadless areas.	The impacts to social values, such as recreation and ecosystem services, are discussed in the socioeconomic analysis. Scoping comments revealed that some people value air and water quality, wildlife, and old growth trees, among others. The FEIS discloses that the effects of the action alternatives include maintained or improved water quality, suitable or improved wildlife habitat, conservation of large, old trees, and decreased risk of severe, unwanted wildfire. In addition, the action alternatives are anticipated to have positive effects to fishing, gathering special forest products, and hunting over the long term. In addition, the Scenery section states that the sights, sounds, and changes in vegetation from activities and use would further decrease the apparent naturalness and sense of solitude within harvest units and along roads during logging operations.
Social Values	242	The Forest Service is not recognizing the social/cultural aspects of Wilderness.	There is no Wilderness found within the project area. Analysis of project effects to potential wilderness, Inventoried Roadless Areas, and other undeveloped lands are disclosed in chapter 4 of the FEIS (Social Environment).

Category	Commenter ID#	Summary of comments	Summary Response
Scenery	259	I believe we should be especially conservative in considering impacts of logging in steep, environmentally and aesthetically significant areas.	We are taking a very cautious approach to managing vegetation on steep slopes through the implementation of Project Design Criteria (PDC) (FEIS Appendix J, Soils; and the Physical Environment Supporting Documentation). PDCs would limit the potential for soil and vegetation disturbance and sediment mobility. Best Management Practices, and Forest Plan guidance also help ensure the use of appropriate silvicultural methods to protect the environment and aesthetically valuable areas. All forest restoration treatment types, regardless of slope, would use an approach which uses historical stand tree patterns as one indicator of resiliency and restoration need. These types of treatments provide greater viewing distances, which is in general aesthetically preferable. The resilience and appearance of the stands would also be improved by retaining large trees. These and other benefits contribute to both protection of the environment, and the improvement of aesthetics.
Scenery	267	Page 111 Table 52. Proportion of the Lower Joseph Creek Restoration Project in each landscape visibility ….“Other” needs defined when it is more than 50% of landscape. What is not within 1/2 mile to more than four miles? Recommend remove this piece from EIS.	You are correct. DEIS Table 52 did not add value to the analysis of effects, and has been removed from the FEIS. The scenery analyses follow agency direction (National Forest Landscape Management Volume 2, Chapter 1 the Visual Management System (Agriculture Handbook 462, USDA Forest Service 1974); Landscape Aesthetics, A Handbook for Scenery Management (Agriculture Handbook 701, USDA Forest Service 1995); and Wallowa-Whitman Forest Plan direction.
Firewood	1	Firewood is an important resource to the communities of Wallowa County, please find all the manners possible to allow us access.	The FEIS analyzes a range of alternative open system road networks from 170 to 230 miles of open roads. The availability of firewood is determined by the local decision-maker.

Category	Commenter ID#	Summary of comments	Summary Response
Prescribed Fire	225, 226, 244, 265	The cumulative effects of not being able to place 48,000 acres of prescribed fire on the landscape over the next 10-20 years are of concern. I am concerned that the Forest Service will not be able to fully implement the project, which could have a significant effect on the desired outcomes of this project. The magnitude of proposed burning is problematic due to labor, funding and timing. Please consider alternatives to prescribed fire that will emulate the same effect in order to ensure that the area is properly treated. We are opposed to prescribed burning in moister, colder and high elevation mixed conifer forest types (including active Pileated woodpecker foraging habitat, and American marten habitat), which are naturally subject to infrequent, high severity fire.	Prescribed burning activities are designed to be compatible with mechanical vegetation treatments, and able to make the most use of unplanned and planned ignitions. The use of planned and unplanned ignitions to achieve theproject purpose and need would be much less costly than using mechanical means alone. The FEIS recognizes that using prescribed fire on all 90,000 acres could prove difficult given available funding and appropriate prescribed fire weather to meet the desired conditions. Therefore, the landscape was prioritized by restoration need to first address the fuels created through silvicultural management and maintenance of dry upland forest, followed by moist upland forest where appropriate, and non-forest areas (FEIS table 9). The USFS Wallowa Mountains Office (WMO) burns approximately 3,000 acres on average per year and over the 10 to 20 year planning horizon it would be reasonably feasible to burn 30-50,000 acres of the project depending on resource availability and burn windows. The underlying assumption of burning "up to 90,000 acres" is established to recognize the ecologic role fire once had in this area and provide implementation flexibility to prioritize and take advantage of "burn windows" and available personnel to complete the job of restoration. The FEIS describes the landscape prescribed fire prioritization strategy.
Prescribed Fire	267	By not treating the riparian areas and connecting areas, it will reduce the ability to implement prescribed fire because of existing fuel loads and the risk of losing these areas to the fire.	The FEIS analyses the effects of treating (Alternative 2) versus not treating (Alternatives 1 and 3) RHCAs. The FEIS acknowledges the challenge of actively re-introducing fire to the landscape with and withour pre-treating existing stand structure and fuel loads (FEIS, chapter 4).

Category	Commenter ID#	Summary of comments	Summary Response
Activity fuels treatments	262	The treatment of residual debris is too prescriptive and limiting.	Activity fuel treatment methods include flexibility to determine the appropriate method during implementation. The FEIS discloses that activity fuels would be treated in a variety of ways including, but not limited to, mastication, removal, pile (grapple or hand) and burn, cutting and scattering limbs, or prescribed fire (chapter 4, Effects Common to All Action Alternatives).
Fire effects	225	The DEIS would benefit from a more comprehensive analysis of the effects of prescribed fire on a variety of resources: snags, ground and shrub nesting birds, sediment from fire activities, noxious weeds, microbiotic crusts, air quality, rare plants and soils.	Interdisciplinary team specialists have reviewed the fire effects analyses for adequacy, and made adjustments in the FEIS as needed (chapter 4, Biological Environment). The FEIS includes more complete analyses of prescribed burning effects to these resources, including more explicit linkages between the discussions of effects and the FEIS project design criteria (Appendix J). Effects analyses to microbiotic crusts have been added to the FEIS. Prior to implementation of prescribed fire, a burn plan would be prepared with consideration from the district interdisciplinary team. This would include input and suggestions from district range, noxious weed, and botany specialists, among others.
Fireline construction	243	Firelines used to facilitate prescribed fire in unroaded areas should be minimized and mitigated to protect soil, water, and scenic values. Where possible, firelines should be located on the outside rather than inside of the roadless boundary.	See project design criteria (FEIS Appendix J) for fireline construction and placement guidelines.

Category	Commenter ID#	Summary of comments	Summary Response
Smoke production and human health	264	What are the health risks associated with doing nothing versus providing a project that restores the area? What are the socioeconomic benefits of treating stands and returning them to conditions that allow prescribed underburns, versus the costs and impacts of wildland fire? There are numerous studies and articles related to the socioeconomic impacts to health associated with wildfire. Recent articles that I am providing can provide a quick glimpse of why and how the smoke impacts should be a part of your analysis.	Thank you for providing supporting references for your comment. Smoke production comparisons between prescribed fire and wildfire are displayed in the FEIS (chapter 4, Physical Environment, Air Quality). The Oregon Department of Forestry is the administrative agency that ensures smoke management during prescribed fire is within the Clean Air Act standards and approves smoke management plans and permits smoke production levels with consideration of public health and safety at the time of implementing prescribed fire. The socioeconomic analysis qualitatively addressed the recreation and human health impacts of smoke. The LJCRP treatments and other ongoing and foreseeable treatments could increase exposure to smoke emissions, which could cause cumulative effects to health and quality of life for individuals who are sensitive to smoke. However, but the action alternatives would also decrease the risk of uncharacteristically severe wildfire, which would decrease the probability of pulses of smoke emissions associated with these events (see FEIS chapter 4 for the socioeconomic effects to recreation and human health from smoke).
Prescribed fire	243	It may be that a significant progress toward vegetation management goals can be realized through prescribed fire or other means, rather than commercial extraction with associated roads and loss of forest structure.	One purpose of this project is to introduce fire on up to 90,000 acres with planned or unplanned ignitions. In other places the existing species composition, structure and density is such that fire may do more ecological harm than good.

Category	Commenter ID#	Summary of comments	Summary Response
Prescribed fire	266	Please respond to the scientific articles provided in this section in relating to fire: Williams and Baker (2012); Sheriff et al. 2014; Polluck et al. (2012); Lydersen et al. 2014; Odion et al.2014; Hanson and Odion 2014...Please provide evidence, including data, to show that logging encourages, provides for, or supports these processes - or that BMPs/PDCs sufficiently protect them.	Fule et al. 2013 provides a systematic assessment of Williams and Baker (2012) in regards to methodology and interpretation of disturbance regimes based solely on tree size, species, and density. To the degree that there is uncertainty about the character of fire disturbance in the Blue Mountains, local research is available. Specifically Heyerdahl and Agee 1996 and Heyerdahl 1997 characterized fire history within the Blue Mountains. Stand reconstruction in the Blue Mountains (following methods in Churchill et al. 2012) has been completed to support the recommendations in the Dry Forest Restoration Guide (Franklin et al 2013). This guide recognizes the heterogeneity of stand and landscape patterns and associated fire behavior. The restoration objectives within the LJCRP include the same structural attributes Williams and Baker indicate drive disturbance processes (tree size, density, composition, and number of strata). Sheriff et al 2014. studied wildfire severity in Coloradoo montane forests, and would be of limited application to the LJCRP area. Polluck et al. (2012) discusses using reference conditions in riparian areas to test similarity between restoration treatments and reference ranges of variability. Odion et al 2014 studied Northern Spotted Owl habitats that very considerably from the project area. The LJCRP objective is to restore the diverse range of variability in forest vegetation and disturbance characterized by the unique landscape setting where it is found. See the project record for a more complete and detailed analysis of the references you provided, and there application to the project FEIS.
Effects analysis	226	Please be sure to include the beneficial effects that the implementation of this project will have. Many times Environmental Impact Statements do not emphasize the benefits of the project, the main focus is the detrimental effects.	We have improved the "story" of this project in the FEIS, including a more thorough discussion of benefits.

Category	Commenter ID#	Summary of comments	Summary Response
Effects analysis	262	Effects of Alternative 1 (No Action) are not fully-addressed. The DEIS also does not adequately consider the benefits of wildfire, insects, and disease to species within these areas, particularly in relation to the no action alternative,even though there is a large body of scientific evidence documenting those benefits. The DEIS also fails to discuss the positive benefits of passive restoration.	The effects analysis for Alternative 1 (No Action) discusses the benefits of no action - which largely takes a passive approach to restoration - in terms of its relative achievement of desired conditions. Alternatives 2 and 3 use active forest restoration across 37 and 24% of the project landscape, leaving the remainder to grow, develop, and change under a passive approach. Active and passive fire management could occur across the vast majority of the project landscape, although all alternatives assume fire suppression will continue into the future. There is a section specific to insect and disease susceptibility for the existing condition for all alternatives (FEIS table 10). Effects of the alternatives - including active management and projected natural disturbance regimes - are measured in-part by the degree to which desired conditions are achieved. In other words, the effects of natural disturbances are not ignored in the analysis of effects, but in fact are considered in terms of how they interact with active manangement to result in comparative levels of fire resilient species, large tree abundance, and mosaics of stand structures and densities.
Effects analysis	264	The DEIS is insufficient in the Human Element analysis as needed in CEQ regs and FSM direction.	The preparation of the FEIS was guided by CEQ regulations for implementing NEPA [40 CFR 1500-1508]. NEPA requires that consequences to the human environment be analyzed and disclosed. The social and economic specialist report details the human component of the affected environment and the anticipated social and economic effects from the alternatives.

Category	Commenter ID#	Summary of comments	Summary Response
Effects analysis	265	The Forest Service is violating NEPA and NFMA legal requirements by planning a large scale, ecologically destructive timber sale under the guise of “restoration” that will actually threaten the viability of listed and Management Indicator Species in the project area, and that will potentially violate the Clean Water Act, the Wallowa Whitman Forest Plan, and other relevant statutes.	Our analysis did not find that the activities proposed in this project within any alternative would lead to a negative trend in viability on the Wallowa-Whitman NF. Viability of wildlife species is primarily assessed using the historical range of variability (HRV) concept; comparing current amounts and distribution of habitat to historical conditions. By managing habitat within HRV it is assumed that adequate habitat will be provided because species survived those levels of habitat in the past to be present today. Thus, if we manage current habitats within the range of historic variability, we are likely to do an adequate job of maintaining population viability. This project would not reduce any habitat conditions to below the HRV (FEIS tables 51-55, 70-74). The project is also consistent with the Clean Water Act (FEIS, chapter 4, Effects Common to All Action ALternatives, Water Quality and Temperature).
Effects analysis	225, 243, 266	Lands immediately adjacent to the project area have been adversely affected by intensive management that includes recent clearcuts, herbicide application, trapping, roadbuilding, and grazing. An important function of federal lands is to mitigate for degraded conditions on non-federal lands. The cumulative effects summary for aquatic habitat does not adequately quantify the proposed actions cumulative effects for sediment. The cumulative effects analysis of wildlife was too narrow in scope and scale, and should not have been limited to the project area.	Cumulative effects analyses were improved between publication of the DEIS and FEIS (see FEIS Chapter 4).

Category	Commenter ID#	Summary of comments	Summary Response
Effects analysis	266	The DEIS does not include current best science in its assumptions or analyses regarding the appropriateness or efficacy of thinning with regard to 1) the scientific controversy in determining HRV determinations 2) scientific controversy regarding risks of vegetation manipulation as active “restoration” potentially outweighing the perceived or predicted benefits 3) scientific controversy regarding the effectiveness of logging/thinning treatments for restoration. The DEIS analysis of the alternatives, including the “no action” alternative fails to disclose scientific controversy or use best science in its analysis of fuels treatment effectiveness in controlling future fire severity or risk (Lydersen et al. 2014, Hanson and Odion 2014). The Forest Service fails to disclose the ongoing scientific controversy over their use of “fire condition class” and “fire regimes” to characterize departure from assumed historical range of variability of fire frequency and severity for a particular area.	The estimation of HRV for this project came from Powell 2012, which was a response to the requirement of the Eastside Screens to complete a landscape-level assessment of the historical range of variability for structural stages, including a determination of how existing structural stage percentages compare with their historical ranges. Powell 2012 compiled the best available science to estimated ranges of variation for species composition, structural stages and density classes with the intent to reflect ecosystem properties free of major influence by Euro-American humans, providing insights into ecosystem resilience. In this context, the range of variation estimates were intended to help us understand what an ecosystem is capable of, how historical disturbance regimes functioned, and inherent variation in ecosystem conditions and processes – the patterns, connectivity, seral stages, and cover types produced by ecological systems at a landscape scale. Hence, the HRV estimates used in the LJCRP are based on pre-European settlement natural ecological proceses as a foundation. FEIS recognizes the importance of heterogeneity in disturbance regimes and forest structure, density, composition, and pattern (e.g., Williams and Baker 2012). The FEIS analyzes a range of alternatives, from no action (Alternative 1) to active management of differing extents (Alternatives 2 and 3), and their relative beneficial and adverse effects. Lydersen et al. (2014) is a study of the Rim Fire in Yosemite National Park indicating that moderate to severe fire effects occured under plume dominated conditions regardless of forest conditions, fire history, or topography. TheLJCRP is not designed to mitigate fires occuring under extreme fire weather. Hanson and Odion (2014) describes fire severity in the Sierra Nevada of California. To the extent that this literature is relevant and consistent with the Lower Joseph landscape, it recognizes the role of using wildfire to "restore landscape structure and heterogeneity...as well as fire effects associated with natural diversity." Fire condition class is not used in the project analysis. Fire regimes are broad descriptions of the severity and frequency of this disturbance process. Departure in the LJCRP area is primarily described using forest vegetation

Category	Commenter ID#	Summary of comments	Summary Response
			structural attributes such as density, pattern, and structural stage. The Eastside Screens Amendment to the Forest Plan (Regional Forester's Amendment #2) directed the Forest Service to complete an HRV departure analysis. Disturbances such as fire played a role in creating and maintaing the HRV characteristics on the landscape. As vegetation changes so does frequency and severity of disturbance. Fire behavior modeling (See appendix D) informed the "departure" of severity within the LJCRP area.

Category	Commenter ID#	Summary of comments	Summary Response
Effects analysis	267	DEIS Page 148 says that there are no other vegetation projects planned in the project area for the foreseeable future. This is incorrect. Wallowa County's Lower Joseph Creek Watershed Assessment plans for vegetation projects to be accomplished on the acres not mechanically treated at this time, to be treated in the future (possibly 20 years).	Cumulative effects analyses of projects planned "for the reasonably foreseeable future" include those that have a high likelihood of being implemented. In practical terms, they are projects that have been at least initiated through public scoping. Potential projects included in watershed assessments, but not yet proposed by the Forest Service nor scoped, are not considered to yet be part of "reasonably foreseeable future" projects.

Category	Commenter ID#	Summary of comments	Summary Response
Effects analysis	263	The Forest Service has a legal obligation under NEPA to accurately, scientifically, and objectively describe the environmental consequences of logging and road building in ecologically significant areas. The analysis for this project, including the two developed action alternatives, both degrade undeveloped lands and fail the requirements of the NEPA concerning these requirements, and the requisite disclosure of scientific research and recommendations pertaining to roadless and unroaded areas. Despite the well-established science supporting the protection of roadless areas 1,000 acres or larger along with all ecologically significant roadless areas regardless of size, Alternative 2 would commercially harvest 4,919 acres outside IRAs. The majority of those acres – 4,761 acres – would be within roadless polygons of 1,000 to 4,999 acres. LJCRP DEIS p. 208. Alternative 3 would commercially log 3,607 acres of undeveloped lands outside of IRAs. The majority of those acres – 3,503 acres – would be within roadless polygons of 1,000 to 4,999 acres. LJCRP DEIS p. 234. Furthermore, the analysis of these proposed actions is lacking. The Draft EIS does not recognize the literature that recommends protection of these areas or the impacts to these ecologically significant areas should either alternative move forward.	Parts of LJCRP are designated inventoried roadless areas and are managed under the Roadless Area Conservation Rule. Other parts have no evidence of past management or road building such as PWAs or other undeveloped lands. Effects to intrinsic characteristics of these lands are disclosed in the FEIS. Lands within IRAs still maintain their associated Forest Plan Management Area designations, goals, and, objectivesalong with RACR and agency policy related to IRAs. There are no designated wilderness areas within or adjacent to the LJCRP, and NationalForest System lands are managed under the multiple use objectives outlined in the respective managment plans as amended (Forest Plan or HCNRA CMP). There are no forest-wide or management area standards specific to "other undeveloped lands" (e.g., outside IRAs). It is outside the scope of this project to amend the forest plan for designation of new protected areas that would be free from mechanical treatment. All lands, including other undeveloped lands (OULs) in patches less than 5,000 acres, are managed consistent with forest-wide standards and guidelines and by designated Forest Plan management area allocations. The majority (51%) of other undeveloped lands in the LJCRP fall into management area 3 – Wildlife/Timber emphasis (FEIS, chapter 2, social environment). The objectives for any management actions proposed in OULs in the LJCRP area, regardless of size, do not substantially impair the ecological significance of these areas. System road construction is not proposed in any alternative. "Other undeveloped lands" have intrinsic ecological and social values because they do not contain roads and evidence of past timber harvest. These values are used as indicators for comparison to display effects between alternatives in the FEIS (chapter 4, social environment). Other undeveloped lands are not inventoried roadless areas or potential wilderness areas and therefore are described using different indicators of comparison. The FEIS adequately discloses the environmental impacts of forest vegetation treatments in IRAs, PWAs, and "other undeveloped lands" (FEIS, chapter 4, social environment). A request to change the management direction for areas not

Category	Commenter ID#	Summary of comments	Summary Response
			currently defined as IRAs or Wilderness is better directed to the Forest Plan revision process.

Category	Commenter ID#	Summary of comments	Summary Response
NEPA process	243	The accelerated NEPA process used for this project resulted in abbreviated analysis of road impacts. We think that NEPA must be fully implemented to ensure informed public comment and fully informed decisions. NEPA short-cuts can have adverse ecological consequences if it means that impacts are not fully considered and mitigated and alternatives are not thoroughly explored. NEPA mandates accuracy information and analysis. 40 CFR 1500.1(b).	The NEPA process for this project was faster than the norm due to the establishment of a dedicated interdisciplinary team with no other duties than project planning; and analyses met the legal, regulatory, and policy requirements regarding NEPA analyses. The Wallowa Whitman National Forest is currently undergoing a review of its transporation system for preparation of a Travel Management Plan. The current direction from the Forest Supervisor is to conduct a Roads Analysis on a project by project basis and determine the resulting transportation system that meets forest plan standards and guidelline and consultation requirements. A roads analsysis was conducted for this EIS and the resulting analysis was used to define a range in motor vehicle access and trends towards forest plan standards, and the FEIS meets consultation requirements. The interdisciplinary team met all NEPA requirements of the code of federal regulations. 40 CFR 1500.1.(b) states, "(b) NEPA procedures must insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken. The information must be of high quality. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA. Most important, NEPA documents must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail."

Category	Commenter ID#	Summary of comments	Summary Response
NEPA process	263	In our scoping comments, HCPC “requested an alternative in the pending EIS that does not log within any undeveloped lands.” Neither action alternative (nor any of the alternative considered but eliminated from detailed study) excluded commercial logging activities on undeveloped lands outside of IRAs. By failing to analyze such an alternative the Forest Service failed to meet NEPA‘s requirements to incorporate the best available science and develop a scientifically sound environmentally protective action alternative.	The action alternatives are designed to meet the purpose and need for the project. "Other undeveloped lands" (areas that do not meet potential wilderness criteria, nor were included within inventoried roadless area boundaries) do not have any special management direction beyond that of the underlying management allocation. The FEIS analyzes a range of effects from no treatment in "other undeveloped lands" (No Action alternative) to varying levels of treatment in these areas to meet the project purpose and need (alternatives 2 and 3). Any of these alternatives, or a blended alterantive can be selected for the decision. The analysis follows all NEPA requirements for analysis of the range of effects.
NEPA process	265	The Forest Service fails to analyze the great similarity between European colonist practices that significantly degraded the land, waterways, forests, wildlife, fish, and native plant biodiversity in the project area and the greater Wallowa-Whitman National Forest area and the planned extractive and natural value-degrading activities in the Lower Joseph timber sale, roading, and associated activities.	Current conditions of the LJCRP landscape reflect the long history of human use, and as such, effects of past land management practices are considered within the purpose and need of the project. The purpose and need of the project includes contributing to local restoration economies built on natural resource products. The FEIS analyzes the effects of alternative restoration approaches, which would have varying socioeconomic effects. The design of restoration treatments are largely ecologically-based, and the alternatives are designed to provide a range of alternatives that allow for trade-offs between social, economic and ecological issues and values during the decision-making process.

Category	Commenter ID#	Summary of comments	Summary Response
Consistency with the Forest Plan	262, 265	The proposed action relationship to the Forest Plan is unclear. What is meant by efforts being made “to align wherever possible, desired conditions of the LJCRP with the current Forest Plan, and the DEIS for the Forest Plan revision?" The Forest Plan Revision has not gone through the complete NEPA public process yet and has not been approved. The existing LRMP for the Wallowa Whitman National Forest must be followed for meeting Forest Plan standards and existing Forest Plan direction. (See LJCRP DEIS p. 3)	Chapter 3, and Appendix B of the FEIS clarifies connections between project objectives and the current Forest Plan. The statement "to align wherever possible" indicates consideration of the Forest Plan Revision process and the landscape goals and objectives identified for the Wallowa Whitman National Forest. Exising forest plan standards, guidelines, and direction are being met unless otherwise otherwise stated, or included in a proposed amendment.
Consistency with the Forest Plan	225	The DEIS does not adequately delineate standards and guidelines between the HCNRA and WWNF.	See FEIS Chapter 3, tables 26, 27,and 29, and Appendix B in the FEIS, which shows activity in the HCNRA, other Forest Plan management areas, and associated standards and guidelines by reference.
Other plans	267	You have missed the following documents: Wallowa County Nez Perce Tribe Salmon Habitat Recovery Plan, Wallowa County Comprehensive Management Plan ;Custom and Culture of Wallowa County , Oregon; Wallowa County's Economic Base;Lower Joseph Creek Watershed Assessment, Article 36 SALMON HABITAT RESTORATION known collectively as Wallowa County's local Land use plan.	Page 313 in the DEIS listed key federal and state policies. Between the DEIS and FEIS, we added other plans and policies that are important for the management of the Lower Joseph Creek Restoration Project area (FEIS chapter 3, and Appendix B).
Preferred Alternative	5, 284	The EPA prefers the road-related actions proposed under Alternative 2. They find these to more fully support needed reductions in fine sediment to streams in the planning area. Alternative 2 is a step forward; I hope it will be adopted.	EPA's preference for Alternative 2 is noted.

Category	Commenter ID#	Summary of comments	Summary Response
Preferred Alternative	225	The tribe does not feel that Alternative 2 is the enviornmentally preferable alternative that would best promote the national environmental policy as expressed in NEPA section 101. The Tribe suggest blending specific elements of both alternatives with new approaches to old growth and fire management resulting in an alternative which best protects and preserves historic, cultural and natural resources.	Alternative 3 does not propose commercial harvest in designated old growth (MA-15), RHCAs, PWAs and IRAs, nor does it allow cutting of trees ≥21" dbh; and Alternative 2 approaches Forest Plan road density standards for fish and wildlife. Depending on the comparisons of decision criteria, and ecological, social and economic concerns, the decision-maker can select parts of each alterantive to build the final Record of Decision.

Category	Commenter ID#	Summary of comments	Summary Response
Management Areas and other land areas	225, 242, 243, 259, 260, 263, 265, 266, 268, 285, Form email	We are strongly opposed to management (including commercial and non-commercial logging, prescribed burning, roading, etc.) in Inventoried Roadless Areas, Potential Wilderness Areas, and “Undeveloped lands”, and to commercial-size logging in old growth management areas and any Riparian Habitat Conservation Areas, including category 4 RHCAs. The Lower Joseph Creek Restoration Project proposes to log ~800 acres in MA15 Designated Old Growth Areas, including 50 acres of Moist Mixed Conifer Forest. Logging in these areas runs counter to Forest Plan direction to manage these areas to “maintain habitat diversity, preserve aesthetic values, and to provide old growth habitat for wildlife. In addition, the standards indicate that no scheduled harvest will occur in Designated Old Growth Areas. The Tribe recommends no commercial harvest in IRAs with minimal ground based disturbance.	In Alternative 3, no treatments are proposed in IRAs, PWAs, and MA15, and only non-commercial thinning could occur in category 4 RHCAs outside old forest multi-story and old forest single story structures (OFMS and OFSS) in accordance with the Blue Mountains PDCs. No system road construction is proposed in IRAs or elsewhere under any alternative. Under certain circumstances, management is appropriate and allowed by policy, law and/or regulation in Inventoried Roadless Areas (IRAs), Potential Widlerness Areas (PWAs), designated old growth (MA15), and Riparian Habitat Conservation Areas (RHCAs). The appropriateness of management is determined by specific Forest Plan desired conditions, mangement area direction, and standards and guidelines (as amended, in the case of RHCAs), or policy (in the case of IRAs). PWAs delineate areas that may have wilderness characteristics, but in and of themselves did not meet the standards for proposed Wilderness in the Forest Plan. The site-specific identification of PWAs in the EIS is for effects analysis purposes and does not confer any other management direction than that given in the Forest Plan under the management area(s) for which they are a part. Proposed management in MA15 and RHCAs also adheres to Forest Plan direction, and is intended to achieve goals for restoring old growth characteristics, or riparian mangement objectives, respectively. Active management of MA15 areas is allowed by the Forest Plan if it serves to restore or maintain old forest characteristics. Particularly in the dry forests, habitats for large tree open-canopied associated species is below the HRV. Proposed harvest to create more large tree open-canopied forests may benefit species associated with larger tree structure and open canopies. The prescriptions for these areas are to maintain all trees ≥ 21" dbh, and large snags will be protected. Prescriptions within MA 15 dry forests, are designed to maintain old forest characteristics and to move the areas toward a more resilient state that is more characteristic of the natural conditions in drier environments. Harvesting in MA15s or of trees ≥ 21" dbh is not proposed in Alternative 3. The treatments proposed for MA15 areas under the Modified Proposed

Category	Commenter ID#	Summary of comments	Summary Response
			Action would not be considered "scheduled harvest". "Scheduled harvest" refers to regulated harvest that occurs on a rotating and regular basis for the purposes of timber production. No such harvests are planned for MA15 areas. Additionally, the MA15 designation does not necessarily mean that the current condition of the area is high quality "old forest". The 51 acres of moist forests within MA15 is not currently in an old forest condition.

Category	Commenter ID#	Summary of comments	Summary Response
Management Areas and other land areas	242, 243, 259, 260, 263, 265, 267	I don't understand how the USFS can legally carry out timber sales in a roadless area.	Alternative 2 includes cutting of generally small diameter trees, and some larger trees that have grown-in since the start of the fire suppression era, for the purpose of improving roadless area characteristics as defined in 36 CFR 294.11 (diversity of plant and animal communities). These activities fall within those exceptions provided in the Roadless Area Conservation Rule (RACR) at 36 CFR 294.13(b)(1)(ii) (cutting …generally small diameter timber …to …restore the characteristics of ecosystem composition and structure). The activities also fall within those authorities re-delegated to the Forest Service on October 2, 2009 for the cutting, sale or removal of generally small diameter timber when needed to maintain or restore the characteristics of ecosystem compositions and structure. No new road construction is proposed in IRAs in any alternative. "Undeveloped lands" do not represent a Forest Service management area, but rather a condition, and management falls within the Forest Plan guidance for the respective management area within which it is a part. The FEIS describes how the proposed treatments meet these requirements and encourage forest resiliency and restoration of disturbance processes in the LJCRP. The RACR also requires effects to IRA characteristics to be disclosed. These are disclosed within the FEIS (Chapter 4, IRAs). There would be no road building associated with treatment within any IRA. Access to identified treatment areas is facilitated with existing roads or designated as helicopter yarding.

Category	Commenter ID#	Summary of comments	Summary Response
Management Areas and other land areas	243	Why did you not use Peter Morrison, Susan Snetsinger and George Wooten 1998? (Unprotected Wild Lands In Washington State An Analysis of Their Current Status and Future under Current Management Direction, A report by The Pacific Biodiversity Institute, February 1998 http://www.okanogan1.com/research/roads/Roadless_Report_by_Morrison_et_al_2000.pdf)	This report is focused on Washington State. The LJCRP activites are entirely within the state of Oregon. This report is applicable to the following National Forests as indicated within the report. Roadless Areas in Individual National Forests; Okanogan, Colville, Wenatchee, Umatilla, Kaniksu, Gifford Pinchot, Mt. Baker - Snoqualmie, Olympic.
Management Areas and other land areas	226	We...endorse the work in the Inventoried Roadless Areas that the collaborative discussed. While we were disappointed that commercial harvest was excluded, we still believe that the Forest Service is moving in the right direction and implementing the non-commercial treatments will assist in reducing uncharacteristic fire behavior and will improve the ecological situation of these areas.	The Stand Improvement (SI) treatments within the IRA would reduce the departure between current and desired conditions in terms of species composition, structure, density and pattern as well contribute to a more resilient ecosystem.
Management Areas and other land areas	265	We are supportive of establishing the two Research Natural Areas, which may actually be an appropriate use of site-specific Forest Plan amendments, as opposed to other Forest Plan amendments which would effectively serve to violate existing Forest Plan standards.	Thanks for your support. Forest Plan amendments serve to change outdated Forest Plan direction, or direction not appropriate for a specific case or changed conditions.

Category	Commenter ID#	Summary of comments	Summary Response
Management Areas and other land areas	242, 243, 263, 285, Form email	Under both action alternatives, the Lower Joseph Creek Restoration Project would conduct logging, road building, mechanized activities, thinning, and/or extensive burning in undeveloped and unroaded areas that currently provide ecologically important habitat and refugia. The DEIS fails to accurately disclose and address the ecological importance and actual contiguous roadless extent of these areas, fails to correctly disclose their ecological site-specific conditions, and fails to adequately address the proposed project's logging, roading, mechanized thinning, and other management action impacts upon these areas. The Forest Service failed to adequately disclose the environmental impacts of logging in roadless expanses. The implementation plan (Appendix J) and analysis of small diameter tree removal in IRAs are both incomplete. The FEIS should be sure to provide more complete information in these areas. Some of the proposed activities have the potential to undermine the roadless designation of IRAs.	Additional information has been added to the FEIS (Chapter 4, IRAs/PWAs). The FEIS (Chapter 4, Social Environment) compares the alternatives relative to "undeveloped" lands in the project area. The process used to identify other undeveloped lands is described in the "PWA"/IRA/Wilderness report located in the project record. Human influences have had an impact on long-term ecological processes within these lands particularly through the use of grazing and wildfire suppression. The FEIS, Chapter 4 includes detailed analyses regading this project's effects on the apparent naturalness, degree of solitude, sense of remoteness, aerial extent, and patch sizes of "other undeveloped lands". Alternative 3 addresses concerns about implementing forest restoration activities in IRAs, PWAs, and RHCAs and does not include treatments in these areas. Alternative 1 - the no action alternative - takes a largely passive approach in these areas. The FEIS discloses the social and ecological trade-offs of these management aproaches, and the decision-maker has the space to select an alternative in the record of decision that blends components of multiple alternatives. Inventoried Roadless Area designation and boundaries would not be impacted or changed due to the activies identified in this project. No roads are proposed for construction in IRAs under any alternative.

Category	Commenter ID#	Summary of comments	Summary Response
Management Areas and other land areas	266	All Wild and Scenic values of within the entire project area should be protected from detrimental management impacts. Unfortunately, we are concerned that logging in or adjacent to Wild and Scenic areas will degrade the values associated with Wild and Scenic designation, as well as exacerbate invasive weed issues in these areas (such as the invasive weed issues with cheat grass along Joseph Creek as discussed in the DEIS pg. 76)	The LJCRP incorporates all Forest Plan objectives, standards and guidelines for scenic quality, which together represent the goal to manage all National Forest lands to obtain the highest possible visual quality, commensurate with other appropriate public uses, cost and benefits. The scenery analysis evaluated view sheds from the Wild and Scenic River, and found that treatments in the viewsheds would be in the background, and would enhance scenic quality by restoring natural structure and composition, and increasing landscape stability through the reduced risk of uncharacteristic stand replacement fire (FEIS Chapter 4, Scenery). No treatments are proposed adjacent to the Wild and Scenic River itself.
Management Areas and other land areas	225, 243	Commercial logging and road construction within the National Recreation Area should be discouraged in favor of conservation, reliance on natural processes, and traditional quiet recreation.	HCNRA CMP outlines management areas with specific goals and objectives. Some of these areas do not allow for commercial harvest (such as Management Area 9), and thus do not contain commerical activities or road construction. The intent of this project is to use, to the degree possible natural processes such as fire to restore a resilient landscape. Sometimes this is possible through just using prescribed fire; other times the fire behavior would put underrepresented landscape features such as old trees of seral species, or large trees of any species at greater risk of mortality. The LJCRP action alternatives are compliant with the WW LRMP and the HCNRA CMP, as amended. The inadvertent inclusion of treatment units in MA 9 in the DEIS have been removed from the FEIS.

Category	Commenter ID#	Summary of comments	Summary Response
Management Areas and other land areas	243, 263, 285	Because the Lower Joseph Creek Draft EIS only included areas “5,000 acres or greater or contiguous to an existing wilderness area, or potential wilderness areas in other Federal ownership” (LJCRP DEIS p. 118) in its Potential Wilderness evaluation, it fails to adequately consider the irretrievable impacts of the wilderness qualities of roadless expanses that are functionally contiguous with identified Potential Wilderness Areas (PWA) but under 5000 acres. Together these areas are of sufficient size as to make practicable its preservation and use in an unimpaired condition...Aside from avoiding compliance with Ninth Circuit precedent, the agency’s inventory of potential wilderness areas fails for another reason. The agency excluded 300 feet on either side of forest service system roads and areas with part harvest from consideration for Potential Wilderness. LJCRP DEIS p. 118. The methodology and justification for ruling out these areas was not provided in the Draft EIS or elsewhere in the project record1. Such an approach does not conform with the Forest Service Handbook (FSH), the Wilderness Act, or Congress’ explicit direction. The 300 foot buffer along roads should be rejected in order to comply with the Forest Service’s Planning Handbook which calls for “broad and inclusive” identification of potential wilderness. Region 6 needs to justify why is chooses to apply a 300 foot buffer.	Effects to all these lands (regardless of size) and their intrinsic, ecologic, physical, or biologic values were considered and disclosed in the FEIS. In Lands Council; HCPC; BMBP V. USFS decision regarding the South George Opinion upheld the agency's use of 300 foot buffer in identification of potential wilderness area boundaries. The 300 foot buffer is a specific situation that has mainly been used on the Wallowa-Whitman and Umatilla National Forests. Criteria found in FSH1909.12 Ch. 71, allow for the boundaries of PWA be "locate(d) at prominent natural or semi-permanent human made features to facilitat an easy on-the-ground-identification (emphasis added)." The Forest Service recognizes that the types of development that excludes areas from being included in the PWA inventory such as stumps would not occur on all these acres (particularly in the non-forested lands adjacent to roads). However, to allow for easy identification and to account for the developed character existing in the forested land a 300 foot influence zone was selected. The 9th circuit court of appeals on February 18, 2015 upheld the Forest Service's application of this specific criteria in PWA analysis stating that the Forest Service has complied with NEPA (Lands Council, HCPC, LOWD-BMBP v. USFS). FSH 1909.12 Ch. 71 Wilderness directives effective January 2007 provides the guidance for PWA analysis for the Lower Joseph Creek Restoration Project. Regional direction for implementing 2012 planning rule directives are very clear that the application of the directives is at the Forest Plan level only. The transition language for the planning directives allow us to continue with our current methodologies for forest plan revision, depending on how far along we are in the process (FSM 1920.3(9)(b)). We can apply that same logic to our project planning. The deciding official determined that the LJCRP would continue to use the 2007 directives for PWA analysis due to the timing of notice and comment. The methodology is disclosed in the FEIS.

Category	Commenter ID#	Summary of comments	Summary Response
Management Areas and other land areas	243	The FS Potential Wilderness Area inventory excludes all past harvest even though some past harvest was selective.	Past harvest was identifed in the spatial analysis (GIS) database. This is the best available information and maps we currently have to determine the extent of past harvest that is still evident. Aerial photo interpretation, personal communication, and field exams were utilized to verify that past harvest areas still contained developed features (stumps, skid trails, etc) that are substantially recognizable and thus would be excluded from the PWA inventory. Only harverst that occured post 1971 was considered in this analysis, although there is a long history of logging that extends much further back in time (such as railroad logging).
Management Areas and other land areas	226, 244	Please explain how the treatments fall in to the forest plan management areas, for example, what percentage of the treatments are in MA 15 and what percentage are in timber emphasis areas? The amount of commercial logging broken out by management area or by logging system was not specified.	The FEIS clarifies the distribution of management areas across the project area, treatments across management areas, and the distribution of logging systems (FEIS Tables 26, 27, 29, 50, and 69).
Management Areas and other land areas	226	I am encouraged by the Forest Service's approach to this project to do what is right for the land regardless of the administrative designation of the land base. It is important that the Forest Service continue to recognize that administrative designations do not protect the land from uncharacteristic disturbance.	The project design is consistent with all land designations, as specified in the existing Forest Plan, HCNRA Comprehensive Management Plan, and the Roadless Rule.

Category	Commenter ID#	Summary of comments	Summary Response
Management Areas and other land areas	243	We have provided documentation to the Forest Service and members of the collaborative group demarcating and explaining what we call our Citizen Roadless Inventory and what has also been called “other unroaded areas.” An interactive statewide map can be found at http://www.oregonwild.org/explore-oregon/oregon-wild-map-gallery. By whatever name they are called, we generally define these areas as those that meet the IRA criteria set forth by the USFS but applied to areas over 1,000 acres. They are generally in fairly good shape with no substantial/obvious logging, development, or roads.	The citizens roadless inventory contains areas that overlap inventoried roadless areas, potential wilderness areas, and other areas where evidence of logging, road building, or harvest are not recognizable. It also contains areas that contain roads and other improvements (roads, skid trails, stumps, etc) that exclude it from consideration in the PWA inventory (FSH 1909.12 Ch. 71). Affects to areas identified in this "citizens unroaded" map have been analyzed in the FEIS (chapter 4, Social Environment).
Management Areas and other land areas	226	Boise Cascade does not support the use of the maps created by Oregon Wild to determine unroaded/undeveloped areas within the project area. The methodology behind the creation of these maps is flawed and…The Forest Service has identified a suite a of treatments that are scientifically based and show a need to actively manage the landscape to increase habitat suitability, decrease fire danger, and increase economic activity.	The FEIS (Chapter 4, Social Environment) compares the alternatives relative to "undeveloped" lands, and areas identified by Oregon Wild as "unroaded" in the project area. The process used to identify other undeveloped lands is described in the "PWA"/IRA/Wilderness report located in the project record.
Management Areas and other land areas	263	Joseph Canyon roadless area meets the inventory criteria for areas with wilderness potential. Logging in these areas will degrade potential wilderness characteristics - characteristics which the agency is responsible for preserving.	Portions of the Joseph Canyon IRA do meet inventory criteria for Potential Wilderness. However, portions that include existing roads and evidence of past harvest do not meet these criteria. Affects to Potential Wilderness character and size are disclosed in the FEIS.

Category	Commenter ID#	Summary of comments	Summary Response
Management Areas and other land areas	225, 265	We support the LJCRP in establishment of two RNAs. This is an appropriate use of site-specific Forest Plan amendments.	Establishing the two RNAs as part of the LJCRP would serve to implement Forest Plan direction, establish a locally-relevant control site for improving our understanding of invasive species spread, grassland productivity and diversity, and other resource values, and increase NEPA efficiency relative to the establishment of RNAs proposed in Forest Plans across the Region in general.

Category	Commenter ID#	Summary of comments	Summary Response
Purpose and need	243, 265, 266	We ask the Forest Service to drop this project as it stands due to it being obviously conflicting with ecologically sound restoration goals, wildlife and fish species' habitat needs for biodiversity, and sound forest management in general, including the need to protect de facto wilderness in roadless areas, potential wilderness areas, and undeveloped lands for wildlife, water quality, fish, and future generations of people--including indigenous peoples' treaty rights, and to slow climate change by sequestering carbon. The project proposal to log thousands of acres- including in Designated Old Growth Areas, Moist Mixed Conifer forests, RHCAs, Roadless, Potential Wilderness, and undeveloped lands- does not align with and will not address the primary threats and stressors to ecosystem health. Regardless of vegetative condition relative to historic frequency, the primary threats to ecosystem integrity and forest health are continued grazing, road related impacts, and impacts from logging. We encourage the Forest Service to broaden these efforts to include range management, fish passage, road densities, weeds, carbon storage, etc. The FS should consider conducting a "critical element/function analysis" may provide insights to determine what features of the ecosystem are most in need of restoration. The FS might look at soil fertility, beaver habitat, hydrological function, standing and down dead wood, extirpated or otherwise sensitive species, nitrogen fixation, soil function and composition, distribution of old and mature forests.	Given the relatively large geographic scale, the purpose and need for this project was narrow and focused on restoration of forest composition and structure toward a more resilient condition, and access management. Range and invasive species management was not included in the project's purpose and need, although the project does include project design criteria to address prevention or mitigation of adverse effects to these resources. Both action alternatives propose improvement of aquatic organizsm passage at 6 locations. This project does not preclude analyses of other projects in the same area with different objectives. The purpose and need, proposed action, modified proposed action and Alternative 3, as described and analyzed in the FEIS, is in keeping with policy, law and regulation, as well as the treaty rights of the Nez Perce Tribe. Hence, there are no policy, legal, or regulatory justifications for dropping of this project from the Forest Service's program of work. Further, the Forest Service has engaged the public on the purpose and need for the project, and has been working closely with the Wallowa Whitman Forest Collaborative, which represents a broad group of stakeholder groups and is open to the public. The action alternatives follow ecologically sound restoration goals that have broad scientific agreement (e.g., Franklin et al 2014). Proposed Forest Plan amendments are specific, and have ecologically, and scientifically based justifications (see FEIS Chapter 3). Project-specific climate change mitigation strategies of carbon sequestration have not been institutionalized as an agency policy, beyond goals to restore and maintain ecosystems that are resilient to disturbance, and thus do not lose carbon storage to uncharacteristic fire. Ecologically-based forestry practices can increase the ability of forests to sequester atmospheric carbon while enhancing other ecosystem services, such as improved soil and water quality. Ensuring adequate regeneration and improving forest health through thinning and prescribed burning are some of the ways to increase forest carbon in the long run. Harvesting and regenerating forests can also result in net carbon sequestration in wood products and new forest growth. The appropriateness of carbon sequestration strategies that

Category	Commenter ID#	Summary of comments	Summary Response
			represent a departure from natural forest structure and composition must be weighed against the risk of carbon emissions through uncharacteristic fire. The proposed treatments are designed to move the forest closer to desired conditions regardless of where it is on the landscape. The effects to disturbance regimes (change in stressors to forest health) are disclosed in Chapter 4 of the FEIS. The FEIS analyzes the effects of the alternatives on soils, hydrologic function, standing and down dead wood, sensitive species, and distribution of old and mature forests, and these effects will in-turn inform the final decision. The need to increase the distribution of old and mature forests toward the historic range of variation is already included as one driving force for the alternatives. USFS project planning policy does not require the analysis of re-introducing extirpated species. The pupose and need of this project was published for public comment in January 2014, and the factors mentioned did not rise to the level of significance needed to change the purpose and need, nor analyze alternatives to make these factors the driving force behind restoration.

Category	Commenter ID#	Summary of comments	Summary Response
Purpose and need	265	The DEIS fails to adequately explain through analysis how the either of the action alternatives would actually meet this restoration purpose and need, given the excessively damaging scale and intensity of planned logging, roading, and other proposed activities. How would further logging and roading degradation of the landscape aim “to maintain healthy and restored conditions for future generations?” (DEIS p.5) How will wildlife and fish species dependent on more variable, dense, large tree, LOS, or intact and large relatively pristine habitat survive this proposed large timber sale’s impacts to hydrology, streams, forest canopy, wildlife corridors, large tree structure, Late and Old structure forest, Dedicated Old Growth Management Areas, Inventoried Roadless Areas, Potential Wilderness Areas, and Undeveloped lands in the near, intermediate, or long-term?	The FEIS includes analysis topics and corresponding indicators specific to the vegetation resource and disturbance regimes (fire, insects and disease; Chapter 4). These analysis topics have been tracked throughout the effects analysis in order to address whether, or to what degree, the project meets purpose and need objectives. The effects analyses in the FEIS demonstrate the relative attainment of the project purpose and need by alternative. The action alternatives vary in their attainment of the purpose and need. Both action alternatives reduce departures between current and desired forest structure, composition and pattern, to different degrees. The No Action alternative, in fact, harbors the greatest risk of further landscape degradation through the loss of high value resources to the likely continuation of uncharacteristic fire and insect disturbances. None of the alternatives reduce the amount of LOS structure or wildlife corridors, and treatments proposed in IRAs and PWAs in the modified proposed action are aimed at restoring resilient structure and function. None of the alternatives proposed road construction, and the modified proposed action serves to reduce road densities to within or toward Forest Plan standards for fish and wildlife habitat.

Category	Commenter ID#	Summary of comments	Summary Response
Purpose and need	4, 264	Rework the Purpose and Need statement to be concise and detailed enough so that you agency can meaningfully develop and analyze alternatives. The LoJo project is also about maintaining and enhancing natural resource dependent lifestyles. Also include providing economic and social contributions as part of you purpose and need. Please redraft this P&N so that it is conscies and defendable and ensure that it clearly identifies wood products, including but not limited to mechantable sawlogs, to focus at least a portion of this project on timber and wood products production. Are there less sensitive areas for timber sales that will provide jobs and raw materials?	The purpose and need of the project is determined by Forest Service leadership at the start of a project, and lays out the sideboards for subsequent environmental analyses. Relative timber production was one of many decision criteria. The FEIS discloses the relative social and economic effects of the alternatives, and will be used by the decision-maker in determination of the selected alternative. Please see the Purpose and Need in Chapter 1 of the FEIS. The LJCRP would implement a suite of restoration activities that are intended to make the LJCRP landscape more resilient to uncharacterisitc disturbances and climate change thus helping to protect sensitive areas within the LJCRP analysis area. Jobs and raw materials will be an additional benefit of restoration activities and the analysis indicates that they are not mutually exclusive (See Chapters 3 and 4 of the FEIS and Appendix J for the Project Design Criteria and Best Management Practices).
Purpose and need	5, 242, 262	Larger size and scope of project area is correct. This landscape means a lot to me. I think it should be managed with ecological integrity as the top priority. I would like all resources protected and managed to encourage resilience yet maintain heterogeneity and key natural processes such as wildfire and their inherent diversity across the landscape. The absence of resource management has had a catastrophic impact on fuel loads and consequent fires.	Chapter one in the DEIS discusses the the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. The desired conditions listed in chapter 1 are very much in sync with the topics highlighted in this comment such as resiliency, heterogeneity, diversity and fire as a key process across the Lower Joseph Creek landscape.

Category	Commenter ID#	Summary of comments	Summary Response
Purpose and need	242	For Lower Joseph Canyon to be effective, the proposed thinning and fuel reduction program will need to be repeated at frequent intervals over wide areas. This will result in simplification of stand structure and a reduction in biodiversity. Forests of mixed ages and species composition are generally not subject to complete defoliation because native insects have discrete numbers of hosts. As a result, the growth of ponderosa pine increases when spruce budworm attack grand fir, and the reverse happens when Pandora moth attack pine in a stand of mixed composition (Speer et al. 2001). There are similar advantages to multi-species stands when it comes to diseases, as outlined in a recent publication on 'Managing insects and diseases of Oregon Conifers' (Shaw et al. 2009). The disadvantages of repeated thinning and slash disposal need to be considered particularly in the mixed conifer type.	The proposed action in the LJCRP DEIS covers a discreet spatial and temporal scale. Future planning for this particular landscape beyond this proposed action has not been accomplished nor has the need for repeated thinnings been determined. The post treatment stand structure and species composition for the project area is disclosed for each alternative in Chapter 4 of the FEIS. Our analysis shows that the action alternatives would increase diversity of forest structure, composition, and density within both moist and dry potential vegetation groups and move the landscape toward the desired conditions. As for current multispecies stands that are proposed for treatment, the treatment design would not eliminate any species from those stands. The design is to favor ponderosa pine and western larch wherever that opportunity exists within the treatment units. This is consistent with the desired conditions.
Purpose and need	265	"Uncharacteristic" disturbance from wild fire, insects, and disease needs to be demonstrated to be actually uncharacteristic. The Lower Joseph DEIS does not appear to substantiate the claim that there is an "uncharacteristic" level of disturbance from wild fires, insects, or disease within the project area. (See DEIS p. 26, 1st par.)	Table 6 of the FEIS is derived from fire behavior modeling predicting the existing fire severity. The desired/historical fire severity is derived from expert opinion and literature used to produce the information and data under the Landfire effort. Fire behavior modeling considers current fuel and vegetation conditions with actual sampled weather data as described in FEIS Appendix D. The results are not related to the most severe weather days but are distributed across the entire "burn season" therefore they are a more reasonable representation of expected fire severity. Table 6 shows that fire severity and effects to overstory vegetation is not characteristic of historic or desired conditions, therefore it is currently uncharacteristic.

Category	Commenter ID#	Summary of comments	Summary Response
Purpose and need	265	There is scientific controversy over assumed fire suppression effectiveness and assumed mature tree “encroachment” due to fire suppression that is not disclosed or analyzed in the Lower Joseph DEIS.	Fire suppression in the Blue Mountains has been effective enough to lead to the well established trends in forest change described in Hessburg et al 2005, Hessburg and Agee 2003, etc.

Category	Commenter ID#	Summary of comments	Summary Response
Forest Plan amendments	225, 243, 263, 265, 266	We can agree that there may be limited circumstances under which it may be desirable to remove large-young shade-tolerant trees in order to protect large-old shade-intolerant trees that are even more important. These circumstances are uncommon. In order to preserve public trust, the plan amendment allowing removal of such trees much be very carefully crafted to focus on appropriate ecological circumstances, such as when the crowns of the trees are touching. There is concern about setting precedent for Forest-wide implementation of Forest Plan amendments. The rationale for amending the Eastside Screens is not unique. It is nearly identical as the rationale used on the Snow Basin Project and the other fourteen projects on the Wallowa Whitman where the wildlife portion of the Eastside Screen was amended. Even the Lower Joseph Creek analysis acknowledges that the amendment is needed to address conditions within the Lower Joseph Creek Restoration Project area that are similar to the regional examples that the Regional Forester provided in her 2003 letter referenced by the Lower Joseph Creek analysis and by a regional forest management field guide: Restoration of Dry Forests in Eastern Oregon: A Field Guide (Franklin et. al. 2013). Because these amendments are addressing conditions that occur elsewhere on the Wallowa-Whitman National Forest, they are not site-specific. In order to move forward with the proposal to log in LOS stands below HRV and remove trees 21 inches and greater, the Wallowa-Whitman National Forest must prepare a forest-wide amendment.	The alternatives analyzed in the FEIS include Alternative 3, which does not propose cutting of trees >21". Laws and regulations applicable to project planning acknowledges that our understanding of ecosystems can change with new information, and thus allows for the amendment of out-dated policies and direction, or for changed conditions. Forest Service guidance for implementation of the Eastside Screens explicity requires a landscape assessment of the range of variability of forest structure and composition, and a comparison to current conditions. Proposed Forest Plan amendments are based on these analysis, and represent project-specific needs for forest restoration (see FEIS Chapter 3 for the rationale for proposed Forest Plan amendments).The Forest Plan amendments proposed are project specific, appropriate for this unique landscape and restoration need, and not intended for application Forest-wide. Project specific amendments must be just that - specific to the project. Amendments elsewhere would not be justified by the fact that they were implemented in the LJCRP. The rationale for amending the Eastside Screens for the Lower Joseph Creek Restoration Project is site-specific, addressing specific conditions of species composition and forest structure observed on the unique landtype associations and emergent disturbance regimes of the landscape, and compared to historical references that have been integrated into Forest policy (FEIS, Chapter 3, Forest Plan Amendments). Site specific analysis of current conditions in LOS stands relative to the historic reference shows an overabundance of high density, multi-layered LOS conditions, and an underabundance of single story, low density LOS conditions. Vegetation treatments in LOS within the project area will not reduce the overall abundance of LOS conditions, but rather redstribute conditions between overabundant and underabundant states. We agree that implementation of a Forest Plan amendment for the cutting of trees >21" in diameter will be relatively rare across the landscape (it is estimated that about 15% of trees ≥21" dbh in harvest units coud be cut; see Vegetation and Disturbance specialist's report). The proposed Forest Plan amendments have been

Category	Commenter ID#	Summary of comments	Summary Response
			carefully crafted to be ecologically-appropriate. Any prescriptions that lead to the cutting of trees >21"in diameter are based on ground-based evidence of tree patterns within stands. Whether the Wallowa-Whitman National Forest does or does not develop a forest-wide amendment to the Eastside Screens is not within the purvue of this project.

Category	Commenter ID#	Summary of comments	Summary Response
Forest Plan amendments	226, 243, 265	Please explain the Forest Plan Amendment for Alternative 2 regarding Old Forest; is this amendment to work in Designated Old Growth or is it an amendment just to work in LOS? Why do you need an amendment to work in LOS if there is no net loss of Old Growth?	The forest plan amendment proposed for Alternative 2 and 3 applies to the entire project area, regardless of management area designation. Scenario A of the Eastside Screens wildlife standard allows timber harvest activity in LOS under two circumstances: 1. To transform some portion of an LOS component that is within or above HRV into an LOS component that is deficient (e.g., transforming old forest multi-story stands into old forest single story); and 2. To maintain or enhance existing conditions in LOS stands within or above HRV. The LJCRP proposed action treatments in LOS are designed to transform old forest multi-story conditions (which is above HRV in the project area), into old forest single story, which is below HRV. The proposed action includes thinning about 30 acres in old forest single story conditions (out of a total 200 acres) to maintain or enhance existing conditions. According to the Eastside Screens Scenario A, this objective is permissible for old forest multi-story conditions because it is within HRV, but it is not permissible for old forest single story conditions because abundance of this structure is below HRV. Therefore, a Forest Plan amendment is needed to accomplish this objective. This treatment would not change conditions from an LOS class, but would serve to restore more resilient structure consistent with natural disturbance regimes. This proposed treatment meets the intent of Scenario A because there would be no net loss of LOS as a result of proposed treatments. The understory thinning treatments proposed for these stands are designed to address species composition, stand density, insect susceptibility, climate change adaptation, and fire risk considerations. The FEIS, Chapter 3 describes the rationale for the proposed amendment to treat 25, and 20 acres in Alternatives 2 and 3, respectively that are currently in an OFSS condition, but are trending toward a multi-story condition.

Category	Commenter ID#	Summary of comments	Summary Response
Forest Plan amendments	225, 263, 266	The Wallowa-Whitman has approved at least fifteen site-specific amendments to the Eastside Screens item 6d, Scenario A since they were adopted. Despite these collectively significant actions, the cumulative impacts analysis for the Lower Joseph Creek Restoration Project fails to acknowledge the cumulative effects of the proposed site-specific amendments to the Eastside Screens. The problem is that the amendment to the Forest Plan in the Lower Joseph Creek Restoration Project area is not an isolated amendment to the protections that are in place for live old growth trees.	The cumulative effects (FEIS, Chapter 4, Cumulative Effects), and Forest Plan amendment (Chapter 3) sections have been greatly improved in the FEIS. The FEIS analyzes whether there are vegetation management or prescribed burning activities ongoing or planned for the foreseeable future within the project area (Chapter 3; section "Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis"). A forest-wide cumulative effects analysis for Eastside Screens was completed between DEIS and FEIS, and is included in the FEIS. State-and-transition modeling for the project area and the WWNF as a whole also showed that, given no action, more large trees (>20”) would be lost to fire over a 30-year modeling scenario than would be cut or lost to fire under the action alternatives, or, for the WWNF as a whole, if current rates of forest management activity continued into the future (FEIS Appendix C). The statement on pg 213 of the DEIS was one contradiction to many other statements made throughout the document about prescribed burning activities that are foreseeable in the future. This contradiction is corrected in the FEIS. Additional cumulative effects analyses regarding site specific amendments to the Eastside Screens follow USFS Region 6 direction, and are included in the FEIS.

Category	Commenter ID#	Summary of comments	Summary Response
Forest Plan amendments	243, 265	There is nothing in the rationale given for removing trees greater than 21” dbh (DEIS pp.27-28) that identifies specific sites where this is considered necessary or explains the scientific method (with the relevant citation) for determining that a tree is “generally competing with a desirable tree.” (DEIS p.27) What does “generally competing” mean?...There is no scientific support given for the assumption that the younger trees actually “need” to be removed “based on the need to restore HRV in stand pattern and characteristic fire regime dynamics.” (DEIS p.27) Further, stand pattern and characteristic fire regimes are landscape scale dynamics, not site-specific problems.	The FEIS discloses the rationales and effects of amending the Eastside Screens (see FEIS chapters 3 and 4). The proposed amendments and their rationales are consistent with current agency policy.One of the core principles for LJCRP is to retain and release old trees (FEIS Appendix J - Project Design Criteria). Franklin et. al. 2013 recommends that younger trees and other competing vegetation should be removed from the vicinity of older trees to reduce competition and for water and to reduce ladder fuels which could spread fire into the canopy of older trees. The FEIS has been improved in its discussion of the site-specific need for Forest Plan amendment to cut trees > 21"dbh, and to treat old forest single story stands (FEIS Chapter 3), and includes a map of areas where this amendment would occur.
Forest Plan amendments	5	What is the validity of Eastside screens, contract provisions and harvest in RHCAs?	The use of PACFISH, Eastside Screens (Forest Plan Amendments) and contract provisions is intended to protect those resources that the Forest Plan Amendments were set forth to protect. With site specific data, the Amendments can be adjusted to address long term goals of restoration if meeting the objective of the Amendment. Site specific data was used to validate the need for treatment to both protect and restore those resources.
Forest Plan amendments	226	Boise Cascade supports the Forest Plan amendments as detailed in the DEIS because the NFMA provides abundant discretion for the Forest Service to amend their plans "in any manner whatsoever." We believe that these amendments make sense for the project given that an arbitrary diameter limit such as the 21" limitation limits the ability of the Forest Service to achieve the desired conditions, composition, and structure for the Lower Joseph Project area.	The design of prescriptions for cutting of any trees >21” would be based on the desire to restore forest structure and composition toward reference conditions (HRV), particularly to increase the abundance of shade-intolerant tree species (ponderosa pine and western larch), reduce the risk of uncharacteristically severe fire and insect and disease outbreaks, and increase resiliency to natural disturbance and climate change (FEIS Chapter 3).

Category	Commenter ID#	Summary of comments	Summary Response
Alternatives	225	The Tribe encourages protecting watersheds by developing a new alternative that blends elements of the Proposed Modified Action Alternative (Alternative 2), and Alternative 3 with more moderate treatments in old growth management areas and a more thoughtful approach to prescribed fire. This new alternative would result in a less aggressive harvest treatment (especially in old growth areas), no removal of trees >21" DBH, a minimum 100 foot no-harvest buffer in category 4 streams, a decrease in overall road density, larger elk security areas, more focused burning, and no timber treatments in inventoried roadless areas (IRAs), potential wilderness areas (PW As), or in any category of riparian habitat conservation areas (RHCAs).	Most of this comment can be dealt with as a blended alternative during development of the Record of Decision. Alternative 3 does not propose commercial harvest in designated old growth, RHCAs and IRAs, and Alternative 2 approaches Forest Plan road density standards for fish and wildlife. The FEIS will better clarify how the treatments are designed to meet forest plan desired conditions for wildlife. The implementation guide is not a prt of the EIS. Specific to the treatment design for designated old forest (MA-15) - Alternative 3 foregoes treatment in MA-15 and would leave the existing condition intact. Treatments proposed in MA-15 under Alternative 2 were designed to be conservative. For example: no trees 21" and larger would be removed; changes in density would be low to moderate (none of the treatments would result in a low density class where it doesn't already exist). Leaving an overall denser condition increases the number of replacement trees available when the old trees complete their life cycle. These treatments are also designed with improving resiliency of the old trees and old forest structure to insects, fire and climate change in mind. Proven techniques for improving resiliency of old trees include reducing crown competition and increase growing space adjacent to the old trees.
Alternatives	225	The Tribe suggests blending specific elements of both alternatives with new approaches to old growth and fire management resulting in an alternative which best protects and preserves historic, cultural, and natural resources. On such a large landscape scale, the 100,000 acre LJCRP needs more watershed restoration work proposed instead of forest restoration through prescription harvests.	The action alterantives have the same level of protection of cultural and historic resources. Given project design criteria, the closer we are to moving toward RV, the greater the reduction in risk to natural resources. Proposing more watershed restoration work is outside ther purpose and need of this project. A blended alterantive to address concerns can be addressed duriing development of the Record of Decision.

Category	Commenter ID#	Summary of comments	Summary Response
Alternatives	263	The composition of the two Lower Joseph Creek action alternatives is strange. The Proposed Action would log in ecologically sensitive areas but take a more reasoned approached to managing roads. Alternative 3, drops some of the roadless area logging but would defer to Wallowa County on how to manage the road system. Neither alternative would fulfill the Forest Service obligations and duties under the National Environmental Policy Act (NEPA), the National Forest Management Act (NFMA), or other relevant statutes and regulations. HCPC suggests blending elements of both alternatives and include new approaches to managing ecologically significant roadless areas outside of IRAs and PWAs, old growth forests, and RHCAs to result in a decision that better protects and preserves the resources within the project area.	The Proposed Action emphasizes active ecological restoration, including forest restoration toward more natural ranges of variation, and reductions in road density toward Forest Plan standards for the benefit of fish and wildlife habitat. Alterantive 3 aims to achieve ecological restoration to the degree possible given two primary social values: desires to not actively restore certain areas (Inventoried Roadless Areas, Riparian Habitat Conservation Areas, Potential Wilderness Areas), and desires to not actively restore road-related degradation of wildlife and fish habitat so as to provide more public road access. It is not clear what is meant by "ecologically sensitive areas", since areas like IRAs, PWAs, and RHCAs are not defined by "ecological sensitivity". However, since these are the areas not actively treated in Alternative 3, we assume that these are the types of areas being referenced. Vegetation treatments in either alternative would be ecologically- and scientifically-based, and would follow Forest Plan Standards and Guidelines, as well as national best management practices to ensure protection of species diversity, fish and wildlife habitat, soil, water, traditional cultural values, and other resources, while facilitating more natural ecological processes. The no action alternative effects analysis discloses that there can be adverse effects of doing nothing to reverse human-caused departures between current conditions and ranges of natural variability. The NEPA analysis for this project follows NEPA, NFMA and other relevant laws and regulations. The comment is not specific enough to respond more directly about which sections of these laws and regulations the commenter is referencing.

Category	Commenter ID#	Summary of comments	Summary Response
Alternatives	265	There is still an insufficient range of alternatives in that there is no action alternative we could support, as there is none that significantly reduces the volume and scale of proposed commercial logging and also significantly reduces the amount of planned excessive road construction and reconstruction.	The range of alternatives in the FEIS covers wholy passive restoration with no commercial nor non-commercial tree harvest (No Action alternative) to active restoration to meet the project purpose and need. The range of alternatives is adequate to address the range of effects of any of these selectable alternatives.
Alternatives	265	The reasons given for rejecting “alternative 4”, which remains largely unclear, are vague and confusing. Was this an attempt to better protect “resources” than Alternative 2 would do? Was it an attempt to keep more roads open under Alternative 2? Why would another alternative not be developed at the DEIS stage? Accelerated time frames and NEPA “efficiencies” are not legal requirements, whereas a full range of alternatives is a legal requirement under NEPA. Clearly Forest Plan direction is not respected in Alternative 2 (and to a lesser extent, not fully in Alternative 3) so Forest Plan direction can not necessarily substitute for any proposed increased ecological protections for Alternative 2.	"Alternative 4" was considered but eliminated from further analysis because its components were already considered as part of Alternative 2. Discussion of this rationale has been clarified in the FEIS. A full range of alternatives was analyzed relative to the identified purpose and need for this project, as published in the Federal Register in January 2014. All Forest Plan direction has been followed, except where specifically described in proposed Forest Plan amendments.
Alternatives	226, 264	Please develop an alternative - based on the key issue of economic and social need - that maximizes wood products, including merchantable saw logs, generated for local and regional economies. Remember, if we are going to “create resilient ecosystems” we have to find a feasible way to pay for it.	Maximizing income and the amount of sawlogs were not a part of the purpose and need for this project, as idenified by Forest Service leadership. Hence, the suggested alternative is outside the scope of this project. Timber volume production was one of many decision criteria used to assess the relative effectiveness of each alternative in meeting the purpose and need. The FEIS discloses the relative social and economic contributions of each alternative (FEIS chapter 4, Socioeconomics).

Category	Commenter ID#	Summary of comments	Summary Response
Alternatives	242	I suggest another alternative that responds to the ecological trade-offs of road reconstruction and temporary road building.	The range of alternatives, and comparisons of their relative effects in the FEIS covers the ecological trade-offs between road reconstruction and temporary road construction (none in the No Action alternative compared to 12.6 and 82.6 miles of temporary road construction and road maintenance/reconstruction in the action alternatives, respectively (see chapter 4, wildlife, aquatic habitat, physical environment sections).
Alternatives	243	To earn broad public support and better achieve legitimate restoration goals, we encourage the Forest Service to broaden these efforts to include range management, fish passage, road densities, weeds, carbon storage, etc	Resource concerns are analyzed in the FEIS and provided for in Forest Plan standards and guidelines, project design criteria (FEIS Appendix J), and policy, regulation, and law. The LJCRP includes improvement of 6 aquatic organism passages in both action alternatives. The alternatives vary in the degree of road closures, with Alternative 2 moving the landscape closest to Forest Plan road density standards. A number of project design criteria (FEIS Appendix J) address management of non-native invasive plant species, and prevention of invasive species expansion. The FEIS also describes effects on carbon storage. Range management is outside the scope of this project.
Alternatives	265	We are in favor of reducing open road densities to Forest Plan standards or better, but not as a side benefit to appease us into accepting an ecologically devastating timber sale. The Forest Service should focus on restoring ecological conditions degraded by past management (including the use of passive restoration and protection measures) without adding more damage from logging and roading.	The selected alternative for the project decision can combine components of multiple alternatives analyzed in the FEIS, including any actions analyzed within ithe range of effects. The range of alternatives include the No Action alternative, which almost exclusively uses "passive" forest restoration (other than fire suppression), and two action alternatives, which apply active forest management to 24-37% of the project area and largely use passive restoration on the rest (other than prescribed fire). The range of alternatives also assessed the effects of open road networks ranging from 170 to 230 miles. The decision-maker can select any of these alternatives or a blended alternative.

Category	Commenter ID#	Summary of comments	Summary Response
Collaboration	226, 243	Given that the Wallowa Whitman Forest Collaborative is a relatively new group in a challenging ecological, political, and social landscape, the aggressiveness of the project has strained nascent trust and common ground. For this project to be a success, for the greater and long term good of the landscape, the Collaborative, its members, and all stakeholders, we urge the Forest Service to constrain its decision to those parts of the project that have the full support of the Collaborative and other stakeholders. Boise Cascade supports the Wallowa-Whitman Forest Collaborative consensus positions on the Lower Joseph Watershed Restoration Project. We hope that the Forest Service takes these proposals seriously when making the final decision about this project.	The positions of the local collaborative, Nez Perce Tribe, Wallowa County, other agencies, and general public will be taken into consideration as part of the Record of Decision. Collaboration with the WAWFC has been an ongoing and integral part of the planning process since this project was initiatied. The range of alternatives analyzed in the FEIS cover the positions included in the draft consensus of the WAWFC (the draft consensus document is included in the project record).

Category	Commenter ID#	Summary of comments	Summary Response
Collaboration	226, 230, 243, 244, 285	When conditions prompt the consideration of road closures or decommissioning, I recommend the U.S. Forest Service utilize a site specific collaborative process in coordination with the local County Government, involving all interested stakeholders to determine a solution that maintains motorized public access as well as meeting resource protection goals. Roads are extremely important for the future needs of both the communities and forest health. Roads are important for recreation, timber harvest, and fire management on the landscape. Boise Cascade supports a road system on the landscape that will meet all of these needs. This may entail road closures and obliteration to mitigate environmental damage done by roads, but we strongly encourage the Forest Service to work with stakeholders to address the roads issues. We also strongly encourage the Forest Service explore seasonal closures prior to obliteration of roads. The Wilderness Society...objects to the reference in the DEIS to the road network meeting "public access needs as identified by Wallowa County." Since the travel management plan for the Wallowa-Whitman National Forest appears to be in limbo for the immediate future, it is inappropriate for the Forest Service to appear to be giving "access needs ... identified by Wallowa County" any particular weight in projects like the Lower Joseph project. It is...clear that the road network proposed under Alternative 3 is entirely insufficient to meet the standards of Subpart A since it appears to be based on one factor alone: public access, as determined by a very small interest group.	Developing land management projects collaboratively is a desirable and worthy goal. The interdisciplinary project planning team engaged the general public, Wallowa County, Nez Perce tribe, and the Wallowa Whitman Forest Collaborative (which is open to the public) throughout development of the project. Wallowa County is a cooperating agency on this project, and through a detailed site-specific assessment, provided the best available information on the levels of actual public use of the existing road system. The use of the best available information in the development of alternatives does not result in the weighting of any one alternative relative to the final decision. The final decision uses the relative effects on ecological, social and economic decision criteria (FEIS, chapter 4). Opportunities for the public to provide input were provided through formal comment periods, public meetings and field trips. The process was as collaborative as possible, given administrative, procedural and resource constraints, and the willingness or availability of interested parties to engage in collaboration. However, providing oportunities for collaboration does not mean that all interested parties will be represented. The NEPA process requires that any interested party will have the opportunity to provide input on a project, regardless of their availability or interest to engage in site-specific collaboration. Road management was determined to be a significant issue for this project because the conflicting concerns raised during public scoping could not be rectified under the proposed action. Hence, this conflict led to the development of alternatives and analysis and comparison of effects of a range of alternatives representing the range of road concerns. The alternatives attempt to incorporate various sources of input - from collaboration, formal comment periods, consultation with the Nez Perce tribe, working sessions with Wallowa County, and other means - to be able to assess the trade-offs between road network options. In preparation of the FEIS, the project planning team considered seasonal closures of roads; however, the negative effects of open roads on elk and other wildlife species is not seasonal. Also, the road denstiy standards in

Category	Commenter ID#	Summary of comments	Summary Response
			the Forest Plan are a year-long standard which is consistent with the best available science of this issue (FEIS, chapter 4, Wildlife). Since 2007, the Wallowa-Whitman National Forest has been building the Travel Management Plan (TMP) for the Forest, per the direction in the 2005 Travel Management Rule (36 CFR 212). No timeframe has been established because these discussions will take some time in order to ensure sound decisions are made and supported in the future. The TMP process is another opportunity to collaborate with the Forest in travel management. Until a Forest-wide TMP is finalized, access management is occurring on a project-by-project basis to the degree necessary, but this process does not supersede the TMP process. The Forest Service is working on the TMP collaboratively with local communities, interest groups, Tribes, other agencies, and Wallowa-Whitman employees, while also adhering to local, state and federal regulations and caring for the land.

Category	Commenter ID#	Summary of comments	Summary Response
Collaboration	265	"Desired" future conditions appear to be determined by the Forest Service alone, and often do not represent adherence to applicable laws (e.g. planned violation of the existing Forest Plan through Forest Plan amendments), or the desires of the broader regional and national public, who are by majority typically opposed to logging of the National Forests, and by great majority opposed to logging and roading of roadless areas.	Forest Plan desired future conditions were developed under a public planning process, and further quantified by expert ecologists through review of the best available scientific literature and ecological modeling (see Powell 2012). Forest Service guidance for implementation of the Eastside Screens explicity requires a landscape assessment of the range of variability of forest structure and composition, and a comparison to current conditions. Laws and regulations applicable to project planning acknowledges that our udnerstanding of ecosystems can change with new information, and thus allows for the amendment of out-dated policies and direction. Public scoping and DEIS comments on the LJCRP do not bear-out the assumption that the majority, much less the great majority, of the public are opposed to active management of National Forest System lands in the project area.
Collaboration	243	We urge the FS to harmonize NEPA and collaborative efforts. Collaboration is not a substitute for NEPA or other broad public engagement. NEPA and collaboration should reinforce each other. We are still learning how to do collaboration, but ideally collaborative groups can help the FS identify issues that need to be analyzed, and NEPA analysis can inform better collaboration and better decisions.	Throughout the LJCRP NEPA process, we have worked closely with the local collaborative to build their capacity in understanding and applying NEPA, while we build our capacity to effectively capture local concerns within the NEPA process.
Collaboration	244	I am a member of the Wallowa Whitman Forest Collaborative and support the consensus positions that the collaborative has drafted regarding the treatments in the project area.	We appreciate the time and effort the Wallowa Whitman Forest Collaborative has invested in discussing the LJCRP project, and revealing where there is, and is not collaborative consensus. The draft WAWFC consensus positions will be considered during decision-making along with Tribal, cooperating agency, and other public input on the LJCRP.

Category	Commenter ID#	Summary of comments	Summary Response
Public comment	2	You have consciously excluded electronic public comment opportunities on the DEIS by conveniently forgetting to post the email address for comments online.	The planning team followed the letter of the law in making the DEIS available for comment, and providing details on how to submit comments. The notice of availability of the DEIS and the various means by which the public could submit comments was published in the federal register, the local newspaper of record, and on the project website. Letters were also sent to the project mailing list, including to the address of this commenter, announcing the availability of the DEIS for public comment and how to submit comments by email, postal mail, or in-person. The Wallowa-Whitman National Forest website included a link to the project, the address to which comments could be sent, and contact information of the team lead in case anyone had questions about how to submit comments. The comment period was 90-days, about 2-3 times longer than the average project, so there was plenty of time to get clarification if a commenter was unsure of comment submission procedures.
Policies and plans	267	Where do you list the county policies that are part of the Wallowa County Natural Resources Plan? They include: Wallowa County Comprehensive Management Plan; Lower Joseph Creek Watershed Assessment; Upper Joseph Creek Watershed Assessment; Wallowa County Custom and Culture, Wallowa County Economic Base; Travel Management Plan for Wallowa County; Alternative W of the HCNRA Comprehensive Management Plan.	Chapter 3 of the FEIS lists policies and plans that are germane to the project objectives, including the Wallowa County Comprehensive Management Plan (CMP), the HCNRA CMP. Appendix B provides detail about the Forest Plan and HCNRA CMP guidance relevant to the LJCRP. Chapter 1 ezxplains how Wallowa County's Lower Joseph Creek Watershed Assessment was used as the original project proposal.

Category	Commenter ID#	Summary of comments	Summary Response
Monitoring	243, 265, 284	It is important to include a credible monitoring plan in a project this scale. Monitoring questions must be carefully chosen and sampling designs must yield meaningful results. Why is there no specific monitoring strategy proposed in the DEIS for consideration during the public comment period? Without credible monitoring protocols established, it is highly unlikely that adaptive management will actually be implemented, allowing ecological impacts to continue un-checked. Why aren't connected actions, project design elements, site-specific mitigation measures, and a monitoring strategy included in the DEIS analysis? The EPA recommends that the FEIS and ROD highlight the need to employ multiparty monitoring and to track the result of management effort and follow disturbances and recovery efforts over a long term with the RHCAs.	Chapter 3 ("Monitoring and Learning") of the FEIS describes monitoring for the LJCRP. The FEIS does a better job of clarifying where these components are tied to the effects analyses. Where monitoring is required as a part of implementation, and assumed to have bearing on environmental effects, it is discussed in the relevant resource section (e.g., see FEIS chapter 4, Water Quality and Temperature, Heritage), and Appendix J, Project Design Criteria. A multi-party monitoring plan is currently being designed by the Wallowa-Whitman Forest Collaborative to further study management uncertainties in the project area, and represents a long-lasting means to learn and adjust National Forest management through time. Connected action, project design elements, and site-specific mitigation measures were analyzed as part of the effects analyses. The implementation and monitoring budgeting process is outside the purvue of the NEPA process.
Biological Assessments	266	Hydrologist reports and biological opinions or assessments for fish should have been included in the appendices of the DEIS.	The aquatics Biological Assessment will be available in the FEIS as well as the Biological Opinion. These documents are not part of the public record until a Biological Opinion has been rendered by NOAA Fisheries.

Category	Commenter ID#	Summary of comments	Summary Response
Temporary roads: Legacy and soils effects	230, 265, 266	Temporary roads left in a state of non-use can have impacts on forests and soils that last for decades. The public often continues to use these roads long after implementation of camouflaging and other activities designed to leave them in a state of nonuse. As a result, soil compaction/ disturbance and sedimentation impacts persist. The adverse impacts of building temporary roads likely outweigh any possible benefits to forest health. We are asking the Forest Service to drop all new and "temporary" road construction, and not to re-open closed roads. Many closed roads are now overgrown or were closed to protect wildlife or water quality and soils, and should not be re-opened. Roads density and traffic negatively affect terrestrial wildlife such as deer and elk, as well as bobcat, lynx, wolves, and other animals sensitive to roads.	It is acknoweledged in the effects section (FEIS chapter 4) that roads and their use have a negative impact on most wildlife species. Alternative 2 proposes to close additional roads to better meet forest plan standards, which will benefically affect most wildlife species. Alternative 3 proposes to leave the most miles of roads open. During implementation of the project, development of temporary roads will be evaluated relative to the cost:benefit of each individual site. It is possible that some of the roads identified as needed for the logging operations will not be needed. Given the project purpose and need, temporary road construction was minimized to the extent possible. In order to access many of the stands proposed for restoration treatments, temporary roads provide the greatest cost:benefit ratio (e.g., relative to alternatively using helicopters). What isn't diplayed in the effects analysis are all of the areas where temporary roads were originally proposed (26 miles) but the anticipated effects of using these roads would be too great. The process used to determine temporary road suitability is discussed in FEIS Chapter 4, and Project Design Criteria and Best Management Practices (FEIS, Appendix J). The description of the process of identfying suitable locations for temporary roads has been improved in the FEIS. All temporary roads will be obliterated upon completion of project implementation, so will only have a short-term effect on wildlife habitat, and do not represent a lasting increase in road density realtive to Forest Plan standards for road density.

Category	Commenter ID#	Summary of comments	Summary Response
Roads: Rationales for road actions	262	We strongly support your efforts to implement proposed harvest treatments in the project area; but this simply cannot be accomplished without improving an effective transportation system that includes forest roads—whether “temporary” or otherwise classified. Roads are an important part of the logging/transportation plans—and are identified in the Wallowa-Whitman Forest Plan as important attributes of these management areas. The NEPA decision document language should accommodate a full range of modern road access technologies; rather than needlessly prescribing a narrow set of specifically-limiting methods. Forest roads are necessary; please fully disclose where and what they are proposed. Harvest, protection, and active forest management cannot be successful without sufficient road developments.	The FEIS accomodates a full range of transporation planning to facilitate vegetative treatments. The alternatives identify a range of varying combinations of road treatments by road segment, and the FEIS discloses their relative effects. The exisiting condition of the transporation system will need to be further assessed during implementation to refine more specifically where and how road reconstruction, closure and decommissioning needs to take place. The full suite of technologies would be availalable to implement road actions as a result of the project decision. Aside from Project Design Criteria (FEIS Appendix J), the FEIS alternatives propose which roads would be targeted for treatment, not necessarily how the treatment would be accomplished.

Category	Commenter ID#	Summary of comments	Summary Response
Roads: Travel Management Rule	230, 267	Existing Wallowa-Whitman forest plan direction fails to comply with the substantive requirements of subpart A. Accordingly, the Forest Service may not rely on or otherwise incorporate existing plan direction to satisfy its substantive duties under subpart A (Roads Rule 2001. 66 Fed. Reg. 3206 (Jan. 12, 2001); 36 C.F.R. part 212, subpart A). AND The Wallowa-Whitman is also in gross violation of the Travel Management Rule: Subpart B, which requires forests to manage motor vehicle access. 36 C.F.R. § 212.51. Once motorized routes are designated, cross-country travel is prohibited. 36 C.F.R. § 212.52; 36 C.F.R. § 261.13. We were told that this area would be finished with road issues once this project is complete. If the DEIS does not provide direction towards achieving a sustainable, minimum road system, it is unlikely that the Forest Service will satisfy the requirements of subpart A in the foreseeable future. The Lower Joseph DEIS refers to a travel analysis as part of the process for this project (DEIS at 29), but it does not describe the criteria by which the roads were analyzed. For this travel analysis to meet the Roads Rule, all four criteria listed above must be addressed. There is no evidence that all criteria were examined.Please clarify if this is the decision of road closures for this area or if we will endure this pain again with TMP for this area.	Since 2007, the Wallowa-Whitman National Forest has been building the Travel Management Plan (TMP) for the Forest, per the direction in the 2005 Travel Management Rule (36 CFR 212). No timeframe has been established because these discussions will take some time in order to ensure sound decisions are made and supported in the future. Until a Forest-wide TMP is finalized, access management is occurring on a project-by-project basis to the degree necessary, but this process does not supersede the TMP process. The Forest Service is working collaboratively with local communities, interest groups, Tribes, other agencies, and Wallowa-Whitman employees, while also adhering to local, state and federal regulations and caring for the land. A roads analysis (FSH 7709.55, chapter 20) was conducted in conjunction with the FEIS to inform the development of planning alternatives relative to the designation of roads for motor vehicle use in the LJCRP area. Management of cross-country travel and off-highway vehicle trails was not identified as a purpose and need for this project, and was not a part of the EIS analysis of the direct and indirect effects of proposed road actions. The LJCRP decision may include proposed changes to the transportation system, or the responsible official may choose to defer any changes until the Subpart B travel analysis is complete, and include changes in that decision. Input on the TMP and design for cross-country travel is best directed to that specific project and process. For more information on how you can provide relevant and effective input on travel management planning on the Wallowa-Whitman National Forest can be found at: http://www.fs.usda.gov/detail/wallowa-whitman/landmanagement/projects/?cid=fsbdev7_008909

Category	Commenter ID#	Summary of comments	Summary Response
Roads: Effects	3, 230, 243, 263, 265, 266, 267	While well-sited and maintained roads undoubtedly provide important services to society, the adverse ecological and environmental impacts associated with the Forest Service's massive and deteriorating road system are well-documented. Building more new and "temporary" roads appears to be in violation of Forest Plan standards for road densities in the project area, and contrary to Wallowa Whitman transportation management objectives. Such excessive road building and re-construction must also be in conflict with legal guidance for protecting federally listed fish, especially as Lower Joseph Creek apparently is habitat for Steelhead trout and is a tributary to the Grande Ronde River, where there are listed Salmon downstream. The DEIS does not adequately consider the well-documented cumulative impacts of roads and management in relation to the Lower Joseph Creek Restoration Project. The final decision for the Lower Joseph Creek Restoration Projectmust meet the forest plan road density standards in all sub watersheds. Also see The Wilderness Society's literature review on the impacts of roads to natural resources.	The FEIS alternatives propose no system new road construction, 12.6 miles of temporary road construction and 86 miles of road reconstruction and maintenance. The action alternatives also propose improving aquatic organism passage at 6 sites (culverts), and reducing barriers to fish migration. What isn't diplayed in the effects analysis are all of the areas where temporary roads were originally proposed during scoping of the proposed action (26 miles) but were removed from the modified proposed action because the anticipated effects of these roads on natural resources were deemed to be be too great. Temporary roads would be obliterated upon completion of project implementation, and as such do not represent a mid- or long term increase in road density relative to aquatic and wildlife standards and guidelines (FEIS, chapter 4, Aquatic Habitat, and Wildlife). The alternatives also propose varying levels of road closure and decommissioning, resulting in varying levels of open and total road density, and their relative effects to aquatic and wildlife habitat are disclosed in the FEIS (FEIS, chapter 4, Wildlife, Aquatic Habitat). The FEIS discloses the direct, indirect, and cumulative effects of these road actions on soils, water, aquatic, plant, and wildlife habitat, aquatic and wildlife species habitat connectivity, public and tribal access, recreation, native and invasive plant species, characteristics of unroaded areas, threatened and endangered species, and scenery, to name a few (FEIS chapter 4). The project is undergoing consultation regarding federally listed species, and will receive determinations from the National Marine Fisheries Service before a final decision is signed. The deciding official will consider these effects, in conjunction with effects of forest restoration actions, and social values such as forest access, when making a final decision. The deciding official can select an alternative, an alternative that combines attributes from the alternatives or, select no action.

Category	Commenter ID#	Summary of comments	Summary Response
Roads: Access for public uses	1, 5, 263, 267	Road closures cause a reduction in the ability of the public to access their dispersed camp sites, firewood cutting, their favorite hunting sites and the ability to view or harvest the natural resources such as wildlife, berries and mushrooms. Most of the roads in Lower Joseph creek are far from the riparian areas. If a road is not close to a riparian and causing erosion issues then it should be kept open. The Forest Service should provide opportunities for people to explore the canyon lands of Northeast Oregon by maintaining the Chico trail and developing new recreation trails in the project area.	The alternatives analysed in the FEIS cover a full range of effects on public access, with 187, 170, and 230 miles of open system roads for Alternatives 1, 2, and 3, respectively. Road treatments are for the purposes of improving wildlife and fish habitat to trend toward Forest Plan standards and guidelines. The rationales for road closures in Alternative 2 are based on a roads analysis that was completed in conjunction with this project, as per FSH 7709.55, chapter 20. The roads analysis evaluated the road network needed for the long term management of the landscape, as well as natural resource concerns regarding the existing road network. The road network in Alternative 3 is representative of that which would meet public access needs for such activities as firewood cutting, viewing vistas, recreation, and hunting; this alternative was informed by public access data provided by Wallowa County. The deciding official will use the FEIS effects analyses along with tribal, county, and public input to determine the best alternative that meets the project purpose and need, and balances resource and social needs. This project proposes no changes to the Chico trail or access to the trail. Recreational trail construction and maintenance is outside the scope of this project. The Wallowa Valley Ranger District will consider opportunities to provide public access to wood piles for firewood cutting.
Roads: Effects analysis	230	Did you consider the Wilderness Society's literature review titled "Transportation Infrastructure and Access on National Forests and Grasslands" (May 2014)?	The data and information in the literature cited is incorporated into the Roads Analsyis for the FEIS.

Category	Commenter ID#	Summary of comments	Summary Response
Roads: Benefits from closures and decommissioning	5, 243, 263	Roads are important for public access to public lands. However, the over-abundance of existing roads on the Wallowa-Whitman National Forest creates problems for water quality and habitat for fish and wildlife. The Lower Joseph Creek Restoration Projectprovides an opportunity to improve habitat and water quality by implementing projects to decommission and close problematic roads. There are tremendous benefits from closing and decommissioning roads. Benefits include hydrologic stability, water quality, fish habitat, wildlife habitat (corridors, security, expanded area where snag habitat can be tolerated, etc), slope stability, soil health, reduced weed vectors, and reduced fire ignition risks.	The FEIS discloses the beneficial and adverse effects of road closures and decommissioning by alternative (FEIS chapter 4, physical, biological and social environment sections). The deciding official will use the FEIS effects analyses along with tribal, county, and public input to determine the best alternative that meets the project purpose and need, and addresses resource and social issues.

Category	Commenter ID#	Summary of comments	Summary Response
Roads: Accelerated timeline	243	The accelerated NEPA process used for this project resulted in abbreviated analysis of road impacts. We think that NEPA must be fully implemented to ensure informed public comment and fully informed decisions. NEPA short-cuts can have adverse ecological consequences if it means that impacts are not fully considered and mitigated and alternatives are not thoroughly explored. When conditions prompt the consideration of road closures or decommissioning, I recommend the U.S. Forest Service utilize a site specific collaborative process in coordination with the local County Government, involving all interested stakeholders to determine a solution that maintains motorized public access as well as meeting resource protection goals.	The Forest Service prepared the FEIS in compliance with the National Environmental Policy Act (NEPA) (36 CFR 220; 40 CFR 1500-1518) and other relevant Federal and State laws and regulations, and tribal trust responsibilities (see FEIS, Appendix B). This project tiers to the WWNF Forest Plan, ROD and FEIS as amended (1990). A roads analysis was completed as a part of this project, as per FSH 7709.55, chapter 20. The roads analysis identified road needs and concerns, and along with tribal, cooperating agency, and public input, led to the development of alternative road management approaches. The FEIS adequately discloses the effects of these alternative road networks on aquatic and wildlife habitat, plants and special habitats, social and economic values, the physical environment, and other resources and values. The FEIS also includes Project Desgin Criteria that specifically address necessary mitigations and best manaement practices (FEIS, Appendix J). Project planning was completed by an interdisciplinary team dedicated to the Lower Joseph Creek Restoration Project; hence, the time taken for EIS analyses cannot be compared to other similar projects where the interdisciplinary team is engaged in numerous projects, tasks, and ancillary duties simultaneously.

Category	Commenter ID#	Summary of comments	Summary Response
Roads: Invasive plant species	263, 267	Planned temporary roads are common to both alternatives, while mileage appears to be low (12.6 miles), the temporary roads would be constructed through weed populations and the risk of spread is high. Why are we not mitigating this issue with stated weed control program for these roads to stop the spread of these weeds? We should have a plan that includes seeding all disturbed sites to slow the spread of annuals. Additionally at some of the sites improved species should be included. Roads and trails serve as corridors for non-native invasions, and logging equipment is frequently cited as the key link in the transport and spread of invasive or noxious plants. [We] suggest that the final project include monitoring of the project area after completion so that weeds infestation sites can be identified and treated before spreading into adjacent areas. We also request an that the final decision drop all temporary road building and road re-construction as it creates disturbed soil conditions ideal for invasive weed spread.	Temporary road construction, and road improvements such as grading, rocking and clearing ditches are ground disturbing and have a high potential risk for spreading exiting noxious weed populations. It is relatively easy to observe that weeds tend to concentrate along roads, where there is frequently disturbed soil, and nutrient rich run-off that concentrates in roadside ditches. Due to litigation of the Final 2010 Wallowa-Whitman National Forest Invasive Plants Treatment EIS, use of herbicides within the LJCRP area is limited to sites approved in a court settlement. Treatments in new sites would be restricted to non-chemical treatments, such as hand-pulling (FEIS, chapter 2, Noxious weeds and other non-native invasive plants). Guidance for controlling noxious weeds can be found in both the Wallowa Whitman National Forest Plan, and Region 6 Invasive Species Program Management Direction. Project Design Criteria specific to the LJCRP (FEIS Appendix J) would help reduce the spread of noxious and invasive plants in the LJCRP.

Category	Commenter ID#	Summary of comments	Summary Response
Roads: Wildife habitat	263	The distance band approach should be used for the Lower Joseph Creek Restoration Project. Elk have great cultural and economic significance to local communities, first nation people, and the Nation. Impacts on elk from project activities warrant more in depth analysis and the use of the best available science.	Our experience with running HEI using the distance band analysis does not show a substantial change in the HEI values and HEI values would still meet Forest Plan Standards (FEIS, chapter 4, WIldlife). Nonetheless, HEI was calculated using both the original technique for roads as well as using the distance band technique (FEIS table 37). The more recent research shows that providing for nutrition availability, and providing access to this nutrition (away from roads) is important. Alternative 2 includes 33 more miles of closed road than the current condition in areas with currently high road densities relative to Forest Plan standards. These road closures will help mitigate the potential loss of cover in areas where nutrition is increased due to opening up the canopy and allowing for understory vegetation development (FEIS, chapter 4, Wildlife). The FEIS includes a better description and analysis of these issues as compared to the DEIS.
Roads: Adverse effects of road decommissioning	5	Transportation systems are at risk, as many fall in designated roadless lands that environmental groups want for wilderness. The practice destruction (decommissioning, see defiinition page 260 of glossary) of these roads with a goal of potential wilderness or reducing road maintenance costs is short sighted. It results in a lack of access for fire and timber management resulting in more blackened acres. The cost to destroy these roads is as much as the original funding to build them. The erosion I have seen from this misguided practice is more evident than during the construction and use. Installing erosion controls, restricting use, gates, green dot systems ect. is more cost effective and provides a balanaced land use alternative.	The Roads Analysis conducted for this project has identified roads that could be decommissioned to meet Forest Plan Standards and Guidelines. Decommissioned roads can produce sediment delivery to streams for two years and then the delivery is generally reduced to pre project (decommissioned) levels. Access for treatment actions has been assessed in the FEIS. The FEIS proposed to close and decommission roads based on site specific needs to reduce the potential sediment delivery from the restoration action.

Category	Commenter ID#	Summary of comments	Summary Response
Roads: Timing of actions	226	We support the Forest Service's plans to reconstruct roads as well as the building of 12.6 miles of temporary roads to facilitate the proposed treatments; please explain the timeline for these road openings and temporary roads. Will they be opened incrementally or will all 60 miles of roads be opened at the same time?	Implementation of the proposed road treatments would take place over the course of 10 years as the decision is implemented. Road reconstruction would occur incrementally throughout the implementation period. The implementation period would start in the months following the publication of the Record of Decision and may last 10 years or more. Temporary roads would be constructed as they are needed to access the relevant proposed activity units and removed the same season. Temporary roads are not intented for public use.
Roads: Methods of road decommissioning	225	Given the documented benefits of full road recontouring where funds are available, this should be the prefered method of road closure. Where funds are not available suggested priorities to be followed for road treatments. The comment included specific advice for prioritization of road decommissioning.	We have reviewed the 2007 reference provided. We acknowledge the importance of recontouring, but do not think that it is appropriate in every case. The FEIS alternatives do not limit the use of recontouring in the decommissioning of roads, and may be used on a case-by-case basis where it is deemed appropriate by local resource specialists. Wepp (sedimentation) modeling showed that sediment delivery from roads is not an issue in the LJCRP area. The FEIS accommodates a full range of transportation planning to facilitate vegetative treatments. The existing condition of the transportation system will need to be further assessed to evaluate specifically how road reconstruction, closure and decommissioning needs to take place. All roads analyzed for decommissioning may be candidates for recontouring, which will be prioritized based on resource need. We agree with much of the prioritization scheme provided by the Nez Perce tribe, and have incorporated appropriate parts of it in the project implementation guide (on file at the Wallowa Valley Ranger District office).
Roads: Incorrect information	267	If they are closing more roads in Alt 2 then why are the numbers the same?	This table in the DEIS was incorrect and has been corrected in the FEIS.

Category	Commenter ID#	Summary of comments	Summary Response
Roads: Location of vegetation treatments	243	Since an optimal landscape restoration plan includes a mix of treated and untreated areas, the agency can easily avoid road construction by co-locating untreated areas and inaccessible areas. This alternative should have been considered in the EIS.	The identification of areas needing treatment was based on departure between existing and desired forest structure, density, and composition. The roads analysis conducted as a part of this project (as per FSH 7709.55, chapter 20) assessed access needs for vegetation treatments, as well as resource concerns related to roads. The vast area of inventoried roadless areas, which exhibits a similar departure in conditions as the rest of the landscape, and where no new roads are proposed in any alternative, precludes treatment of a large proportion of the need. Limiting treatments only to areas with current road access would not serve to meet the purpose and need for this project to restore conditions toward the range of variability. There is a substantial difference between the alternatives in the extent of the open road network (170-230 miles, and the FEIS discloses the comparative physical, biological, social, and economic effects (FEIS chapter 4).

Category	Commenter ID#	Summary of comments	Summary Response
Temporary Roads	226, 242, 243, 263, 266	There are concerns over the proposed 12.6 miles of temporary roads, particularly as they relate to sediment production and delivery to streams, soils productivity and the tradeoffs between the effects and benefits of temporary road construction.	The EIS acknowledges the effects associated with temporary road construction and thoroughly discloses those effects. The Lower Joseph Creek Restoration Project does not propose any road construction, temporary or otherwise, in Inventoried Roadless Areas. As part of project design temporary roads were kept to a minimum to minimize effects such as soil disturbance and potential erosion. There were designed to specifically meet the greatest need, while having the smallest effect. Early in the planning stage the identified many more temporary roads to help reduce the cost of the implementation but those roads were removed from from further consideration because of a cost-benefit analysis. The proposed temporary roads are a result of our cost-benefit analysis. Furthermore, we conducted a rigorous analysis of effects temporary roads from the perspective of sediment production and delivery to waterways. The outcome of this analysis is incorporated in the project design and current proposal. Regarding soils productivity, the LJCRP will be consistent with all Rule, Law and Regulation pertaining to Detrimental Soils Conditions. Temporary roads will be designed whenever possible over existing disturbance footprints (legacy roads) and will give us mechanized access to other areas of legacy disturbance. This gives us an opportunity to partially remediate these legacy impacts, when appropriate, to improve soils productivity across the LJCRP Analysis Area. For more information on the effects and management practices associated with temporary roads, please see the Chapter 4 of the FEIS, the Physical Environment Supporting Documentation, Project Design Criteria and Best Management Practices.

Category	Commenter ID#	Summary of comments	Summary Response
Roads	1, 225, 226, 230, 243, 244, 262, 263, 265, 266, 267, 285	We received a wide range of comments regarding the management of the road system with in the LJCRP. Several commenters expressed a strong desire to maintain the current road system for recreation, traditional uses and future managment. A few commenters indicated a desire to add additional roads to improve access for a variety of uses. Many other comments expressed a desire to close and/or decommission roads to improve wildlife habitat and remediate effects to the aquatic system. Finally, some commenters described a desire to maintain access as much as possible while prioritizing the most important roads to close/decommission for ecological benefit.	Based on the comments that we received during scoping, we analyzed the road system across the spectrum of balancing ecological need and access within the LJCRP. We incorporated the interests pertaining to roads within the range of effects analyzed across all alternatives in the LJCRP DEIS and expanding these discussions after reviewing comments following publication of the DEIS.
Roads and Logging Systems	226	I suggest that the Forest Service look at alternatives to helicopter logging that will still treat the land as designed. Please explain why the Forest Service could not build a temporary road to treat these areas that are currently slated for helicopter logging.	Logging systems were estimated by the interdisciplinary team using a combination of slope, distance to specified roads, and limited use of temporary roads to access the proposed harvest units. The associated acres by estimated logging system are listed in tables 50 and 68 for Alternatives 2 and 3, respectively. Map 25 shows the estimated logging system by unit and logging system type for Alternative 2. Given that the appropriate logging systems were estimated, the FEIS analyzed logging systems effects based on a range of acres by logging system. The range was based on the results of an approximately 10% sample where detailed logging systems were designed in the field, compared to the estimate, and the differences were then used to estimate ranges. The final logging system selection by stand would be completed during implementation, considering the final decision and site specific constraints and opportunities. Specific design features and best management practices for each logging system are listed in Appendix J.

Category	Commenter ID#	Summary of comments	Summary Response
Roads	267	On Page 36 of the DEIS, is is stated that current activities such as permitted grazing, dispersed recreation use, fire protection, and scheduled road maintenance would continue within the project area. This is not true. Roads that are currently closed administratively but still open on the ground would continue to be closed. This is not really a no action alternative. Closing roads already administratively closed is an action?	The decision resulting from the analyses in the FEIS carries forward all previous road management decisions, unless otherwise noted in the final Record of Decision. The decision hypothetically could open roads that are currently closed under a previous decision as long as the decision is consistent with Forest Plan desired conditions, standards and guidelines, and other agency policies. Unless reveresed by this decision, roads that are currently closed would remain closed.
Roads	267	Table Mountain, accessed by Forest Service Road 4650, provides scenic viewpoints south and west across grassy hillsides and forested stringers into Joseph Canyon and the Joseph Creek Wild and Scenic River, and has been identified as an important place to view scenery by local residents. Yet, in Alternative 2 you don't leave open the roads necessary to use those viewing sites. From this statement you should leave those roads open to allow this viewing opportunity.	There is a loop road that is left open (Rd #4650120). Limiting open roads does not necessarily remove viewing opportunities.
Roads	267	Under Alternative 3, the cumulative effects on access to FS lands are less than the effects from Alternative 2 since there are no new closures or decommissioned roads. There shouldn't be any effect from current conditions because we are not proposing to close and roads.	A more complete cumulative effects analysis has been completed for the FEIS.

Category	Commenter ID#	Summary of comments	Summary Response
Roads	267	Wallowa County believes that two following comments from the LJCDEIS show that the conservative Wallowa – Whitman National Forests Standard road density requirements are not needed in this watershed and that the existing condition is more than satisfactory for elk and steelhead trout.	We know of no data to support this claim that the existing condition is "more than satisfactory for elk and steelhead". As the County points out, the local ODFW biologists has stated that 'managing road densities is important', and has expressed a need in the scoping of this project that reducing overall road densities is important. The Wallowa Whitman National Forest is currently undergoing a review of its transporation system for preparation of a Travel Management Plan. The current direction from the Forest Supervisor is to conduct a Roads Analysis on a project by project basis and determine the resulting transportation system that meets forest plan standards and guidelline and consultation requirements. A roads analsysis was conducted for this EIS and the resulting analysis was used to define motor vehicle access while meeting or trending toward forest plan standards and consultation requirements

Category	Commenter ID#	Summary of comments	Summary Response
Climate Change	243, 250, 258, 263, 265, 278	The NEPA analysis must avoid minimizing this project's contribution to carbon emissions and global warming by saying the effects of this project would be negligible on a global scale. This is not an appropriate framework. Global climate change and ocean acidification are the result of the cumulative effects on the global carbon cycle which is spatially distributed. There is no single culprit, nor is there a silver bullet solution. All emissions are part of the problem, and all land management decisions must be part of the solution. Since the global carbon cycle is spatially distributed, carbon storage and carbon emissions will always be spread out around the globe, and the carbon flux at any given place and time may appear small, but cumulatively they help determine the temperature of our climate and the pH of our oceans. Given the current carbon overload in the atmosphere and oceans, the carbon consequences of every project must be carefully considered (rather than dismissed as negligible). The conclusions in Zhang et al (2010) conflict with the findings of many other studies showing that logging to reduce fire effects will emit more carbon than it saves. The FEIS needs to carefully document the adverse effects of logging on carbon storage and should strive to mitigate those effects by retaining more trees, such as in unroaded areas and with greater basal area retention. The literature clearly shows that mature forested areas provide opportunities for maintaining carbon stocks on federal lands.	Project-specific climate change mitigation strategies of carbon sequestration have not been institutionalized as an agency policy, beyond goals to restore and maintain ecosystems that are resilient to disturbance, and thus do not lose carbon storage to uncharacteristic fire. Ecologically-based forestry practices can increase the ability of forests to sequester atmospheric carbon while enhancing other ecosystem services, such as improved soil and water quality. Harvesting and regenerating forests can also result in net carbon sequestration in wood products and new forest growth. The effects analysis in Chapter 4 of the FEIS shows no net loss of old forest structure (OFSS or OFMS) in either of the action alternatives. It also shows the treatments would result in positive movement toward the desired condition for the larger tree size classes. Landscape modeling specific to the LJCRP area, using "climate-informed" state-and-transition models (e.g., sensu Halofsky et al. 2014) produced by the USFS Pacific Northwest Region Research Station projected that, over the next 90 years, Alternative 1 (no action), in combination with projected climate change effects, would likely result in a decline in large tree dominated stands to less than 5% of the landscape area. This outcome is largely due to the greater amount of stand replacement fire in closed forest conditions with climate change. Climate change models also project a likelihood that stand replacement disturbances may catalyze forest conversions to non-forest potential vegetation types (Halofsky et al. 2014). Comparatively, as a result of increased forest resiliency and less stand replacement fire in treated stands, Alternative 2, with continuing maintenance treatments, maintains an increasing trend in large tree open forest condition, which would compose over 25% of the landscape area after nine decades (see FEIS chapter 4, Climate, and Appendix C for more information).

Category	Commenter ID#	Summary of comments	Summary Response
Range management	263	Allowing grazing to continue within the project area will result in high density forest structure, lack of stand initiation structure, detrimental soil conditions and retarded RHCA conditions. Thinning, logging, and burning prescriptions, particularly within or adjacent to RHCAs, may result in increased livestock access to riparian areas. These issues were not analyzed in the Draft EIS. These issues must be addressed prior to finalization of this project.	The purpose and need for this project did not include allotment management planning, which will be addressed by the Ranger District under a separate environmental assessment process and planning schedule. The following project design criteria (Appendix J) are included in the FEIS and are a part of the effects analyses (FEIS Chapter 4): Range–1 (The range manager will work with the timber sale officer with respect to the timing and location of logging operations. Timber harvest within the project area is not anticipated to impact ongoing grazing operations. All gates must be closed while livestock are within the allotment adjacent to the harvest units), Range–5 (The botanist, invasive species specialist and range manager will work together to determine whether prescribed fire or other vegetation restoration activities will require resting portions of the pasture treated), Range–6 (If any fences are damaged during burning operations, repairs must be made immediately to prevent livestock from entering areas outside of established allotments), and Range–7 (The range manager will work with fire management to determine timing and location of prescribed fire. Burn blocks should be planned in a manner that does not interrupt planned livestock management on the allotments. All burns will be coordinated with the District Range Management Specialist).

Category	Commenter ID#	Summary of comments	Summary Response
Noxious Weeds	263, 265, 266, 267	Roads and trails serve as corridors for non-native invasions, and logging equipment is frequently cited as the key link in the transport and spread of invasive or noxious plants.We also request an that the final decision drop all temporary road building and road re-construction as it creates disturbed soil conditions ideal for invasive weed spread. There is insufficient analysis in the DEIS as to effects of action alternatives to the introduction and dispersal of invasive exotic plants. We request that the Forest Service take full prevention measures for preventing the introduction and dispersal of invasive plants as required by the Region 6 FEIS on invasive plant management, identify likely vectors and site specific entry points for invasive plants, and thoroughly analyze how they will prevent invasive exotic plants from being introduced and dispersed by this project.	Noxious weed spread along roads and by logging equipment is addressed in the EIS and in the noxious weeds and invasive species specialist report. Project Design Criteria (FEIS Appendix J) are given in both the EIS and implementation guide to decrease the spead of noxious weeds along roads and by logging equipment and activities.
Noxious Weeds	263	The final project should include monitoring of the project area after completion so that weeds infestation sites can be identified and treated before spreading into adjacent areas.	Weed population monitoring and mapping are part of the district's program of work. Wallowa county also monitors and maps.
Range	266	We are concerned that decreased shade in uplands across the project area will cause livestock to change grazing behavior in ways that have unintended negative consequences. Cattle will concentrate in riparian areas and further impact riparian areas, stream bank stability, erosion, and water quality.	Dry forest will have canopy closure taken below 40% on 11% of the entire project area. There will still be ample shade on the landscape for cattle. Only 10% of Category 4 streams (seasonal waterflow only) are planned for thinning. Project design criteria arein place to ensure that District resource specialists (botanist, invasive species specialist and range manager) would work together to determine whether prescribed fire or other vegetation restoration activities would require resting portions of treated pastures to help mitigate changes in cattle concentration areas.

Category	Commenter ID#	Summary of comments	Summary Response
Range	267	The DEIS states that past activities and ongoing fire suppression and grazing continue to add to the departure in density, composition, structure and characteristic disturbance regimes, while the actions proposed under this project are designed to restore that departure and disturbance. Since this has been grazed for over 300 years, how is grazing add in to the departure?	Grazing has been a large part of the project area for a long time. However, there continue to be interactions between domestic grazing, abundance and continuity of fine fuels that carry frequent fire, and rates of tree regeneration.
Range	243	The values of RHCA go beyond fish, temperature, and hydrology. Did the FS analyze impacts on factors like habitat connectivity (including, but not limited to elk), hardwood recruitment, thermal refugia, livestock exclusion, structural complexity, etc.?	Livestock exclusion is beyond the scope of this project.
Range	267	Reducing the risk of increased nonnative species infestations cannot be done in these settings without successfully seeding vegetative species. Reseeding areas impacted by logging and burning, preferably with improved grass and forb species reduces the weed problem, gives forage production long term in place of short term rest and retards the re-invasion of to many trees. Improved species seeding should be used to help mitigate this issue.	A revegetation plan is being written as part of the implementation guide for this project, following current USFS policy.

Category	Commenter ID#	Summary of comments	Summary Response
Range	267	The DEIS states that grasslands of the LJCRP area generally burned historically with replacement severity, and still do, although high levels of domestic livestock grazing in some areas have reduced fire extent and frequency relative to historical levels. There is no area in Lower Jo that has high levels of livestock grazing. This statement needs removed. Wallowa County just completed two different range land assessments and were conducted with USFS personnel involved. The Lower Joseph Creek Watershed assessment was finished in 2014 and should be used as the basis for these assessments, not older and larger scale assessments.	Information from the 2014 Lower Joseph Creek Watershed Assessment has been incorporated between the DEIS and FEIS.
Range	263	Allowing grazing to continue within the project area will result in high density forest structure, lack of stand initiation structure, detrimental soil conditions and retarded RHCA conditions. Thinning, logging, and burning prescriptions, particularly within or adjacent to RHCAs, may result in increased livestock access to riparian areas. These issues were not analyzed in the Draft EIS. These issues must be addressed prior to finalization of this project. Also, the Final EIS must address the cumulative impacts on the project area from logging and grazing. Finally, we request that you consider reducing grazing activities within logged and burnedareas to allow them to recover post project.	Project design criteria (FEIS Appendix J) would ensure that District specialists work with the timber sale officer with respect to the timing and location of logging operations. Timber harvest within the project area is not anticipated to impact ongoing grazing operations. Further, the botanist, invasive species specialist and range manager would work together to determine whether prescribed fire or other vegetation restoration activities would require resting portions of the pasture treated, and if any fences are damaged during burning operations, repairs must be made immediately to prevent livestock from entering areas outside of established allotments. The PDCs also specify that the range manager would work with fire management to determine timing and location of prescribed fire, and burn blocks should be planned in a manner that does not interrupt planned livestock management on the allotments. Cumulative effects analyses in the FEIS have been improvedsince the DEIS (FEIS chapter 4, Cumulative effects).

Category	Commenter ID#	Summary of comments	Summary Response
Range	263	The Final EIS must address the cumulative impacts on the project area from logging and grazing. Finally, we request that you consider reducing grazing activities within logged and burned areas to allow them to recover post project.	Thanks for your comment. Project design criteria • Range–1 The range manager will work with the timber sale officer with respect to the timing and location of logging operations. Timber harvest within the project area is not anticipated to impact ongoing grazing operations. All gates must be closed while livestock are within the allotment adjacent to the harvest units. • Range–5 The botanist, invasive species specialist and range manager will work together to determine whether prescribed fire or other vegetation restoration activities will require resting portions of the pasture treated.• Range–6 If any fences are damaged during burning operations, repairs must be made immediately to prevent livestock from entering areas outside of established allotments.• Range–7 The range manager will work with fire management to determine timing and location of prescribed fire. Burn blocks should be planned in a manner that does not interrupt planned livestock management on the allotments. All burns will be coordinated with the District Range Management Specialist.

Category	Commenter ID#	Summary of comments	Summary Response
TES Plants	265	Lithosol habitat is very fragile and should be avoided with ground disturbing activities. The Wallowa rice grass and White fleabane species should be fully buffered and protected from ground-disturbing activities. We are concerned that cumulatively, across the Forests they occupy, sensitive Calochortus populations are being eliminated or diminished by various timber sales and road construction. We ask that the Forest Service protect any sensitive or TES plant populations from ground-disturbing activities through buffers of at least 100 feet to prevent this cumulative loss. This should include both Calochortus macrocarpus v. maculosus populations identified. (See DEIS p.183.)	Project Design Criteria (FEIS Appendix J) would be used to protect all sensitive plants in the project area. Identified treatment units falling outside of areas already inventoried for the presence of TES plant species would be evaluated for the need for further survey work. Those areas would be cleared for treatment through documenting the results of further surveys or through documenting the rationale why further surveys would not be necessary. This work will be overseen by the zone botanist. Known TES plant populations would be identified as needed on the ground and or on maps for implementation prior to road grading and other road improvements, designation of parking areas and landings, and logging, with work overseen by a journey level botanist. No road construction activities, or staging areas (such as landings, parking, piling) are allowed on non-forested habitats such as lithosols, grasslands, or meadows. PDCs also call for activities to avoid disturbing Davis fleabane/Snake River Daisy populations adjacent to Cold Springs Road (FS 4680) and feeder roads such as 4680200,4680208, 4680212, 4680220, 4680219, and 4680170; and avoid ground disturbing activities on known TES plant sites.
Plant diversity	265	The “Native plant diversity” scoring system used in Table 1 is apparently absurdly biased by the inclusion of non-native species occurrence.	Thanks you for your comment, the table has been changed to show only native scores. However, in doing so the score changed by 0.1 percent.

Category	Commenter ID#	Summary of comments	Summary Response
Implementation	243	Much of the trust and agreement built on this project is because of demonstration marks from the Blue Mountain ID team that inspired confidence. The same team will not be responsible for the actual marks and implementation. Given the acknowledgement that these are complex prescriptions, the Forest Service must be able to demonstrate they are adequately equipped to meet the same standards of the planning team or identify resources to be so equipped.	The IDT worked with Wallowa-Whitman forest staff and implementation personnel to develop an implementation guide that will bridge the IDT vision presented in the FEIS to the implementation on the ground. The FEIS has an updated section of project design criteria (FEIS Appendix J) that will serve as the foundation for the implementation guide. The team is also consulting with ICO experts to present a LJCRP specific ICO training to the implemetation crews and bring silviculture staff and prescriptionist up to speed on ICO techniques and prescription development.
Implementation	226	During implementation, I encourage the Forest Service to utilize the new tools from the Farm Bill that authorizes normal timber sales to be sold using designation by prescription. Using this form for implementation will reduce the implementation costs.	The implementation tools used will depend on contract authority determined to be most appropriate.

Category	Commenter ID#	Summary of comments	Summary Response
Implementation	225, 243, 263	Due to the complicated nature of the Lower Joseph Creek Restoration Project design features, migration measures and other proposed implementation guidelines we request a chance to review the project's implementation plan. We also request that we are provided with an annual implementation monitoring plan. A lot of trust has been build with the Blue Mountain Restoration Team but this team will not be responsible for implementing the project. Given that there are complex prescriptions, the Forest Service must demonstrate that they have the resources and expertise to implement the planning team's vision.	The IDT is currently working with Wallowa-Whitman forest staff and implementation personel to develop an implementation guide that will bridge the IDT vision presented in the FEIS to the implementation on the ground. The draft impelemntation plan was provided to the Nez Perce Tribal staff for review, and the final will be on file with the Wallowa Mountains District, Joseph, OR. We welcome input on the implementation and monitoring plan. The FEIS will have an updated section of project design criteria that will serve as the foundation for the implementation guide. The team is also consulting with ICO experts to present a LJCRP specific ICO training to the implemetation crews and bring silviculture staff and prescriptionist up to speed on ICO techniques and prescription development. The implementation plan for the LJCRP is a living document and is not a part of the NEPA process, although it is founded its propoed activities and project design criteria (FEIS Appendix J).

Comment Letters from Agencies

United States Department of Interior

Comment # 6

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
620 SW Main Street, Suite 201
Portland, Oregon 97205-3026

IN REPLY REFER TO:
9043.1
ER14/0726

Electronically Filed

February 6, 2015

Attn: Ayn Shlisky
72150 Coyote Road
Pendleton, OR 97801

Dear Ms. Shlisky:

The Department of the Interior has reviewed the Draft Environmental Impact Statement for the U.S. Forest Service Lower Joseph Creek Restoration Project, Wallowa-Whitman National Forest, Oregon. The Department has no comments on the document at this time.

We appreciate the opportunity to comment.

Sincerely

Allison O'Brien
Regional Environmental Officer

United States Environmental Protection Agency

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

OFFICE OF
ECOSYSTEMS, TRIBAL AND
PUBLIC AFFAIRS

February 12, 2015

Ayn Shlisky
Blue Mountains Restoration Team Lead
72510 Coyote Rd.
Pendleton, OR 97801

Re: EPA Region 10 comments on the Lower Joseph Creek Restoration Project Draft Environmental Impact Statement (DEIS) (EPA Project number 14-0003-AFS).

Dear Ms. Shlisky:

The U.S. Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (DEIS) for the proposed Lower Joseph Creek Restoration Project (Project) in the Wallowa-Whitman National Forest in Oregon. Our review was conducted in accordance with EPA responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act (CAA).

The DEIS analyzes the range of effects of three alternatives: the no action alternative and two action alternatives. The action alternatives are designed to restore, maintain, and enhance forest and rangeland resiliency to natural disturbances; protect natural resources at risk due to uncharacteristic wildfires and insect and disease outbreaks; contribute to local economic and social vitality; modify fire behavior potential; and improve future forest, range, and fire management opportunities. Project components under Alternative 2 (the preferred alternative) include thinning and mechanical fuel treatments across 22,119 acres, including 2,600 acres in Class 4 riparian habitat conservation areas (RHCAs); the application of fire on up to 90,000 acres (planned and unplanned); 82.6 miles of road reconstruction, and 12.6 miles of new temporary road construction. Proposed watershed improvement activities include the closure of 16 miles of road; the decommissioning of 25 miles of road; and the provision of aquatic organism passage at six sites within the planning area. Alternative 3 would address issues raised in scoping by reducing the number of acres treated within RHCAs and other land use allocations, eliminating the harvest of trees over 21 inches diameter at breast height (dbh) and by holding road densities static for fisheries and wildlife objectives relative to the current condition.

The EPA is supportive of the overarching goals and objectives of the proposed project, and we find the DEIS to be clear and well organized. We also appreciate the Forest's responsiveness to issues raised during the scoping process. In particular, we appreciate the effort taken to distinguish between Class 4 RHCAs and Class 1, 2 and 3 RHCAs in the preferred alternative. Overall, we find the treatments proposed under Alternative 2 to align well with the broad body of science emerging about dry and moist mixed conifer forests[1]. We also prefer the road-related actions proposed under Alternative 2. We find these to more fully support needed reductions in fine sediment to streams within the planning area.

[1] http://www.fs.fed.us/pnw/publications/MMC_Synthesis_24Feb14.pdf

Printed on Recycled Paper

A key element of the preferred alternative is the proposed harvest of young grand fir, Douglas-fir, and Lodgepole pine that are over 21 inches dbh. While the DEIS makes clear that the intent behind the removal of these trees is to restore species composition towards the historic range of variability (HRV) and to promote forest resilience, it does not fully disclose the circumstances under which those trees would be removed. We recommend the FEIS include a marking guide for the removal and retention of young grand-fir, Douglas-fir and Lodgepole pine. The draft marking guide developed by the Ochoco Forest Restoration Collaborative[2] may provide a reference point for the development of a marking guide for the Lower Joseph Creek Restoration Project. We further recommend that the FEIS clarify the way in which older trees will be identified. The DEIS references the "Van Pelt guidelines"[3] but does not commit to a particular methodology. Because retention of older trees (regardless of diameter) is a key component of the preferred alternative, it would be helpful to reviewers to have a clear idea of how those trees will be identified.

With regard to proposed activity within the RHCAs, we are pleased to note that the preferred alternative focuses active management on higher gradient (Class 4) RHCAs. These riparian zones are more likely to exhibit the fire regime of the adjacent upslope environment and benefit from silvicultural treatment to restore the natural fire regime. We also note, however, the challenges associated with restoring complex, dynamic systems, and with understanding our ability to affect those systems. Resilience can be difficult to measure – due in part to data availability and in part to the tools at our disposal. Given these restraints, there is a need to employ a strong monitoring and adaptive management approach. The scope and scale of the Lower Joseph Creek Project present an excellent opportunity to understand how treatments, such as those proposed in the RHCAs, may affect ecological interactions at the landscape scale. We recommend that the FEIS and ROD highlight the need to employ multi-party monitoring, and to track the results of management efforts and follow disturbances and recovery efforts over a long term within the RHCAs. Having this information will give managers the ability to inform subsequent management decisions with what was learned from previous management decisions and thus make appropriate adjustments.

Based on our review, we are rating the DEIS as LO (Lack of Objections). We appreciate the opportunity to review and comment on the DEIS, and we look forward to furthering our understanding of this and other projects that develop through the Eastside Restoration Strategy. If you have any questions about our review, please contact me at (206) 553-1601, or by electronic mail at reichgott.christine@epa.gov. Or you may contact Teresa Kubo of my staff at 503-326-2859 or by electronic mail at kubo.teresa@epa.gov .

Sincerely,

Christine B. Reichgott

Christine B. Reichgott, Manager
Environmental Review and Sediment Management Unit

Enclosure:
1. EPA Rating System for Draft Environmental Impact Statements

[2] Appendix G - Criteria to guide decision-making on the removal/retention of grand fir and Douglas-fir in 384 acres within the Wolf project http://a123.g.akamai.net/7/123/11558/abc123/forestservic.download.akamai.com/11558/www/nepa/95968_FSPLT3_1658824.pdf

[3] Franklin, J. F., M. A. Henstrom, R. Van Pelt, J. B. Buchanan, and S. Hull. 2008. The Case for Active Management of Dry Forest Types in Eastern Washington: Perpetuating and Creating Old Forest Structures and Functions. Page 105 *in* W. D. o. N. Resources, editor.

2

U.S. Environmental Protection Agency Rating System for
Draft Environmental Impact Statements
Definitions and Follow-Up Action*

Environmental Impact of the Action

LO – Lack of Objections
The U.S. Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC – Environmental Concerns
EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO – Environmental Objections
EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU – Environmentally Unsatisfactory
EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 – Adequate
EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 – Insufficient Information
The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 – Inadequate
EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February, 1987.

Wallowa County Board of Commissioners

WALLOWA COUNTY
BOARD OF COMMISSIONERS
STATE OF OREGON

541-426-4543, X 130
FAX: 541-426-0582
e-mail:slcommissioners@co.wallowa.or.us

CHAIRMAN, MIKE HAYWARD
COMMISSIONER, PAUL CASTILLEJA
COMMISSIONER SUSAN ROBERTS

TOM MONTOYA, FOREST SUPERVISOR
1550 Dewey Ave.
Baker City, OR 97850

RE: Lower Joseph Creek DEIS (LJCDEIS)

Pursuant to 40 CFR1506.2 Wallowa County Board of Commissioners has been granted cooperation agency status in the development of Lower Joseph Creek planning process.

Pursuant to 40 CFR 1508.12 Wallowa County has special expertise with respect to the Lower Joseph Creek Watershed. Since 1993 with the completion of the first edition of the Wallowa County/Nez Perce Tribe Salmon Habitat Recovery Plan (the Plan), through the establishment of the Wallowa County Natural Resource Advisory Committee, to the revision of 1999 of the Plan and the update of 2002 of the Plan, the Wallowa County Board of Commissioners has continued to identify concerns and conditions with regard to watershed conditions in Wallowa County. The Plan is incorporated into the Wallowa County Land Use Plan. Wallowa County has developed, completed, and adopted as part of their Salmon Habitat Recovery Plan the Lower Joseph Creek Watershed Assessment.

Pursuant to 40 CFR 1508.5 Wallowa County has special expertise relating to the physical environment, custom, culture and local tax base as defined in the Wallowa County Land Use Plan in 2009.

According to the regulations, federal agencies shall cooperate to the fullest extent possible with State and local agencies to reduce duplication any inconsistency of a proposed action with any approved State or local plan.

Therefore to ensure that the federal agency fully and adequately considers the effect of its LJCDEIS on the physical environment, culture, and tax base of the citizens of Wallowa County, Wallowa County Board of Commissioners hereby requests as a cooperating agency that the LJCDEIS is consistent with the Wallowa County land use plan and our custom and culture.

The following are our comments on the LJCDEIS:

Errata (highlighted in red)

- **Page 11** *says page 1*

  Comment: Page numbers are off.

- **Page 62 -** While forest management likely had affected vegetation pattern by the 1930s, it is the best source of data available on

- **Page 54** - **Stem Exclusion (SE)**. In this structural stage, trees initially grow fast and quickly occupy all of their growing space, competing strongly for sunlight and moisture. Because trees are tall and reduce light, understory plants (including smaller trees) are shaded and grow more slowly. Species needing sunlight usually die; shrubs and herbs may go dormant. In this stage, establishment of new trees is

- **Page 54 - Understory Reinitiation (UR)**. As the forest develops, a new age class of trees (cohort) eventually g ets established after overstory trees begin to die or because they no longer fully occupy their growing space.

- **Page 55** - **Old Forest (OF)**. Many age classes and vegetation layers mark this structural stage containing large, old trees. Snags and decayed fallen trees may also be present, leaving a discontinuous overstory canopy. The drawing shows a single-layer stand of ponderosa pine reflecting the influence of frequent surface fire on dry-forest sites (**old forest single stratum; OFSS**). Surface fire is not as common on moist sites or common on cold sites, so these areas

- **Page 71** - Historically, western pine beetle *(Dendroctonus brevicomis)* has caused the most damage in the California pine regions, but this insect has caused loss of **Page 97** *Within this project area there is the Chesnimnus Cooperative Travel management Area. This is a joint agreement between the Wallowa-Whitman NF and the Oregon Department of Fish and Wildlife where there are identified seasonal road closures. The closures are in effect 3 days prior to the rifle bull elk season through the end of the rifle bull season (approximately 10/25 – 11/27). The objectives of this closure are to protect soils and wildlife habitat, minimize harassment of wildlife, maintain adequate bull escapement, and promote quality hunting.*

- **Page 102** *Some tribal comments, concerns, values and beliefs required interpretation to more fully describe and disclose effects to Tribal values by alternative. In all cases these interpretations considered the tribe's public comment responses, as well as issues shared at government to government consultation, or staff to*
  staff, coordination meetings.

  Comment: Typo

- **Page 123** - The action alternatives propose to re-open old temporary roads. Additionally, the action alternatives also proposes to construct approximately 12.6 miles of temporary road. Temporary road reconstruction would re-establish sever

- **Page 130** – Thinning, logging, and prescribed fire may facilitate exotic species invasions by disturbing existing vegetation, exposing mineral soil, facilitating the spread of propagules, reducing shading, and increasing soil resource availability (Dodson et al. 2008) with the

- **Page 131** - Treatments in Alternatives 2 and 3 would have the most impact where post treatment takes density to less than 40% cover.

- **Page 135** - Fringed myotis appears to be most common in drier woodlands roosting in large trees and and snags. Alternatives 2 and 3 propose commercial harvest treatments on 16,700 acres and 10,200 acres respectively. Though snags are not prescribed for harvest, large snags will be removed due to safety and

- **Page 152 – Short-term uses/long-term productivity**

  Short-term effects of tree removal and prescribed burning will reduce inter-tree competition and free up growing space for residual trees and understory vegetation. Under all action alternatives, the proposed actions and associated design features would not affect long-term productivity of forest vegetation and timber resources.

  Unavoidable adverse effects

  There are no unavoidable adverse effects related to forest vegetation and timber resources.

  Irreversible/Irretrievable commitments of resources

  Under all alternatives, the proposed actions and associated design features would not involve or invoke irreversible and irretrievable commitments of forest vegetation and timber resources

- **Page 152**

  Comment: Remove *(Neil)*

- **Page 157** - Alternative 1 does not meet the purpose and need of the project because there would be no restoration of structure, density, composition or pattern, thus no restoration of disturbance processes at the landscape scale. Disturbances will

- **Page 202 -** Alternative 2 would reduce the high amount of open road densities by closing some open roads and decommissioning X already closed roads. Road maintenance would bring existing roads to a minimum maintenance standard.

- **Page 214** - However, indirectly, there is greater potential for long term surface erosion and sediment production under Alternative 3 because fewer roads are being closed conditions (remove word ??)and the proposed treatments will be less effective at moving the landscape toward a more resilient condition. Alternative 2 and 3 have

- **Page 231 -** Mechanical treatments are the same as Alternative 2; involving ground, sky line and helicopter (?) logging systems that include skidding, construction of temporary roads and landings.

Acronyms

Page v Acronyms

Comment: Add "PF" No definition found where used between pages 316 and 338

Forest Plan direction and other key planning policies

Page 4 ⊓⊓ *Other relevant Federal and State laws and regulations, and Forest Service manuals and handbooks.*

Comment: Where do you list the county policies that are part of the Wallowa County Natural Resources Plan? They include: Wallowa County Comprehensive Management Plan; Lower Joseph Creek Watershed Assessment; Upper Joseph Creek Watershed Assessment; Wallowa County Custom and Culture, Wallowa County Economic Base; Travel Management Plan for Wallowa County; Alternative W of the HCNRA Comprehensive Management Plan.

U.S. Forest Service Region 6 Sensitive wildlife species

Page 12 of Table 8: Mammals –Gray Wolf
available (Witmer et al. 1998).

Comment: It should say " individuals or packs" may take livestock when ungulates are less vulnerable or available or when wolves encounter livestock.

Page 14 of Table 8: Johnson's hairstreak
These butterflies occur within coniferous forests which contain the mistletoes of the genus Arceuthobium, commonly referred to as dwarf mistletoe. These plants are highly specialized and are known to occur on a number of different conifers (Schmitt and Spiegel 2008). Oldgrowth and late successional second growth forests provide the best habitat for this butterfly, although younger forests where dwarf mistletoe is present also supports C. johnsoni populations (Larsen et al. 1995,Miller and Hammond 007)LaBonte et al. 2001).

Comment: This makes no sense butterflies to plants?

Watershed, Riparian, and Aquatic Habitat

Page *20* *Watersheds that are functioning properly have terrestrial, riparian, and Aquatic ecosystems that capture, store, and release water, sediment, wood, and nutrients within their range of natural variability for these processes (USDA Forest Service 2011b).*

Comment: There is a great problem of using functioning properly here. If this is in the sense of PFC it is misused. If it is not, then many of us jump to the conclusions that you are talking of PFC so perception is reality and we need to better define. Maybe functioning is the correct wording and "naturally pristine" is the words out of place.

Issues driving alternatives

Other considerations

-Climate change adaptation

Page 34
_ Reducing the risk of increased nonnative species infestations through reductions in the extent of current nonnative species and prevention of future infestations

Comment: This cannot be done in these settings without successfully seeding vegetative species. The annual grasses we are dealing with require special active actions.

- Learning and adaptive management
Page 34
Adaptive management is an interactive learning process producing improved

understanding and improved management over time, with an emphasis on uncertainty about resource responses to management actions and the value of reducing that uncertainty.

Comment: Vegetation seeding should be looked at as a learning option under adaptive management.

Page 35 - 4. Gather information to test hypotheses
_ *Stream sedimentation and temperature monitoring by subwatershed*

Comment : Sediment needs to be during implementation but temperature is very long term. More to the point might be volume of water actually reaching the streams instead of evaporating or being used by the overpopulation of trees.

Alternatives Considered in Detail

Alternative 1 – No Action
Page 36 - *Current activities such as permitted grazing, dispersed recreation use, fire protection, and scheduled road maintenance would continue within the project area.*

Comment: This is not true. Roads that are currently closed administratively but still open on the ground would continue to be closed. This is not really a no action alternative.

Alternative 3
Page 37 - Table 11. Descriptions of planning alternatives for the Lower Joseph Creek Restoration Project
Alt 1 (No Action) - Road Network
No management actions would be taken to influence the direction or rate of change for moving existing conditions toward desired condition. Current activities such as permitted grazing, dispersed recreation use, fire protection,
and scheduled road maintenance would continue within the project area.

Comment: Closing roads already administratively closed is an action?

Page 37 – 38 *– Alternative 2 - Trees greater than 21" could be harvested, within the context of restoring forest resilience, safety or administration. Treatment extent generally based on priority treatment needs to move the landscape toward HRV.*

Comment: We agree with the following statement : *Page 27 - Hard diameter limits, such as a 21-inch dbh limit, can make it difficult to achieve desired composition in at least dry and possibly also mixed conifer forests, and compromise their future resilience (Franklin et al. 2013a, Stine In Press, 2014) Hard diameter limits, such as a 21-inch dbh limit, can make it difficult to achieve desired composition in at least dry, and possibly also mixed conifer forests, and compromise their future resilience (Franklin et al. 2013a).*

The Physical Environment
Water, watersheds and riparian habitat conservation areas

Page 51 Table 16. Water quality limited waters associated with the Lower Joseph Creek Restoration Project analysis area.
Davis Creek Flow Modification

Comment: Any idea what modification has been done to our knowledge Davis Creek has had very limited modifications? If they cannot be identified this comment needs removed.

Page 53
Current impacts to water resources include flow modification (three water quality limited streams), an elevated total road density on NFS lands in four subwatersheds, and degraded streambanks from grazing.

Comment: What evidence do you have that there are degraded streambanks from grazing? Also isn't flow modification usually due to irrigation or dams? Where do we have stream flow modification?

Sediment delivery to streams

Page 57
There are six culverts within the project area that are partial or complete barriers to the upstream migration of fish, creating an issue of habitat connectivity. The culverts are located on Broady Creek and tributaries (four culverts), Davis Creek, and Sumac Creek (Table 25). None of the six culverts identified are complete barriers. Some level of passage is evidenced by the presence of spawning and juvenile salmonids above each culvert. However, these culverts impede passage at various times of the year through a combination of excessive gradient, undersized to pass high flows, or being "perched" above the stream surface more than 4 inches. Habitat connectivity can be increased by removing or replacing these culverts.

Pages 57 and 58
Table 25. ***Salmonid fish species and age class blocked by culverts and miles of habitat blocked.***

Stream Name Location	FS Road Number	Fish Species	Adult/Juvenile Passage Barrier	Miles of Habitat Blocked
Broady Creek	4600505	ST,RT	juvenile and adult	3.0
WF Broady Creek	4600505	ST, RT	juvenile and adult	2.5
WF Broady Creek Tributary	4600505	ST, RT	juvenile and adult	0.5

Lower Joseph Creek Restoration Project

Stream Name Location	FS Road Number	Fish Species	Adult/Juvenile Passage Barrier	Miles of Habitat Blocked
EF Broady	4600505	ST, RT	juvenile and adult	2.0
Davis Creek	4602120	ST,RT	juvenile and adult	3.5
Sumac Creek	4600190	ST,RT	juvenile and adult	1.0

ST=Steelhead, RT=redband trout

Comment: Needs discussed with pictures.

Riparian vegetation
Page 59

Subwatershed Name	*Category 1*	*Category 2*	*Category 4*	*Category 1*	*Category 2*	*Category 4*
	RHCAs (acres) Total	*RHCAs (acres) FS*	*RHCAs (acres) Total*	*RHCAs (acres) FS*	*RHCAs (acres) Total*	*RHCAs (acres) FS*
Broady Creek	*875*	*587*	*1,407*	*1,085*	*143*	*143*
Horse Creek	*713*	*411*	*2,356*	*1,115*	*132*	*47*
Rush Creek	*1,174*	*108*	*2,178*	*552*	*464*	*215*
Lower Cottonwood Creek	*867*	*169*	*1,583*	*816*	*224*	*173*
Upper Cottonwood Creek	*806*	*716*	*2,179*	*1,996*	*130*	*130*
Peavine Creek	*997*	*643*	*1,698*	*1,276*	*166*	*166*
Total:	***5,432***	***2,634***	***11,401***	***6,840***	***1,259***	***874***

Comment: Repeat info from earlier.

Rangelands

Page 76 *In an evaluation of Blue Mountain ecology plot data, sixty-seven percent of the sampled plots in the moist upland herbland potential vegetation group within the LJCRP were in good to fair condition (Phases A and B). In the dry upland herbland potential vegetation group, eight percent of the sampled plots within the project area were in good or fair condition. Condition is evaluated on vegetation composition, such as cover of non-native annual grasses in relation to perennial bunchgrass cover, and the location of large areas of bare soil are in relation to plant cover, biological soil crust, and litter.*

Comment: The Lower Joseph Creek Watershed assessment was finished in 2014 and should be used as the basis for these assessments, not this older and larger scale with little to no actual data from the wastershed. USFS folks were the major pieces of the data collection and the write-up. Lower Joseph Creek's 28 C&T plots and 38 IIRH plots did not find the conditions as described.

Grasslands (Moist and Dry Upland Herbland PVGs)

Page 80 *Dry upland herblands are generally in fair to poor condition in the project area. The generally poor condition of dry upland herblands may be due to drier soil conditions and*

shorter growing seasons in droughty years which may make recovery slower than recovery of moist upland herblands, even when management is changed in a positive direction.

Comment: Those who have concerns about livestock grazing impacts on natural resources need to consider grazing in the context in which it occurs. Too often the term *grazing* is used generically, without context and without description of timing, intensity, duration, or kind or class of animal doing the grazing. To use the term grazing in a generic sense is meaningless. As noted by HYPERLINK "http://onlinelibrary.wiley.com.ezproxy.proxy.library.oregonstate.edu/doi/10.1111/j.1523-1739.2005.00115.x/full" \l "b6" \o "Link to bibliographic citation" Heady and Child (1994), the amount of time without grazing, when it occurs in the growing season, the degree of utilization, and when it occurs are the principal components of grazing plans. These factors must fit the ecological site, resources, and management objectives. When discussing grazing impacts, management objectives, the grazing plan, and degree of adherence to the plan should be described.

Comment: Need to point out that all of the C&T files survived fire and should be used. In the Summaries of the plot work is a much more detailed and accurate description of the range conditions in Lower Joseph Creek. In no way do they reflect the same conditions as are currently in the DEIS. Statements from these should be used in this DEIS.

OVERALL SUMMARY IIRH ASSESSMENT

Ecological site characteristics of the IIRH assessment sites ranged from open meadows and dry scabland areas to open forested sites. Topographically, these sites were located on mid to upper slopes, tops of ridges, and plateaus. The exception being IIRH site 34, which was located on a densely forested early seral grand fir/twin flower plant association on a plateau top in the Upper Cottonwood Creek subwatershed. Slopes ranged from less than 5 to greater than 60 percent. Using the IIRH site selection protocol (Williams 2010) an equal number of south and north facing slopes were selected to represent the LJCW. However, south and north facing slopes may not be equally represented within each subwatershed.

Condition trend is not determined with the IIRH analysis. However, data suggest that on the south facing plateau and ridge side slopes, north facing foot slopes and in the concave swales, current management appears to be maintaining ecological conditions. Soil erosion in the dry open meadows, scablands and the steep interslopes within the LJCW appears to be consistent with the hillslope hydrology, summer thunderstorms, and infiltration limitations of these shallow, rocky sites. Erosion on the north ridge and plateau slopes and in the concave swales also appear consistent with inherent hillslope hydrology. Soil stability is provided with clays and organic cementing agents such as root exudates, soil organism secretions, and biological crust organisms (Tisdall and Oades 1982; Bowker et al. 2008). Throughout the LJCW, the soils are generally finely aggregated, stable, and on porous sites with well vegetated mid to late seral perennial bunchgrass, annual grass and forb plant communities and where biological soil crusts are common. The soil pores retain water for plant growth, and allow for adequate infiltration, and percolation (Tisdall and Oades 1982).

Risks to all IIRH site conditions include the encroachment of annual cheatgrass and other invasive species. A decline in native bunchgrasses and an increase in annual vegetation were noted in some areas within the LJCW area. Current rangeland management focuseson site stability by maintaining the mid to late seral vegetation communities and maintaining enough surface protection to prevent accelerated erosion.

LOWER JOSEPH CREEK C&T PLOT SUMMARY

To attempt to monitor the long-term trend in the Lower Joseph Creek Watershed existing Condition and Trend plots were selected across the landscape. These plots were selected based on several criteria including: each allotment was required to have at least one C&T plot, the plot had to be located in an area that received adequate livestock use, and special areas such as proposed RNA's or areas with threatened, endangered or sensitive species or habitats were selected to have a plot. The site selection for C&T and EcoPlots locations for the Lower Joseph Creek Watershed Assessment was, decided upon by the Rangeland Sub-Committee, further information can be obtained from the project file. After selecting the existing plots available and within the established criteria, several new plots were established. New site location locations were carefully considered to make sure that representative sites were read that covered areas with data gaps in watershed. Twenty-eight plots were reread or read with this assessment.

The expected vegetation in the Lower Joseph Creek Watershed, as identified in the Plant Association of the Wallowa-Snake Province (Johnson and Simon 1987), is dominated by Idaho fescue, bluebunch wheatgrass and prairie junegrass. Sub-dominant species include; pinegrass, Sandberg bluegrass, onespike oatgrass, and the forbs; arrowleaf balsamroot, Wyeths buckwheat and silky lupine. Shrubs and trees that are expected to cover the landscape include snowberry, stiff sage, Ponderosa pine, Douglas fir and Tamarack.

This contrasts with the findings from the 2009 and 2011 readings of C&T plots which identified the dominant grasses as bluebunch wheatgrass, Idaho fescue and Sandberg bluegrass, and the sub-dominant species of prairie junegrass, arrowleaf balsamroot, Wyeths buckwheat, onespike oatgrass, silky lupine, pinegrass, Kentucky bluegrass and the introduced grasses of intermediate wheatgrass and timothy. Trees and shrubs found included Ponderosa pine, snowberry and riparian shrubs. Additionally invasive annual weeds including cheatgrass and ventenata were found.

These plots indicate a shift in the species in the plots from a dominance of Idaho fescue as the most abundant grass, to the dominance of bluebunch wheatgrass. Additionally Sandberg bluegrass is more prominent than expected in these plots.

Historically this watershed has been used heavily for a variety of activities, beginning with the presence of Native Americans. For centuries before, and since the white man's presence in the 1880's there has been logging, grazing, hunting, camping, wood gathering, site seeing and homesteading. These activities have precipitated the building of roads, railroad grades, fences, ponds and trails.

History also tells us that significant heavy grazing was conducted in the watershed in the early 1900's. By the mid 1900's grazing had become regulated, and by the 1980's significant changes had occurred in livestock management with rotational grazing and limiting numbers of livestock being used on the landscape.

Since the establishment of the C&T plot sites (starting in the 1950's), many of the activities described above have occurred in close proximity to the C&T plot sites. The vast majority of the C&T sites read for this analysis are located on the tops of ridges, the shoulders of ridges, or the plateaus that connect these ridges. Historically these areas have been used very heavily. Many ridge tops had "stock driveways" that were used to move the sheep bands from the winter grazing to the summer grazing. In addition, much of the Lower Joseph Watershed Assessment area is forested, and therefore attracted the early loggers as the plateaus are relatively flat and has excellent timber. No less than 13 of the total 28 sites were impacted in some way by the above-mentioned activities.

One of the disappointing aspects of the C&T plot results was the inability to calculate a definite trend on most sites. The C&T plot analysis indicates that the range condition has been impacted by previous activities as discussed. As a result, many of these sites show significant change from what is expected. The management changes incorporated 30 to 50 years ago by the natural resource managers and the private landowners has clearly moved most of the land in this watershed in an

upward trend. There are a few exceptions, but overall, the sites across the watershed are stable or improving.

Wildlife has been abundant, particularly elk. The Billy meadows area is the site where elk were released in Northeast Oregon in 1912. Today, the Chesnimnus unit, which encompasses part of the Lower Joseph Watershed Analysis area, is one of the prized elk hunting tag locations. The elk census shows over 5,000 elk in the Chesnimnus unit alone. Heavy use by wildlife is evident in many places within the assessment area.

The seral state found in the Lower Joseph Creek Watershed Assessment area based on the C&T plots are as follows: three sites show mid to late seral, (11% of the sites) four sites show mid seral (14% of the sites), six are mid to early (21% of the sites) and four sites are early seral (14% of the sites). Two sites are early to very early, two are very early (14% of the sites) and one site is very early to disclimax. These conditions show wide variance of conditions across the lower Joseph Creek watershed. Seral state could not be determined on three sites, and three sites showed they had been "prior converted" to either Intermediate wheatgrass or Timothy.

If we look into the causes we can identify that many of these C&T plots have had management imposed upon them, that has potentially altered the results compared the collective landscape. This makes us question if they should be included in the "seral state" final summary. Many of these sites have been impacted by management decisions such as a significant timber harvest that changed the potential of the site, and the site is no longer has the same ecological characteristics. Other sites have had ponds built in the middle of them, or fences and roads built in close proximity that have altered the grazing patterns and travel situations of cattle and wildlife. However, the large degree to which land management decisions and footprint have a presence throughout the entire watershed demonstrates that the C&T the data as a whole still has value.

Soil Stability tests were completed followed the protocol developed by Herrick et al. (2004).Where soil is rated between 1, unstable and 6 highly stable. Soil stability ratings within this watershed area should predominantly fall between 3 and 5 in the classification for soil stability.

Twenty-four sites had soil stability tests conducted both in areas without canopy cover and under canopy cover. Within the areas without cover, sixteen of these sites met expected stability and 18 sites met the expected stability in areas with canopy cover. Five areas without canopy cover and one of the canopy cover sites had a rating of at least 2.7, very close to the expected rating. Only three of the areas without canopy cover and 5 of the canopy cover sites had low stability ratings(less than 2.7).

To summarize, much of the C&T data indicates that positive management changes have already been made on most of the areas as indicated by an upward trend, where a trend could be determined. Although many of the sites could not lead us to an official trend; the data did show, from the species present, that general trends are encouraging in the Lower Joseph Creek watershed. There is still work to be done as some sites are not responding adequately to the change in management that has occurred, or has crossed over a threshold that limits their ability to respond, offering a new and limited site capability.

Habitat

Page 83 *Some non-native pasture grasses were planted in the past, notably after the1986 Wildcat fire. Like nonnative annual grasses, these species also compete with native species for available resources. Current nonnative pasture grass species are: Dactylis glomerata, Thinopyrum intermedium, Phleum praetense, and Bromus carinatus x cultivar.*

Comment: *Orchard* grass, Intermediate Wheatgrass, Timothy and California Brome. Include the common names so it is readable by the common folk.

Page 83 *Construction and use of roads contributes to the expansion of undesirable exotic plants and noxious weed populations throughout much of the forest. Roads are the primary spread corridors for weedy species as vehicles readily transport seeds on their undersides and muddy tires. Large populations of noxious weeds and exotic plants are found along roads that access forest land from agricultural areas*

Comment: The solution is seeding these disturb sites, and using aggressive non-native method as described in the (Isley & Birkmaier, 2014.

Page 84 *Non-native annual grasses and seeded forage grasses are not currently documented in the NRM database. The Forest Service's Blue Mountain Ecology program maintains a database with data collected from ecology plots and range condition and trend plots in key areas. Range monitoring key areas and ecology plots are subjectively selected to represent typical vegetation and condition; hence, the data cannot be directly extrapolated to the project area. In addition, ecology plots are not placed in highly disturbed areas such as landings, salting areas, water troughs, roadsides, quarries, or old agricultural fields where nonnative invasive species are most prevalent. However, the amount of cover in noxious weeds, non-native annual grasses, and seeded forage grasses documented on range and ecology plots likely represents what is typically found in the project area in general.*

Comment: As a cooperating agency Wallowa County should have been at least acknowledged that we just completed two different range land assessments and that they exist, since the fire of the building and were conducted with USFS personnel heavily involved.

Page 84 *Appendix H lists invasive plant species documented in the NRM database, and/or observed in the LJCRP area. The NRM database focuses on state listed noxious weeds, but can include any invasive plant of concern. NRM database also tracks invasive plant surveys as well as treatments.*

Comment: This is the only section (range) so far that I believe is poorly written and not objective. The IIRH includes all lands so it isn't bias just for those pieces of land that is used by grazing or roads or timber harvest so give a snapshot of overall rangeland health while the C&T plots give a perspective of the use areas. County's watershed assessment should be used for these references. Newer and more accurate info.

Management Indicator Species – Fish

Page 86

Table 41. Miles of habitat by stream for listed and sensitive fish species within the Lower Joseph Creek Restoration project area.

Stream Name	Steelhead Habitat (miles)			Redband Habitat (miles)	
	Spawn	Rear	DCH	Spawn	Rear
Swamp Creek	21.1	21.1	21.7	21.7	21.7
Davis Creek	12.3	12.3	12.3	12.3	12.3
Cougar Creek	12.1	12.1	12.1	12.1	12.1
Green Gulch -Joseph Creek	13.2	13.2	13.2	13.2	13.2
Broady Creek	12.2	12.2	12.2	12.2	12.2

Horse Creek	*9.9*	*9.9*	*9.9*	*9.9*	*9.9*
Cottonwood Creek	*18.8*	*18.8*	*18.8*	*18.8*	*18.8*
Peavine Creek	*10.0*	*10.0*	*14.0*	*14.0*	*14.0*
Rush Creek	*16.5*	*16.5*	*16.5*	*16.5*	*16.5*
Sumac Creek	*11.5*	*11.5*	*11.5*	*11.5*	*11.5*
TOTALS	*137.6*	*137.6*	*142.2*	*142.2*	*142.2*

DCH=Designated Critical Habitat. Steelhead DCH: Includes occupied habitat.

Comment: Seems really large numbers Cougar is only about 3 to 4 miles long. Must have used the USGS map layer.

Joseph Canyon Wild and Scenic River Corridor

Page 109

Table Mountain

Table Mountain accessed by Forest Service Road 4650, provides scenic viewpoints south and west across grassy hillsides and forested stringers into Joseph Canyon and the Joseph Creek Wild and Scenic River, and has been identified as an important place to view scenery by local residents.

Comment: Yet in Alternative 2 you don't leave open the roads necessary to use those viewing sites. From this statement you should leave those roads open to allow this viewing opportunity.

Scenic stability

Page 110 *Grasslands of the LJCRP area generally burned historically with replacement severity, and still do, although high levels of domestic livestock grazing in some areas have reduced fire extent and frequency relative to historical levels.*

Comment: There is no area in Lower Jo that has high levels of livestock grazing. This statement needs removed.

Landscape visibility

Page 111

Table 52. Proportion of the Lower Joseph Creek Restoration Project in each landscape visibility class

Visibility class	***Acres***	***%***
Foreground	*11,049*	*11*
Middleground	*21,999*	*22*
Background	*413*	*<1*
Other	*65,116*	*66*
Total	*98,578*	*100*

Comment: "Other" needs defined when it is more than 50% of landscape .... What is not within 1/2 mile to more than four miles? Recommend remove this piece from EIS.

Page 111 *Recreation*

There are 5 developed recreation sites including Coyote and Dougherty campgrounds, the Kirkland Cabin, the Joseph Canyon Viewpoint and the Frog Pond and Chico Trailheads.

Comment: Question their definition of developed? Needs checked for really developed. Only real developed are Coyote Dougherty and Joseph Overlook.

Permitted Uses

Page 114 *The closures are in effect 3 days prior to the rifle bull elk season through the end of the rifle bull season (approximately 10/25 – 11/27).*

Comment: This year it was 10/29 thru 11/17. It usually is only for 17 or 18 days. Needs changed

Vegetative Treatments:

Page 116 *- Stand data will be collected in September for a sample of stands within IRAs to model the existing quadratic mean diameter (QMD) in comparison to post-treatment QMD. If the QMD for proposed treatments in each IRA increases as a result of treatment, this may illustrate that the treatments' net effect is to shift the landscape toward the HRV, increasing the average stand diameter, and reducing the overabundance of stands with smaller average diameters. This will determine and indicate that the treatments meet the criteria of removing small diameter trees.*

Page 205 *- Collection of stand level data to determine the change in quadratic mean diameter (QMD) is occurring in September and the data will be incorporated as soon as it is collected. This data will be analyzed to show that the prescriptions increase the overall QMD within the treated stands by IRA. Tables 82-84 show the existing QMD compared to the post-treatment QMD.*

Comment: Reword the above statements on Pages 116 and 205, removing the reference to September and replacing with the verbiage on *Page 206 - Stand data is currently being collected in the field in IRAs in the LJCRP area. The FEIS will include results of these surveys relative to current, and projected post-treatment QMD.*

Description of Joseph Canyon, Wildhorse, and Cook Ridge IRA

Page 118 Wildhorse IRA (20,308 acres)

Following the Teepee Butte Fire, salvageable timber in excess of 12-inch DBH was removed from the upper flats of Cook Creek. About 4 miles of permanent road and 1 mile of temporary road was constructed to facilitate salvage harvest within both the Cook Ridge and Wildhorse Roadless Areas.

Comment: Repeat from above (previous page) Confusing.

Spatial and temporal context for project level effects analyses

Page *122* *For the effects analyses the spatial context being considered is the 98,600 acres of NFS lands (project area). The baseline year used for this analysis is the year 2014 as the existing condition. In this analysis, all past activities and events are included in the existing condition description. In the effects discussion, post treatment refers to the time the final activity is accomplished (assumed to be the year 2024), "shortterm" effects refers to effects over the 10-year period from the time the final activity was accomplished (year 2034). Beyond 20-years we will be considering effects as "long-term" (year 2054).*

Comment: Reasonably foreseeable future sales and plan 12 – OPINION & ORDER Case 3:12-cv-02271-HZ Document 140 Filed 12/09/14 Page 12 of 55. This discussion raises the question of is the current EIS analysis of reasonable foreseeable future plans.

amendments throughout the Forest adequate.

Effects common to all action alternatives

Page 123 ***Sediment from road construction, road decommissioning, and road maintenance activities.***
All new temporary roads and re-opened temporary roads would be decommissioned and re-vegetated directly following completion of harvest operations to help reduce compaction, increase infiltration rates, minimize surface erosion, and re-establish natural drainage patterns.

Comment: Improved species should be included in planning with specific monitoring designed to evaluate value vs. costs (economical and ecologically)

Page 124 ***Sediment from log haul***
During the wet season, log haul would only be permitted on asphalt and rocked roads when conditions would prevent sediment delivery to streams.

Comment: Define -- does this include snow winter operations? Lower Joseph Creek Should be including operations over snow. Should be left to line officer decision with appropriate mitigation.

Page 130 ***Forest vegetation***
Loss of forage and understory canopy cover through logging and burning activities may require a period of rest prior to grazing, depending on the time of year treatments occur, how much bare soil is exposed, and the condition of understory plants after treatments. This would have to be determined by the range manager and botanist after treatments have been implemented.

Comment: Reseeding these areas, preferably with improved grass and forb species reduces the weed problem, gives forage production long term in place of short term rest and retards the re-invasion of to many trees. Improved species seeding should be used to help mitigate this issue.

Recreation

Page 138 *Direct effects to recreationists accessing dispersed camps in the project area or other areas would occur on roads during haul periods. The presence of large trucks or an increased frequency of traffic may discourage road use to these sites until the road work subsides. When roads are being constructed/reconstructed visitors may expect delays or closures during work periods.*

Comments: Road closures cause a reduction in the ability of the public to access their dispersed camp sites, their favorite hunting sites and the ability to view or harvest the natural resources such as wildlife, berries and mushrooms. Most of the roads in Lower Joseph creek are far from the riparian areas. If a road is not close to a riparian and causing erosion issues then it should be kept open.

Page 139 *Proposed road closures or decommissions would not affect developed campgrounds or trails.*

Comment: The increased road closures in Alt 2 would have a negative impact on the ability of the public to utilize their national forests. Particularly the closures of the roads to the overlooks on Table Mtn.

Page 139 *Long term effects of harvest and post-harvest treatments would solicit various responses from permit users. Permit holders like mushroom pickers, would find short term benefits from open, disturbed mixed conifer forest stands, whereas berry pickers may view the loss of berry patches as a negative effect.*

Comment: Wood cutters would be very negatively impacted. Maybe them the most as access is denied by road closures to some of the most productive locations on the forests.

TES Plants

Page 145 *Grazing is the most likely ongoing activity that could complicate restoration efforts, especially in dry open forest habitats, where palatable browse and grass is most accessible. Pasture condition should be assessed by the district range specialist and the district botanist after restoration treatments occur and prior to putting livestock out to graze.*

Comment: Those who have concerns about livestock grazing impacts on natural resources need to consider grazing in the context in which it occurs. Too often the term *grazing* is used generically, without context and without description of timing, intensity, duration, or kind or class of animal doing the grazing. To use the term grazing in a generic sense is meaningless. As noted by HYPERLINK "http://onlinelibrary.wiley.com.ezproxy.proxy.library.oregonstate.edu/doi/10.1111/j.1523-1739.2005.00115.x/full" \l "b6" \o "Link to bibliographic citation" Heady and Child (1994), the amount of time without grazing, when it occurs in the growing season, the degree of utilization, and when it occurs are the principal components of grazing plans. These factors must fit the ecological site, resources, and management objectives. When discussing grazing impacts, management objectives, the grazing plan, and degree of adherence to the plan should be described.

Page 146
Table 63. Status of forest management projects in the Lower Joseph Creek Restoration Project Area aside from forest vegetation management.
15 Livestock Allotments

Comment: It was 18 earlier, which is it?

Page 146 *The analysis area for aquatic resources for the LJCRP includes portions 15 livestock grazing allotments. Bank alteration, browsing of shrubs and high fine sediment levels along creeks within the active allotments are being addressed by improved management and administration of the grazing that occurs in riparian areas. The majority of stream reaches within the allotments are inaccessible to livestock due to steep terrain. Condition of aquatic and riparian habitats should improve as a result of these improvements in management. Increased monitoring will be occurring to document whether the expected changes occur.*

Comment: Agree with this statement. This statement alone rebuts the statement on page 180.

Cumulative Effects Summary for aquatic habitat

Page 148 *Grazing and roads are the two major management activities in the analysis area contributing to fine sediment effects.*

Comment: Is there data to back this up? Our records from MIMs says that there is little fine sediment issues. The document should not point fingers without showing the data to back it up.

Page 148 *- There are no other vegetation projects planned in the project area for the foreseeable future.*

Comment: This is incorrect. Wallowa County's Lower Joseph Creek Watershed Assessment plans for vegetation projects to be accomplished on the acres not mechanically treated at this time, to be treated in the future (possibly 20 years).

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Page 151 *Once the travel management planning effort is complete, the network of designated roads, trails, and areas will be displayed on a MVUM. This planning will cover the LJCRP area, and may result in travel management actions in addition to, and/or different from those proposed by the LJCRP.*

Comment: This is different from what we heard in NRAC, we were told that this area would be finished with road issues once this project is complete. Please clarify if this is the decision of road closures for this area or if we will endure this pain again with TMP for this area.

Page 152 *Invasive plants are a threat to aquatic and riparian habitats due to their negative effects to native ecosystems. Currently, invasive plant infestations are limited in extent in the LJCRP area (see invasive plants specialist's report). Infestations are mainly located in RHCAs, travel corridors (i.e. roads). Treatment of invasive plants infestations along roads will be treated as part of the prevention strategy for the LJCRP. Impacts to aquatic and riparian habitats and aquatic species may result in ` impacts but will improve riparian conditions in the long-term.*

Comment: The plan needs to reduce open sites as quickly as possible following disturbance. This means seeding these sites with an aggressive plant that will germinate and occupy the site quickly. Many of the native plants don't do this. Invasive of annual grasses should be considered an emergency and non-native grass and forb species should be included in the mix.

Comment: Lower Jo should set up a large scale study. A third of the disturbed sites should not be seeded, third seeded with native and third seeded with nonnative improved species. Monitoring set up to follow through with results of invasives.

Aquatic habitat

Page 158 *Under alternative 1, current management activities in the analysis area that are likely to be contributing to elevated fine sediment levels are livestock grazing and roads.*

Comment: This is not always true. Need to change to either say "may be contributing or qualify that past management of livestock grazing.

Page 158 ***Management indicator species – fish***
Alternative 1 of the LJCRP may impact individual Snake River steelhead and their habitat, but will not likely contribute toward loss of viability to the population or species (MIIH).

Comment: If you do nothing, how is it impacting anything?

Page 158
Watershed and aquatic habitat conditions would likely remain in their current condition for the next 5 years. Current levels of fine sediment in the majority of streams in the analysis area are above the 20% threshold used to indicate adverse impacts to salmonids.

Comment: Current levels of fine sediment in the majority of streams in the analysis area are below the 20% (page 188) threshold used to indicate adverse impacts to salmonids.

Comment: Mims data from LJ shows that all but one stream was within fine sediment threshold. They included Broady, Cougar, Cottonwood, Horse, Davis, Joseph, and Swamp.

Tribal - ***Need to address the true value of the landscape over economics***
Page 167 *Tribal comments state that conservation of forest landscapes should be valued over economic benefits. The belief is that past National Forest management created the current unhealthy landscape conditions through uneven age management practices (i.e. "clear cutting") designed to maximize timber volume (NPTEC July 8, 2014). Therefore, for some tribal members who equate forest management with economic motivations, the effects of No Action would be preferred.*

Comment: It should be added here that little to none of this area has ever been clearcut.

Page 174 *- Mechanical harvesters and forwarders would be required to work on a layer of residual slash placed in the harvester path prior to advancing the equipment.*

Comment: In Wallowa County logging over frozen ground (4 inches) and snow cover (one foot) has shown that no detrimental soil conditions have occurred (See soil monitoring report on the Buck Pilot Project). These ground conditions should be included along with the use of slash matting. (Required should not be used here as well as only slash residual use.

Page 182 *- There would be approximately 16,000 acres of harvest treatment (acres treated that remove timber volume) and there would be approximately 10,400,000 cubic feet* (62mmbf) *of timber volume removed as a result of restoration treatments.*

Page 195 *- Alternative 2 results in restoration activities with commercial timber production of 10,400 ccf per year for 10 years; mechanical, pre-commercial, stand* treatment *on 820 acres per year; 404 acres of restoration treatment by hand labor; and a variety of road projects.*

Page 221 *– There would be approximately 10,200 acres of harvest treatment (acres treated that remove timber volume) and there would be approximately 6,600,000 cubic feet (39mmbf) of timber volume removed as a result of restoration treatments.*

This would be a direct beneficial effect of alternative 3 , but lower than alternative 2.

Also Tables 13 and 64.

Comment: The estimated volume to be removed under Alternatives 2 and 3 is grossly conservative based on the treatments to be implemented on the ground. Wallowa County's Watershed Assessment gives a much closer estimate of volume to be removed 17,680,000 cubic feet (105mmbf) and 11,220,000 cubic feet (66mbf) respectively. Wallowa County believes that their closer estimate of volume to be removed should be used in the LJCDEIS to avoid future objections to the process.

Noxious weeds:

Page 145 *- The possible increase in the number of non-natives due to project activities coupled with transport by livestock could increase the risk for areas outside of the actual project and treatment area boundaries (Merriam et al. 2006).*

Comment: Wildlife, deer and elk, should also be mentioned as vectors of weed transportation.

Non-native invasive plants

Page 183 *Planned temporary roads are common to both alternatives, while mileage appears to be low (12.6 miles), the temporary roads would be constructed through weed populations and the risk of spread is high.*

Comment: Why are we not mitigating this issue with stated weed control program for these roads to stop the spread of these weeds? We should have a plan that includes seeding all disturbed sites to slow the spread of annuals. Additionally at some of the sites improved species should be included.

Page 187

Table 80. *Total Road Density by subwatershed within the Lower Joseph Watershed Alternative*

Subwatershed Name	*Alternative 1*		*Alternative 2*		*Alternative 3*	
	Total Roads	*Total Rd Density*	*Total Roads*	*Total Rd Density*	*Total Roads*	*Total Rd Density*
Cougar Creek	*55.4*	*2.64*	*54.3*	*2.59*	*54.5*	*2.60*
Sumac Creek	*54.6*	*3.21*	*54.6*	*3.21*	*54.6*	*3.21*
Lower Swamp Creek	*41.5*	*1.76*	*41.5*	*1.76*	*41.5*	*1.76*
Davis Creek	*33.6*	*2.90*	*33.6*	*2.90*	*33.6*	*2.90*
Watershed Total:	*152.0*	*1.26*	*141.9*	*1.20*	*143.2*	*1.20*

Comment: If they are closing more roads in Alt 2 then why are the numbers the same? If this is all that it will change then we should not even consider alternative 2 road closures.

Page 189 - ***Management indicator species – fish***

Alternative 2 of the LJCRP may impact individual Snake River steelhead and their

Habitat (MIIH), but will not likely contribute toward loss of viability to the population or species. Impacts to Snake River steelhead may occur as a result of short-term immeasurable increases in fine sediment (see effects to aquatic habitat section).

Current levels of fine sediment in the majority of streams in the analysis area are below the 20% threshold used to indicate adverse impacts to salmonids. In these areas short-term potential increases in fine sediment from proposed prescribed burning and thinning activities are unlikely to result in measurable increases in fine sediment in streams in the analysis area.

Most streams in the analysis area currently exceed the 20% threshold offine sedment. Commercial thinning activities are limited to about 1822 acres. Prescribed burning activities would occur in a larger area but the effects relative to sediment will be mitigated by implementation of the project PDCs. Short-term potential increases in fine sediment from proposed prescribed burning and thinning activities are unlikely to result in measurable increases in fine sediment in streams in the LJCRP area

Comment: These statements are in direct conflict with each other. our MIMS results of 11 sites only shows one stream above the 20% and only 2 of the 3 sites on that stream were over the threshold. Additionally, fine sediment is not the only issue. When fine sediment is found above the threshold, then additional monitoring should be used to attempt to determine the cause. In most places we know of fine sediment issues in Lower Joseph Creek are a left over legacy of past management that is no longer occurring.

Comment: It should be pointed out that these impacts are not wide spread they will be in a few sites across the vast watershed and they are also spread not only over the space but over time which reduces the potential impact to any one localized group of fish.

American marten

Page 191 *In alternative 2 on 114 acres of the marten habitat that is being commercially harvested, is in the prescription 'GS_Mod' (group selection – moderate). Group selections can include openings that are 1/2-4 acres. Martens respond negatively to low levels of habitat fragmentation (Hargis et al. 1999), it may be that openings as large as 4 acres will reduce the quality of the habitat for marten. In the longer-term, as trees continue to grow, American marten would continue to use these harvested areas for some or all of their life history functions.*

Comment: It needs to be pointed out that even though we are removing some of these larger trees, the treatment is opening up the sites, reducing competition which will increase the rate of growth on the remaining trees thereby producing better, healthier and more fire resistant sites. ID the tradeoff of some short term concerns for good long term results.

Rocky Mountain elk

Page 192 *Table 46 summarizes forest plan standards for road density by management area, and alternative. The HEI standard of >=0.5 on MA1 is met in both the Lower and Upper Joseph watersheds. The percent cover on the summer ranges remains above 30%, the forest plan direction, though is reduced to 33% in the Upper Joseph watershed. The reduced cover may increase forage quantity and quality especially in the spring. However, this reduced cover may decrease hiding cover (>=40% canopy closure), particularly in the Upper Joseph watershed and the entire winter range habitat. In the Lower Joseph watershed, on the winter ranges, the percent cover is reduced to 16% (also see Table 45).*

Comment: Cover is over rated as a need for elk (see the vast numbers in the Zumwalt). There is still plenty of cover and feed in the area.

The social environment

Page 194 *Activities under this alternative, such as timber harvest and restoration, will have economic consequences depicted below. The existing economic conditions related to timber harvest and restoration are depicted above (for example, Table 84 depicts employment and specialization in logging and wood products manufacturing).*

Comment: Where are these? I do not find the tables present showing that information.

Financial efficiency

Page 195 *Table 83 summarizes the financial efficiency for alternative 2. The PNV indicates the financial efficiency of the timber sale and restoration activities, including all costs (that are not included in the stumpage rate) and revenues associated with the activities and required design criteria (information obtained from Timber specialist assigned to the project). Restoration activities examined under this alternative include (among others) resiliency treatments, prescribed fire, and planting (assuming all group selections may potentially be planted, although in practice natural regeneration would be used wherever possible). A 4 percent discount rate was used over a period of 10 years (2014–2023), the estimated time required for full implementation of the project.*

Comment: These are not the numbers that came from the Eric White report. Where did these come from! If you are going to completely change a section as cooperating agency we should have been consulted on this.

Page 195 *Table 83. Present Net Value for alternative 2.*

Proposed Action Alternative	*Present Value of Benefits*	*Present Value of Costs*
BENEFITS		
Revenue from commercial timber volume	*$1,940,126*	
COSTS		
Non-Mechanical		*$4,576,354*
Mechanical		*$1,192,525*
Commercial timber harvest		*$2,088,231*
Sum of discounted benefits And costs	*$1,940,126*	*$7,857,110*
Present Net Value	*$(5,916,984)*	

Comment: Table 5 summarizes the Present Net Value (PNV) of timber harvest and restoration treatments from the Forest Service perspective and includes all costs and benefits (revenue) associated with these activities (that are not already included in the stumpage rate - see Methodology section for more details). A 4 percent discount rate was used over a period of 10 years (2014–2023), the estimated time required for full implementation of the project. Over the 10-year treatment period, the LJCRP is expected to cost the Forest Service between approximately $6.4 and $7.9 million. This is the discounted cost to the government of the project. The anticipated revenue from the timber harvest (benefits) is expected to range from approximately $10.2 to $16 million. Therefore, the positive PNVs are $8.1 million for the Proposed Action and $3.8 million for Alternative 3.

No Action Alternative Proposed Action Alternative 3

PV Costs $0, $7,857,110 $6,390,190

PV Revenue $0, $15,953,726 $10,164,068

Present Net Value $0, $8,096,617 $3,773,878
Table 5. Present Net Value of LJCRP Treatments over 10-year Period, 4 Percent Discount Rate

Heritage

Page 199 *The greatest threat to heritage resources is ground disturbing activities associated with mechanical treatments. Alternative 2 mechanically treats 42% more area than Alternative 3 (see Tables 66 and 89)*

Comment: These tables don't answer the issue. Answer is 21936 acres mechanical treatment alt 2, 12778 acres Alt 3. Difference is 9158 acres, that is 42% of the Alt 2 acres.

Concern for value of landscape over economic values

Page 200? *The Tribe believes that economic values often drive forest management projects, including the LJCRP, at the expense of landscape resource values. The estimated economic net value from timber harvest for Alternative 2 is -$5.9 million, demonstrating that positive economic net value is not a motivation for this alternative to be the preferred alternative.0*

Comment: This should be a positive 8.9 million according to the report we received.

Scenery

Page 202 *Alternative 2 would reduce the high amount of open road densities by closing some open roads and decommissioning X already closed roads. Road maintenance would bring existing roads to a minimum maintenance standard. Numerous closed roads would be temporarily opened for commercial material access and removal and re-closed after harvest operations are complete. Also see effects common to all action alternatives.*

Comment: Alternative 2 would restrict people from being able to see these vista's and views, as in not being able to view from the end of Table Mtn into Peavine/Jospeh/Lupine and the same for Horse Pasture Ridge

Table Mountain

Page 203 *Table Mountain has been identified as a valued place by local residents to view scenery. Alternative 2 would increase visibility into stands along FS Road 4650, and 4650120 through 4650170 through single tree selection, intermediate, savanna, and stand improvement by removing trees in the foreground and middleground, enhancing large tree character, opening up the mid canopy, and creating greater foreground diversity. Sixty percent (403 acres) of these treatments would be intermediate, non-commercial (stand improvement), or savanna treatments, and 40% (281 acres) would be single tree selection treatments. Over the long-term, all of these treatments would maintain structural diversity and the natural landscape mosaic, improve the scenic character and the scenic stability of the area, and appear slightly altered in the short-term when viewed in the middleground.*

Comment: Your failure to leave open the 4650135 road reduces the value of Table Mtn. scenic. When you restrict the public from such sites it is apparent you are attempting to shut us out from the really great places on our forest.

Generally Small Diameter

Page 205 *Collection of stand level data to determine the change in quadratic mean diameter (QMD) is occurring in September and the data will be incorporated as soon as it is collected. This data will be analyzed to show that the prescriptions increase the overall QMD within the treated stands by IRA. Tables 82-84 show the existing QMD compared to the post-treatment QMD.*

Comment: Needs replaced with what was found in Sept.

Joseph Canyon IRA

Page 206 *As indicated above, the intent would be to leave a larger QMD following treatment under Alternative 2 by removing generally small diameter trees. Stand data is currently being collected in the field in IRAs in the LJCRP area. The FEIS will include results of these surveys relative to current, and projected post-treatment QMD.*

Comment: Update/replace

Cook Ridge IRA

Page 206 *As indicated above, the intent would be to leave a larger QMD following treatment under Alternative 2 by removing generally small diameter trees. Stand data is currently being collected in the field in IRAs in the LJCRP area. The FEIS will include results of these surveys relative to current, and projected post-treatment QMD.*

Comment: Replace/update

Wildhorse IRA

Page 206 *As indicated above, the intent would be to leave a larger QMD following treatment under Alternative 2 by removing generally small diameter trees. Stand data is currently being collected in the field in IRAs in the LJCRP area. The FEIS will include results of these surveys relative to current, and projected post-treatment QMD.*

Comment: Replace/update

Socioeconomics

Page 212 Heritage

Relatively speaking, alternative 2 may pose a higher cumulative risk to heritage values over time than alternative 3 as it proposes twice the number of mechanical treatments, and will most likely be implemented further into the future than Alternative 3.

Comment: Earlier it was 42%

Inventoried Roadless Areas

Page 213 (top of page) *Past activities and ongoing fire suppression and grazing continue to add to the departure in density, composition, structure and characteristic disturbance regimes, while the actions proposed under this project are designed to restore that departure and disturbance. The overall effect would be beneficial as the LJCRP would provide additional decision space to make more ecologically informed fire*

management decisions, increase acceptance in the use of characteristic fire and help maintain ecosystem composition and structure as described in RACR.

Comment: Since this has been grazed for over 300 years, how is grazing add in to the departure? If you want to discuss the increased intensity and improved management to the equation maybe it can be kept in. If not take it out.

Rocky Mountain elk

Page 192 *To reduce disturbance to big game on winter ranges, timber sale activities, including log haul, would be implemented in ways to minimize activities during periods of low temperatures and accumulated snow depths, typically from December 15 through March 31st.*

Page 225 *To reduce disturbance to big game on winter ranges timber sale activities, including log haul, would minimize activities during periods of low temperatures and accumulated snow depths, typically from December 15 through March 31st.*

Comment: This has not been agreed to, in fact we have discussed winter logging as a preferred alternative to reduce soil damage, compaction etc. We are over MO in Chesnimnus and even though we are below numbers we want on forest lands, these small disturbances are acceptable in this area.

Old growth management areas, late-old forest habitat, and connectivity corridors

Page 226 *Alternative 3 would allow for prescribed fire across much of the planning area, and 413 acres of treatment in seedling/sapling and pole stands within connectivity corridors. Some snags and logs may be consumed by prescribed fire, while new snags and logs are recruited from fire-killed trees. The burning, and small tree thinning in connective corridors will not have a measurable negative effect on the quality or function of the corridors*

Comment: By not entering the riparian areas and connecting areas it will reduce the ability to enter prescribed fire because of the fuel loads and the risk of losing these areas to the fire.

Financial efficiency

Page 227 *Table 97 indicates that alternative 3 is not financially efficient for the timber harvest and required design criteria, as well as for all restoration activities noted above, as indicated by the negative PNV, -$5.1 million. However, since the PNV does not include non-market values, such as ecosystem services as discussed above, the benefits are likely underestimated.*

Comment: These numbers are not consistent with the report presented during the alternative development and are wrong! Should be plus $3,773,878

Economics Tribal:

Page 231 *- Generally, the effects would be the same as alternative 2, but the estimated economic net value from timber harvest for alternative 3 would be -$5.1 million, compared to -$5.9 million for alternative 2. This demonstrates that positive economic net value is not a motivation for this alternative.*

Comment: This is the Present Net Worth Value to the Federal Government. The overall economic benefit to Wallowa County and Northeast Oregon is over $100. million as shown in

the Wallowa County Lower Joseph Creek Watershed Assessment and should be identified in the document.

Comment: These basic numbers need reviewed, explained or changed. They are not the numbers in the specialist report nor do they in any way describe the expected timber harvest off these lands.

Socioeconomics

Page 236 *Under Alternative 3, the cumulative effects on access to FS lands are less than the effects from alternative 2 since there are no new closures or decommissioned roads.*

Comment: There shouldn't be any effect from current conditions because we are not proposing to close and roads. We are leaving it as is.

Page 236 *Recreation: Other on-going and reasonably foreseeable vegetation treatments in the project area will reduce the opportunities for substitute behavior when the preferred recreation site is unavailable. As a result, individuals may choose to stay home, which would decrease visitor spending and consumer surplus to a greater extent than estimated in the direct and indirect effects analysis. However, the cumulative effects to the social and economic impacts from recreation cannot be precisely described. Based on the available information, the effect to visitor spending and consumer surplus from on-going and reasonably foreseeable actions is not expected to change. Although Alternative 3 will likely have less short-term disturbances to recreation (from smoke and limited access) than the Proposed Action, the long term effects to recreation will be also be less improved viewsheds and opportunities to recreate in a healthy forest with reduced risk of wildfire.*

Comment: Increased risk of catastrophic fire needs pointed out as increased risk for alt 3.

Roads:

Page 97 *- The LRMP direction for road densities by management areas calculated at a subwatershed is: MA1 <= 2.5 mile/square mile; MA3 <=1.5 mile/square mile; and HCNRA <=1.5 mile/square mile. The road density estimate does not take into account off-road vehicle use on OHV trails or closed roads, or cross-country travel.*

Page 121 *- The WWNF forest plan and the CMP for the HCNRA describes management areas related to resource issues. For certain management areas, there are road densities described as standards and guidelines to address certain resource concerns (see wildlife section describing road densities relative to elk habitat, above). In addition, the Biological Opinion on the WWNF LRMP for Snake River Salmon and Steelhead (1998) described a 2 mile/square mile road density as a term and condition for 5th field HUCs to limit the potential impact on listed fish and their habitat.*

Page 187 *- The road density for both watersheds in the LJCRP area are under the requirements of the 1998 Biological Opinion for Snake River LRMPs for Snake River Steelhead (2 miles per square mile of total roads). There are a number of subwatersheds that contain Snake River steelhead that have elevated road densities (Tables 79 and 80). The higher road densities, which are an indication of fine sediment delivery to fish bearing streams, would have an effect on steelhead and redband trout production. These higher densities are found in three subwatersheds in the LJCRP area.*

Page 192-193 *The post-project road densities would also be above forest plan standards in subwatersheds. Additionally of concern within the analysis area is the unregulated OHV and full-sized vehicle use of closed roads, which has been shown to negatively affect elk and elk habitat. Together with the loss of cover and higher road densities particularly in the Davis, and Lower Swamp Creek subwatersheds, elk distribution and habitat effectiveness may be negatively affected.*

Page 225 *- Alternative 3 proposes higher miles of open road than in alternative 2. The project would temporarily increase open roads by about 12.6 miles. Post-project road densities in 6 out 10 subwatersheds remain above Forest standards, and there is little change from the existing condition. Excessive open roads have negative effects on habitat effectiveness by taking land out of production, reducing the effectiveness of cover, and increasing disturbance to elk.*

Comment: Wallowa County believes that two following comments from the LJCDEIS show that the conservative Wallowa – Whitman National Forests Standard road density requirements are not needed in this watershed and that the existing condition is more than satisfactory for elk and steelhead trout.

1. *Page 9 – 10 - Within the Lower Joseph project area there are parts of two WMUs: Chesnimus and Sled Springs (Figure 11, Chapter 3). Table 7 shows the recent trend in populations and the management objectives for the two management units. Currently the populations and bull/100 cows ratios are exceeding the management objectives set by ODFW in both management units.*

   According to ODFW (Pat Mathews, ODFW, pers. comm. 2014), the Chesnimnus unit is currently 40% over population management objective with up to 70% of the population occurring on Zumwalt prairie private lands. The ODFW is currently trying to reduce elk numbers and return the elk population to management objective of 3,500 by harvesting antlerless elk on Zumwalt private lands. Elk numbers on the National Forests are much below desired levels, so very little antlerless elk harvest occurs on the national forest portion of the Chesnimnus unit. Managing road density is important for security areas and bull escapement during hunting seasons.

2. *Page 85 - Steelhead are widely distributed in Joseph Creek including throughout the LJCRP analysis area. The current population level (abundance) of the Joseph Creek steelhead population has remained above 1,000 spawners (ICTRT 2010) since 1996 and is rated at very low risk (NOAA 2014). The Joseph Creek steelhead population currently meets the viability criteria with a viability rating of Highly Viable (ICTRT 2007)*

Appendix B - Forest plan direction, and other policies, laws, regulations, and agreements

Page 313

Key federal and state policies applicable to the LJCRP Policies, (NEPA), Council on Environmental Quality Regulations (CEQ), Clean Water Act Laws, (CWA), Endangered Species Act (ESA), Regional Water Quality Control Board Treaties and (CWA), Endangered Species Act (ESA), Regional Water Quality Control Board Regulations Requirements, Invasive Species Executive Order (EO) 13112 of February 3, 1999, 2013 National Strategic Framework for Invasive Species

Management, 2013 Oregon Dept. of Agriculture Noxious Weed Policy and Classification System, Migratory Birds EO 12962 of January 10, 2001, Environmental Justice EO 12898 of February 11, 1994, Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds), ORS 2013 564.105 (Responsibility to protect and conserve native plants by Oregon state law), USDA viability regulation 9500-004 2008, USFWS 2007 Recovery Plan for Silene spaldingii (Spalding's catchfly), and other relevant Federal and State laws and regulations, and Forest Service manuals and handbooks. This project is also consistent with the Wallowa County Community Wildfire Protection Plan (Wallowa County 2006a). Prescribed burning of forest fuels (logging slash or natural) will comply with Oregon Administrative Rules (OAR) 629-048-0001 to 629-048-0500 (Smoke Management Rules) within any forest protection district as described in OAR 629-048-0500 to 0575.

Analysis and documentation for this project has been prepared according to direction contained in the aforementioned policies, laws, treaties, and regulations

Comment: You have missed the following documents: Wallowa County Nez Perce Tribe Salmon Habitat Recovery Plan, Wallowa County Comprehensive Management Plan ;Custom and Culture of Wallowa County , Oregon; Wallowa County's Economic Base;Lower Joseph Creek Watershed Assessment, Article 36 SALMON HABITAT RESTORATION known collectively as Wallowa County's local Land use plan.

Forest plan direction, standards and guidelines applicable to the LJCRP

Page 325 *WLD-S7: Maintain open-road densities for all 61 subwatersheds at or below 1.35 mi./sq. mi., except subwatershed 9L, which would be maintained at or below 1.9 mi./sq. mi. open road densities. (New)*

Comment: Remove (new) from this whole section of range objectives/standards and guides. These are the rules that were created during the CMP process and are currently being utilized. Pages 334 through 338 have (new) that needs replaced.

Page 340 *Riparian Habitat Conservation Areas (RHCAs)*

- *PACFISH interim RHCAs will be delineated on all streams as follows: 300 feet horizontal distance on all fishbearing streams, 150 feet horizontal distance on non-fishbearing perennial streams and wetlands greater than one acre, and 100 feet horizontal distance on all non-fishbearing intermittent streams and wetlands less than one acre. The interim RHCA widths apply until a Watershed analysis is completed, a site-specific analysis is conducted and described and the rationale for modification of interim RHCA boundaries is presented, or the direction is terminated. A watershed analysis was completed for the Lower Joseph Creek Watershed in 2010.*
- *For areas of precommercial thinning utilize the Blue Mountains Project Design Criteria for activities approved within the RHCA.*

Comment: Do they not recognize our watershed assessment finished in 2014?

Appendix J - Project Design Features, Mitigation Measures
and Best Management Practices

Page 382 INVP – 10

Native plant materials are the first choice in revegetation for restoration and rehabilitation where timely natural regeneration of the native plant community is not likely to occur. Non-native, non-invasive plant species may be used in any of the following situations: 1) when needed in emergency conditions to protect basic resource values (e.g., soil stability, water quality and to help prevent the establishment of invasive species), 2) as an interim, non-persistent measure designed to aid in the re-establishment of native plants, 3) if native plant materials are not available, or 4) in permanently altered plant communities. Under no circumstances will non-native invasive plant species be used for revegetation

Comment: Much of our landscape can be considered an emergency due to the invasion of annual grasses, allowing for non native species to be seeded following disturbance.

Page 385 Scenery

Scenery – 10

Pruning tree limbs at variable heights (6' to 20') to expose large diameter trees along the Forest Road 3965 for shaded fuel break provide more variety in the foreground.

Comment: Where is this? 3900 roads are in the southern part of the county, not Joseph Creek. It either needs removed or the correct road number used.

Recommendation: Wallowa County Board of Commissioners believes that the best course of action is a blend of alternatives. The Vegetative Treatments of Alternative 2 and the Road System of Alternative 3 shows the best way to restore the landscape and provide for the custom and culture of Wallowa County.

WALLOWA COUNTY BOARD OF COMMISSIONERS

Chair, Mike Hayward	Commissioner, Susan Roberts
Commissioner, Paul Castilleja	ATTEST: Executive Asst., Tammie Hanson

Union County Board of Commissioners

UNION COUNTY
BOARD OF COMMISSIONERS

STEVE McCLURE, Commissioner
MARK D. DAVIDSON, Commissioner
JACK HOWARD, Commissioner

1106 "K" AVENUE LA GRANDE, OR 97850 PHONE (541) 963-1001 FAX (541) 963-1079 TTY 1-800-735-1232

February 12, 2015

Tom Montoya
Forest Supervisor
Wallowa Whitman National Forest
P.O. Box 907
Baker City, OR 97814

Re: Lower Joseph Creek Restoration Project DEIS

Dear Mr. Montoya:

Thank you for the opportunity to comment on the Lower Joseph Creek Restoration Project. I am pleased that this project is moving forward and will be implemented this year. The jobs that this project will bring and maintain in the area are significant because Union County consistently experienced double digit unemployment from 2008 to 2012. As a Union County Commissioner, I am concerned with the management of the National Forests in and near Union County as it affects the economic, ecological, and social wellbeing of Union County. To that end, I would like to provide the following comments on the proposed Lower Joseph Creek Restoration EIS:

- I am a member of the Wallowa Whitman Forest Collaborative and support the consensus positions that the collaborative has submitted regarding the treatments in the project area.
- The DEIS needs to provide clarity For example, the amount of commercial logging broken out by management area or by logging system was not specified. Please include this in the final iteration of the project.
- I do not agree with or support the use of the Oregon Wild Maps to determine treatments. The treatments are based in science and are located strategically on the landscape to reduce uncharacteristic fire behavior, restore resilience to stands of trees and improve the habitat quality on the landscape.
- The Forest Service should focus on the economic analysis and make this a priority in the current EIS. Restoration should be ecological, but it should also contribute to the socio-economic status of the local communities. Boise

Tom Montoya
February 12, 2015
Page 2

Cascade, LLC currently employs over 600 people in Union County and approximately 100 people in Umatilla County. We've lost 24 forest contract companies and 357 family-wage jobs since 2005 in the Northeast Oregon 7-county Blue Mountain Region. The mills in the area are also running below capacity.

- Climate Change should be a large factor in all projects. I am concerned that the Forest Service's project does not adequately account for climate change. This area is moisture limited with regards to growing capacity and we are concerned that leaving too many trees on the landscape will contribute to the susceptibility of the forest to insects, disease and wildfire.
- I support the collaborative in their proposal to remove trees larger than 21" that are younger than 150 years old as described in the collaboratively developed consensus statement. Many times these large trees are encroaching on the early seral species and creating an unsustainable landscape where trees are continually stressed due to lack of moisture. Removing these large, young trees will help to create a resilient landscape that is better equipped to deal with fire.
- Hunting and tourism are major draws for the local area. The forest should focus on creating more forage for the large ungulates within the area. Removing some trees will create more forage in the project area and help to develop habitat for those animals dependent on open forests. Additional treatments to create/improve forage would be appropriate for the area.
- I support the removal of trees from the Riparian Habitat Conservation Areas (RHCAs). I support the treatments but would like more information on how the 25 foot buffer was chosen and what riparian management objectives are being met through these treatments.
- The cumulative effects of not being able to place 48,000 acres of prescribed fire on the landscape over the next 10-20 years are of concern. There is a large backlog of prescribed fire on the Wallowa-Whitman and I am concerned that the Forest Service will not be able to fully implement the project which could have a significant effect on the desired outcomes of this project. Are there other ways to emulate prescribed fire to treat the fuels on the landscape that do not have as many requirements? Has the Forest Service identified higher priority areas that are in need of fire re-introduction?
- It is important to create more OFSS on the landscape and proposed treatments in the Lower Joseph Project area are appropriate because these treatments will benefit our local economies and also increase habitat for the threatened White-headed woodpecker.
- I am concerned that economics was not a key issue identified for this project. While I understand that there will be an economic benefit coming from both of the action alternatives, the amount and type of economic benefit, both to the Forest

Tom Montoya
February 12, 2015
Page 3

- Service and the local communities could vary significantly. Having economics identified as a key issue would provide better clarity regarding jobs, economic return, return on the investment, as well as a better understanding of how this project fits with the multiple-use mandate.
- The Forest Service should look at the effects of this project on wildlife at a forest-wide scale because this scale will better represent the true viability of the wildlife.
- When conditions prompt the consideration of road closures or decommissioning, I recommend the U.S. Forest Service utilize a site specific collaborative process in coordination with the local County Government, involving all interested stakeholders to determine a solution that maintains motorized public access as well as meeting resource protection goals.

In conclusion, I believe that the project should move forward quickly because not managing the area will result in increasing density classes, increasing fire danger, and decreasing economic health of the local communities. Reduction of the risk of wildfire while adhering to the multiple use mandate of the national forest is important and should be the top priority of the Forest Service. Thank you again for the opportunity to comment on this project. I look forward to seeing the final decision and how it will affect the local economy.

Sincerely,

Mark D. Davidson
Commissioner

Appendix J - Project Design Features, Mitigation Measures and Best Management Practices

Project Design Features

Sensitive Plants

TESP – 1

Identified treatment units falling outside of areas already inventoried for the presence of TES plant species will be evaluated for the need for further survey work. Those areas will be cleared for treatment through documenting the results of further surveys or through documenting the rationale why further surveys would not be necessary. This work will be overseen by the zone botanist.

TESP – 2

Known TES plant populations will be identified as needed on the ground and or on maps for contract implementation prior to road grading and other road improvements, designation of parking areas and landings, and logging, with work overseen by a journey level botanist.

TESP – 3

Avoid placement of staging areas (such as landings, parking, piling) on non-forested habitats that have not been previously impacted such as lithosols, grasslands, or meadows. Where placement of staging areas on unimpacted non-forest habitats are necessary to facilitate operation consult with district botanist and soil scientist.

TESP – 4

Avoid disturbing Davis fleabane/Snake River Daisy populations adjacent to Cold Springs Road (FS 4680) and feeder roads such as 4680200,4680208, 4680212, 4680220, 4680219, and 4680170.

TESP – 5

Avoid ground disturbing activities on known TES plant sites.

Special Habitats

BIOD – 1

Avoid disturbing natural seeps and springs, wet meadows, moist meadows, this includes removing shrubs and trees.

BIOD – 2

Leave tree islands in coniferous forest for conservation of native mycorrhizal fungi, yew, wet areas when these features are found or suspected in units. Mycorrhizae should always be suspected in coniferous forest units.

BIOD – 3

Maintain woody debris as per guidance from eastside screens to provide habitat for nonvascular plants and fungi.

BIOD – 4

Avoid yarding over rock outcrops and talus slopes. Leave trees and shrubs adjacent to rock outcrops, talus as a microclimate buffer.

Noxious Weeds

INVP – 1

The invasive plant program coordinator will determine and prioritize noxious weed treatments for existing and new sites, following ground disturbing activities.

INVP – 2

Identified treatment units falling outside of areas already inventoried for the presence of invasive plant species will be evaluated for the need for further survey work. Those areas will be cleared for treatment through documenting the results of further surveys or through documenting the rationale why further surveys would not be necessary. This work will be overseen by the invasive plant program coordinator.

Known invasive plant populations will be flagged and/or mapped prior to road grading and other road improvements, designation of parking areas and landings, and logging, with work overseen by the invasive species specialists. Equipment operators will receive maps with known sites and instructions to avoid flagged or otherwise identified areas.

INVP – 3

Minimize prescribed fire and ground disturbance from activities such as logging operations and road grading where invasive plant populations, including non-native invasive grasses, are found. Consult local botany or invasive weed specialist prior to implementation for seasonal operation restriction or other mitigations such as equipment washing or avoidance of known populations.

INVP – 4

Do not disturb Meadow Hawkweed in Swamp Creek, or other locations, such as the new meadow hawkweed population on 4600596, within the project area, through ground disturbance that will create bare soil or move seeds or vegetative parts of meadow hawkweed plants to new locations. Machinery used in Swamp Creek Meadow must be washed prior to leaving site.

INVP – 5

No parking, decking or piling on established weed sites.

INVP – 6

Prioritize rehabilitation of landing piles, burn piles, and skid trails with input from botanist, hydrologist, and/or soils specialist. Follow PNW Invasive Plant Program Preventing and Managing Invasive Plants Prevention Standard 2 and FSM 2070.3 with direction and approval from local botanist. .

Range

Range – 1

The range manager will work with the timber sale officer with respect to the timing and location of logging operations. Timber harvest within the project area is not anticipated to impact ongoing grazing operations. All gates must be closed while livestock are within the allotment adjacent to the harvest units.

Range – 2

There are numerous range improvements within the project area in addition to private land boundary fences in many locations. All improvements should be protected during timber harvest activities. If it is necessary to cut range fences, repair should be completed to Forest Service standard prior to use of allotment. These standards are available and should be made a part of the timber sale contract.

Range – 3

No trees used as anchor trees along a fence line shall be marked for harvest.

Range – 4

If it is necessary to cut a fence to enter a harvest unit where livestock are present, the purchaser must be required to close and secure the fence each day at the end of work activities.

Range – 5

The botanist, invasive species specialist and range manager will work together to determine whether prescribed fire or other vegetation restoration activities will require resting portions of the pasture treated.

Range – 6

If any fences are damaged during burning operations, repairs must be made prior to use of allotment to prevent livestock from entering areas outside of established allotments.

Range – 7

The range manager will work with fire management to determine timing and location of prescribed fire. All burns will be coordinated with the District Range Management Specialist.

Soils

Soils – 1

All skid trails must be approved by the Forest Service and should be designed to minimize the area affected by logging operations; use pre-existing skid trails at the discretion of the sale administrator and to the extent feasible.

Soils – 2

No mechanized equipment should operate within RHCA’s with slopes exceeding 35%.

Soils – 3

Use of harvest equipment will not be permitted when soils reach field capacity for moisture, to limit the potential of long-term detrimental soil disturbance. Alternatively, the operators and Forest Service can monitor activities to ensure rutting does not exceed 6” in depth.

Soils – 4

Placement of new temporary roads will be on deep soils, if it is operationally feasible. This will allow for adequate restoration of temporary roads and over time will leave less measurable detrimental soil condition across the proposed activity units. Lithosol (scab flats/rocky, shallow soils) and meadows will not be used for landings and skid trails; unless no other location is practical.

Soils – 5

The following are criteria for designated skid trails that would require more multiple passes in or around Class 4 stream RHCA. Limits are based on WEPP results and are designed to mitigate sediment delivery to waterways. Consult with the local soils specialist or hydrologist for exceptions.

First 100' from stream edge = 0-20% slope	Next 100' to 700' with slope < 35%	Skid trails not permitted within first 100’ of stream Skid trails are permitted perpendicular to channel beyond 100 feet.
	Next 100' to 700' with slope > 35%	Skid trails not permitted within first 100’ of stream No skid trails perpendicular to channel between 100-700 feet
First 100' from stream edge = 21% or more slope	Next 100' to 300' with slope < 35%	Skid trails not permitted within first 100' of stream No skid trails perpendicular to channel between 100-300 feet
	100' to 300' with slope > 35%	Skid trails not permitted up to 300’ of stream

Soils – 6

The treatment of legacy and created compaction (new and existing temporary roads) within and adjacent to activity units should be evaluated for remediation in accordance with the parameters outlined in Soils-8.

Soils-7

All necessary Detrimental Soil Condition surveys will be conducted prior to implementation. If surveys reveal areas where the DSC exceed Forest Plan tolerances of 20% or the DSC will likely be exceeded following implementation of the selected alternative then mitigation should be designed. If mitigation is not suitable for the site (ie shallow or vertic soils and/or topographic constraints) then the treatment area should be excluded from treatment. If there are any questions,

contact your unit soils specialist. Initial surveys will be contracted for the LJCRP during the 2015 field season after treatment units are identified when the draft ROD is published.

Soils – 8

Whenever possible, operate on a bed of slash to mitigate soil compaction. Operations over 4 inches of frozen ground or 2 feet of snow, will adequately protect all of the following soil types.

Soils with an Ash Component

- Soils with an ash component are very common in the LJCRP area. Ash soils are particularly susceptible to compaction and erosion. Therefore, care must be taken to maintain adequate ground cover, particularly on slopes.
- In deeper soils (>30cm) subsoiling is an appropriate mitigation in areas of compaction
- In areas of general disturbance, the top layer (A Horizon) should be pulled back over any disturbed surface. (Pull berms back over disturbed surfaces)
- Erosion control is very important for ash soils. A weed free straw or equivalent should be applied prior to seasonal precipitation on slopes exceeding 15%, adjacent to waterways and ditches (within 100 feet). See BMP AqEco-2 for additional information.

Vertic or Clay-Rich Soils

- Vertic soils typically have a high clay mineral content and are particularly susceptible to smearing and rutting.
- Vertic soils can be operated on with caution when the soil column is either frozen or completely dry, otherwise avoidance should be practiced.
- Subsoiling deeper vertic soils can be beneficial if there is enough organic material to incorporate. If organic material is limited, there are no practical mitigations for impacts to vertic soils.

Shallow soils

- Avoid operating on shallow soils (<10 in depth) unless over frozen ground/snow as described above.

Tribal Relations

Tribal – 1

Consult with The Nez Perce Tribe in compliance with Trust Responsibility NHPA, AIRFA, EO 13007, EO 13175, and other applicable Executive Orders and legislation, particularly if new information regarding sensitive traditional use sites, or other potential properties within the area of potential effect, are revealed or discovered

Tribal – 2

Once treatment areas are laid out and marked on the ground, maps of the area will be shared with tribes through on-going consultation to determine if previously unknown sensitive tribal areas could be potentially impacted.

Tribal – 3

The Forest should share operations schedules and treatment locations with the Tribes prior to management activities in an effort to minimize timing conflicts with, or impacts to, traditional uses such as plant gathering, hunting and fishing, ceremonial uses or family gatherings

Tribal – 4

If at any time within project planning or implementation Traditional Cultural Properties or Sacred Sites are identified or discovered the Nez Perce Tribe will be contacted and management plans and/ or protection measures will be developed.

Heritage Resources

Heritage – 1

Eligible, or potentially eligible, heritage resource properties (or sites) will be managed to achieve a “no effect” or “no adverse effect” determination whenever possible, in consultation with the Oregon State Historic Preservation Office (SHPO) and Advisory Council for Historic Preservation [ACHP (36 CFR 800)].

Heritage – 2

No effect to Heritage resources will be addressed through site avoidance strategies and other site management measures agreed to by the 2004 Programmatic Agreement (PA) between the Region 6 Forest Service, Oregon SHPO and the ACHP.

Heritage – 3

Project leaders or sale administrators shall coordinate with a qualified archaeologist during lay out and prior to mechanical treatments, such as timber harvest activities and all associated ground disturbance, to ensure all eligible, or potentially eligible sites using a no-disturbance buffer as recommended by the local archaeologist.

Heritage – 4

In event that properties are located during treatment, the project will be redesigned to ensure that the properties will be avoided as determined by a qualified archaeologist. Documentation of all located properties will be sent to SHPO. If avoidance procedures are not possible, or if any question exists as to the effectiveness of avoidance, the project shall cease immediately, and the Zone Archaeologist shall consult with the SHPO and ACHP pursuant to 36 CFR Section 800.13(b) to consider the discovery.

Heritage – 5

If bones, artifacts, foundations, or other indications of past human occupation are uncovered during the course of project ground disturbance activities will cease, and a qualified archaeologist will evaluate site conditions to access need for consultation with Oregon SHPO and Tribes

Heritage – 6

Locate and design landings and roads to avoid, minimize, or mitigate adverse effects to heritage resources

Heritage – 7

A qualified archaeologist will work with prescribed fire fuels specialists to design and implement mitigation measures to protect historic and prehistoric sites that contain perishable or wooden materials, or that are near rock outcrops containing rock art, shelters or other historic rock features

Heritage – 8

Low intensity/short duration fires are permissible at lithic scatters, can dumps, stone features, earthen features, and sites with deeply buried deposits. No mop up activities allowed within site boundaries

Heritage –9

Fire control lines should not be constructed through Heritage resource sites. Mop up activities are not allowed within site boundaries as determined by qualified archaeologist.

Heritage – 10

All eligible and unevaluated heritage resources will be avoided when constructing erosion control features such as water bars and check dams

Scenery

The following design criteria are developed to meet the intent of high to moderate scenic integrity objectives for the viewsheds. Vegetative treatments would meet the established VQO of Preservation, Retention or Partial Retention as viewed from use areas and travelways. See standards and guidelines from the Forest Plan (pp. 4-42-4-44), HCNRA CMP (Appendix C, pp C-18-19, C-86), and Joseph Creek Wild and Scenic River Management Plan (Landscape Management standards and guidelines 50-56).

Scenery – 1

Locate new landings out of seen areas or leave vegetative screen from Concern level 1 roads (OR Highway 3; FS Roads 4602090, 4602120, 4602080).

Scenery – 2

Skid patterns, slash, soil exposure and stumps should be visually minor or unnoticed.

Scenery – 3

Cut stumps at a height less than 4” in immediate foreground (300’).

Scenery – 4

Slash pile locations would not be within the immediate foreground, (300’) of Oregon Highway 3 where possible. When slash piles are necessary in this area they will be prioritized for treatment.

Scenery – 5

Limit naturally shaped openings to be a maximum of 5 to 10 acres in size with blended edges.

Scenery – 6

Develop marking guidelines to minimize the amount of paint seen from areas of scenic concern. Paint of backside (uphill) of leave trees or paint take trees along immediate foreground of Oregon Highway 3, FS Roads 46, 4602090, 4602120, and 4602080.

Wildlife

Unless noted, Design elements apply to Alternatives 2 and 3.

Trees

Wild – 1

No harvest of trees ≥ 21” dbh within MA15s, Goshawk PFA’s (map provided and or newly found sites), moist forest, large tree (≥ 20” dbh), closed-canopied (>60%) forests (marten habitat).

Wild – 2

Trees with stem damage, heavy stem decay, poor form, broken tops, numerous large branches, or other characteristics that make them unsuitable for commercial products would be retained for wildlife habitat when available, in the longer term; these trees may become quality snag habitat. Consider skips, or the design of ‘clumps’ in thinning units to avoid thinning in vicinity of these unique trees.

Wild - 3

No harvest of trees ≥ 21” dbh (Alternative 3).

Wild - 4

Retain designated leave trees damaged during logging operations in harvest areas, unless determined to be a safety hazard.

Snags

Wild – 5

Retain all snags (dead trees) during harvest and stand improvement treatments except where they create and operational constraint (skid trail or skyline corridor) or an imminent operational safety hazard.

Wild – 6

Removal of danger trees within the RHCAs, Dedicated Old growth (MA15s), Goshawk PFAs and Marten habitat areas is restricted. When felled from within these dedicated areas, only that portion of the tree within the roadway of the road can be removed. Danger tree determinations would meet Forest Service Danger Tree Policy and Guidelines.

Wild – 7

Utilize prescribed fire lighting techniques to help retain all snags during prescribed burning operations. Larger snags are of great value to primary cavity excavators and not easily replaced if loss occurs due to burning.

Wild – 8

For larger snags (> 20 inches DBH) at higher risk due to heavy fuels accumulations at the base, pullback of fuels or alteration of lighting techniques may be necessary prior to prescribed burning.

Wild – 9

In moist forests, because we are deficient in large snags, and in areas with known pileated woodpecker nests, prior to prescribed burning, rake duff away from the base of large live old growth trees and large snags with accumulations of bark and duff and/or use other protection measures where economically viable and reasonable to do.

Wild – 10

Prescribed burning during active nesting period (e.g. May 20 or post leaf-out) for nesting landbirds will be coordinated with district or forest biologist.

Wild – 11

Road Management - To retain snags and reduce disturbance, currently closed roads that are needed for log haul, and other road closures included within the ROD, would be closed immediately after project implementation (harvest/thinning, and pile burning).

Down Wood, Woody Debris, and Large Logs

Wild – 12

In all treated areas the minimum woody-debris ground cover listed in Table WL-1 below would be retained through all phases of the project where they currently exist. Existing large down logs (logs greater than 12”) would be retained during harvest and grapple piling activities. Standing dead trees within thinning units that present a safety hazard would be felled and left in place if the unit is deficient in woody debris.

Wild – 13

As part of the plan for retention of logs and snags, protection measures shall be used during prescribed under burning to reduce consumption of these large woody fuels needed for wildlife habitat and hydrologic stability.

Wild – 14

Large snags (>20” dbh) felled for safety reasons in RHCAs, MA15s, Goshawk PFAs, and marten habitat will be retained on site to contribute to coarse wood. During any prescribed burning, the objective is to retain these logs, use burning techniques that support retention of these structures.

Table WL-1 Forest Plan Standards for Down Woody Debris

Species	Pieces per acre	Minimum Diameter at Small End (inches)	Minimum Piece Length	Total Length feet/acre
Ponderosa Pine	3-6	12”	greater than 6 feet	20-40 ft.
Mixed Conifer	15-20	12”	greater than 6 feet	120-160 ft

Species	Pieces per acre	Minimum Diameter at Small End (inches)	Minimum Piece Length	Total Length feet/acre
Lodgepole Pine	15-20	8”	greater than 8 feet	120-160 ft

Goshawk

In order to meet Regional Forester’s Eastside Forest Plans Amendment #2, Goshawk Standards, the following measures would be applied:

Wild – 15

Protect known active and historically used (known nesting activity occurring at the site within the last five years) goshawk nest site from disturbance. Defer harvest from 30 acres of the most suitable nesting habitat surrounding all active and historical nest trees.

Wild – 16

Within the 6 mapped goshawk PFAs, no harvest in stands that are currently providing LOS source habitat for goshawks (>=20”dbh and canopy closure >=50% in the dry and >=60% in the moist).

Wild – 17

If a new goshawk nest site is located during monitoring (see Goshawk Monitoring) or sale preparation, the site would be protected by eliminating harvest on 30 acres of the most suitable nesting habitat around the nest site. A 400 acre post fledging area would be designated around the core nest area (if not already designated). Proposed harvest activities that move young stands toward a late old structure condition could occur. Late and Old (LOS) stands would be retained per Regional Foresters Amendment #2 (Senario A). Activities in the post fledging area would apply recommended guidelines for structural composition as described in Reynolds et al. 1992.

Wild – 18

No harvesting of trees >=21” dbh within PFAs, unless a safety hazard. If trees of snags felled for safety purposes, retain them on site for down wood.

Wild – 19

Restrict project activities within ½ mile* of an active goshawk nests between April 1 to August 31 to avoid possible disturbance of goshawk pairs while bonding and nesting. Prohibited management activities include all Forest Service and contracted activities, including but not limited to, such activities as timber harvest, non-commercial thinning, prescribed fire, and roadwork.

*In site-specific cases, the ½ mile distance may be reduced to ¼ mile along frequently traveled roads that would be used for haul routes, where the birds are habituated to traffic, or where topography and vegetation provide a buffer for noise disturbance. Consult District wildlife biologist for direction. Burning operations, non-commercial thinning operations in vicinity of post-fledgling area would generally require the ½ mile buffer.

Wild – 20

In the areas that are not providing LOS source habitat the intent is to enhance stands toward LOS habitat: the objective is to move young stands toward a late old structure. To the extent possible, retain multi-story characteristics, vegetation complexity, large snags, and large down logs. Consider designing unthinned patches (skips) near riparian, springs or seeps, as these can be favored by goshawks for nesting

Wild – 21

Closed roads within goshawk territories that have grown in with thickets would be maintained in an un-drivable state. Non-commercial thinning crews would leave sufficient clusters of trees along these roadbeds to prevent any vehicle access.

Wild – 22

Protect trees and snags ≥20” during prescribed fire operations using a number of methods including but not limited to raking, pull back, and altering ignition patterns to minimize loss of these structures within PFA.

Wild – 23

A map including the nest areas, post-fledgling areas, and ½ mile restricted disturbance area (April 1-September 30) will be provided to the purchaser.

Wild - 24

Because marten habitat is at the lower end of the RV, any harvesting within marten habitat (moist forests, large tree, closed canopy) is designed to maintain old forest characteristics. Canopy closure will remain ≥ 60%, and no harvest of trees ≥ 21” dbh in marten habitat. Maintain snags and large down wood that American marten need for denning, rest areas, and hunting. Large broken top and potentially hollow grand fir would be maintained for denning habitat.

Other Raptors / Pileated woodpeckers

Wild – 25

Contact district wildlife biologist for up-to-date raptor nest locations and activity status before implementation of management activities.

Wild – 26

To conserve nesting habitat of raptors or pileated woodpecker, consult the wildlife biologist to establish a nest zone buffer around any new, or existing, nests discovered prior to or during project layout and implementation and, if appropriate, to restrict activities within the nest area during occupancy, according to requirements of the species involved.

Wild – 27

Protect known (and active) pileated woodpecker nests during all harvest or prescribed burning activities. Maintain a no-cut buffer within 50 feet. Protect nest tree through the use protection measures such as raking and lighting techniques during prescribed burning.

Wild – 28

Raptors are particularly sensitive to disturbance during the reproductive season. Table WL-2

displays seasonal restrictions and nest protection standards for raptor species with known nest sites in or adjacent to the project area.

Effects to species can vary depending on the loudness and duration of the management activity and the topographical or vegetation screening between the management activity and the nest tree. This EIS permits waiver or adjustments to seasonal restrictions if recommended by the District wildlife biologist and approved by the District Ranger.

Table WL-2Summary of Raptor Timing Restrictions

Description	Timing-Activities Prohibited	Buffer for Timing-Activities Permitted	Timing – Activities Permitted	Management Restrictions At All Times
Occupied goshawk nest sites	Activities are prohibited: April 1 - August 31.	Within ½ mile of nest sites	Activities can occur: October 1- March 31	No management within nest stands
Occupied raptor nest sites	Activities are prohibited: March 1 – July 31	Within 660 feet	Activities can occur: August 1-February 28	No management within 100 feet of nest tree

Big Game

Wild - 29

Provide hiding cover in accordance with Forest Plan standards and guides by retaining non-thinned patches of trees throughout the stand. Avoid placing ‘openings’ along more heavily used open roads. Areas more critical for hiding cover include flat topography, along main roads (eg. FS 46, FS 4602, FS 4605, FS 4615, FS 4650, FS 4655, FS 4680), and along fringes of meadows. Hiding cover is defined as vegetation capable of hiding 90 percent of a standing adult deer or elk from human view at 200 feet.

Wild - 30

Winter Range (MA 3): Limit activities associated with this EIS that have the potential to disturb wintering big game. Coordinate seasonal operating restrictions with wildlife biologist if necessary.

Wild – 31

Known calving/fawning areas: Restrict timber harvest, non-commercial thinning, prescribed fire and road work from May 1st to June 30th. In areas not specifically identified for calving and fawning, instruct crews to watch for lone elk or deer. If crews see lone animals, they would search the immediate area for calves and fawns and avoid felling trees or igniting prescribed fire where young animals are discovered.

Connectivity

Wild – 32

To maintain wildlife connectivity corridors in the Dry Forest treatment units maintain ≥40 canopy closure. In the Moist Forest connectivity treatment units maintain ≥50% canopy closure. Connectivity corridors have been mapped, and a map will be provided to the timber sale purchaser.

Threatened, Endangered and Sensitive Species.

Goal: To protect and, manage habitat for the perpetuation and recovery of plants and animals which are listed threatened, endangered, or sensitive. (A list of these species can be found in the Forest Plan EIS.) To assure that management activities do not jeopardize the continued existence of sensitive species or results in adverse modification of their essential habitat.

Wild – 33

To prevent spread of diseases to amphibians including Columbia spotted frog and Rock Mountain tailed frog, gear, hoses and dipping buckets used to transport or move water from streams, rivers, or ponds needs to be disinfected by drying in the sun (must be completely dry inside and out) or washing with a chemical disinfectant before changing to a different water source.

Vegetation Management

Range of Treatments

This EIS analyzed the maximum range of treatments. Implementation of the selected alternative would have the ability to adjust treatment types to on the ground conditions following the guidance presented in the treatment decision matrix.

Treatment Decision Matrix

				Density Class		
	PVG	**Composition Type**	**DMR Rating**	**Low**	**Mod**	**High**
Outside MA 15	Any	Persistent PIPO	None/Low	STS_Low	STS_Mod	STS_High
	Any	Persistent Shade Tolerant	None/Low	STS_Low	STS_Low	STS_Mod
	Dry	Any	Mod/High	IT_Low	IT_Mod	IT_High
	Dry	Recent PSME or Recent ABGR	None/Low	STS_Low	STS_Mod or GS_Mod	STS_High or GS_High
	Moist	Any	Mod/High	IT_Low	IT_Low	IT_Mod
	Moist	Recent PSME or Recent ABGR	None/Low	STS_Low	STS_Low or GS_Low	STS_Mod or GS_Mod
	Dry	Non-Conifer	None/Low	Savanna		
MA 15	Any	Persistent PIPO		STS_OG_Low	STS_OG_Low	STS_OG_Mod
	Any	Recent PSME or Recent ABGR		STS_OG_Low	STS_OG_Low	STS_OG_Mod
	Any	Persistent Shade Tolerant		OG_NoTrt		

Design Common to all GS, STS, IT and SI Treatments

Retain and release old trees.

- Retain old trees regardless of size or species. These trees are generally over 150 years old.
- Remove young trees within 1 to 2 drip-lines (the line extending vertically from the exterior edge of a tree's live crown to the ground) of old ponderosa pine, western larch and Douglas fir. Occasional individual large, vigorous trees may be left when they do not interfere with the objective to reduce crown competition and increase growing space adjacent to old trees. (Note: For Alternative 2, this can include trees ≥21". See other miscellaneous design below.)

Shift tree composition toward fire and drought tolerant species.

- Favor ponderosa pine and western larch as leave trees in all thinning operations.

Restore a mosaic spatial pattern.

- Follow Individual, Clumps and Openings (ICO) approach to quantifying and restoring forest spatial pattern.
    - Leave tree individuals and clumps. Using observed reference condition as guidance for ratio of individuals to clumps and the number of trees per clump (2-20+).

- Openings - .2 to 2 acres. Sinuous/amorphous shape and 50-100 feet across on average at the widest point. Number and size would vary depending on existing condition and the density class desired condition and would not exceed 15% of unit.
- Skips – 1/10 to 1 acre no cut areas. Number and size will vary depending on the existence of suitable conditions and would not exceed 20% of the treatment unit.

Reduce stand densities and increase mean diameter.

- Manage tree density for each density class as prescribed by treatment intensity designation using the following stocking chart as guidance. Overall average density would vary within this range depending on observed reference condition and existing old tree density.

Treatment Intensity Designation

Post Trt↘		Treatment Intensity:		
		High	**Moderate**	**Low**
Existing Density:	High	*Low*	*Moderate*	*High*
	Moderate		*Low*	*Moderate*
	Low			*Low*

Stocking Guidelines by PVG/Density Class

PVG/Tree Density Class	**SDI**	**BA Equivalent (Canopy Cover %): ↘**	**Quadratic Mean Diameter (QMD)**							
			8	**10**	**12**	**14**	**16**	**18**	**20**	**22**
Dry Low	<83	Less Than	41 (<39%)	45 (<40%)	49 (<41%)	52 (<42%)	55 (<43%)	57 (<44%)	60 (<45%)	62 (<45%)
Dry Moderate	83-128	Between	41-64 (39-50%)	45-70 (40-51%)	49-75 (41-52%)	52-80 (42-55%)	55-84 (43-56%)	57-88 (44-56%)	60-92 (45-57%)	62-96 (45-57%)
Dry High	>128	Greater Than	64 (>50%)	70 (>51%)	75 (>52%)	80 (>55%)	84 (>56%)	88 (>56%)	92 (>57%)	96 (>57%)
Moist Low	<165	Less Than	82 (<67%)	90 (<68%)	97 (<69%)	103 (<70%)	109 (<71%)	114 (<71%)	119 (<72%)	123 (<73%)
Moist Moderate	165-248	Between	82-123 (67-81%)	90-135 (68-82%)	97-146 (69-84%)	103-155 (70-85%)	109-163 (71-86%)	114-171 (71-87%)	119-178 (72-88%)	123-185 (73-89%)
Moist High	>248	Greater Than	123 (>81%)	135 (>82%)	146 (>84%)	155 (>85%)	163 (>86%)	171 (>87%)	178 (>88%)	185 (>89%)

- Thin from below removing trees with poor crowns (<35% live crown ratio).
- Retain young (individuals and clumps) replacement trees at a density of 10 to 30 basal area per acre regardless of density class. Young tree leave trees would consist of vigorous (>35%

live crown ratio) dominant and co-dominants with occasional (>45% live crown ratio) mid story and understory trees as individuals or as part of clump.

- Retain wildlife trees – live trees with existing cavities and dead tops.

Initiate fire where and when feasible.

- Burn objectives within thinning units are to increase tree canopy base height, reduce litter/duff cover and produce effects that stimulate regeneration and growth of native herbaceous vegetation.
- Prescribed burns are designed to maintain and enhance desired forest structure, tree densities, snag densities, and CWD levels.
- Retain to the extent possible post-treatment skips. Use ignition patterns and techniques to maintain this structure.

Discriminate against dwarf mistletoe infected trees, host species for Douglas-fir mistletoe and create conditions that minimizes potential for spread to uninfected trees.

- Retention of mistletoe infected trees:
  - Old trees regardless of infection level.
  - Young trees with the lowest mistletoe infection rating when needed to meet stocking objective
- Wherever trees infected with mistletoe are left, establish a non-host or unstocked buffer of at least 50' between infected trees and uninfected residuals.

Other Miscellaneous Design

- Trees ≥21 inches DBH Alternative 2 – Grand fir, lodgepole pine and Douglas-fir trees greater than 21 inches DBH that do not meet the definition of old, may be removed in areas outside of marten source habitat with a STS_High or GS treatment type when necessary to
  - Daylight (reduce crown competition and increase growing space) adjacent to ponderosa pine and western larch.
  - Create canopy gaps of appropriate orientation and size to facilitate natural regeneration of ponderosa pine and western larch
  - Reduce grand fir, lodgepole pine and Douglas-fir seed sources adjacent to canopy gaps to minimize regeneration potential of these species.
- Trees ≥21 inches DBH Alternative 3 – No trees greater than 21 inches DBH may be cut.
- Group selection treatments - No regeneration groups will be created within 100 feet of identified category 4 streams.
- Connectivity corridors –
  - Dry forest PVG stands identified as part of a connectivity corridor, maintain an overall stand canopy cover of 40%+. Use estimates of canopy cover by basal area in stocking table for guidance.
  - Moist forest PVG stands identified as part of a connectivity corridor, maintain an overall stand canopy cover of 50%+. Use estimates of canopy cover by basal area in stocking table for guidance.

- Marten habitat – for stands identified as marten habitat (moist, large tree, closed canopy), maintain an overall stand canopy cover of 60%+. Use estimates of canopy cover by basal area in stocking table for guidance.
- Utilize PACFISH buffers for Category 1 and 3 streams. Follow design criteria for Category 4 streams (see Fisheries PDC Summary).
- Activity fuels management – fuels associated with silvicultural treatments would be treated using mastication, removal, pile and burn, cutting and scattering limbs or other means. Residual fuel levels would be commensurate with predicted burn intensity to meet prescribed fire burn objectives.
- Snags, coarse wood – incorporate the largest snags available and disturbance pockets as indicated by snags, deadwood, or decadence into "skips" as described above.
- Manage coarse wood at the following levels where available:
    - Exceptions to where trees may be removed would be made in the case of threats to human health and safety.

Species	Pieces per Acre	Diameter Small End (inches)	Piece Length & Total Linear Length
Ponderosa pine	3-6	12	>6 feet; 20 – 40 feet
Mixed conifer	15-20	12	>6 feet; 100 -140 feet

Other Treatment Specific Design

Group Selection – Low, Moderate and High Intensity Treatments

ICO variable density thinning within all age classes present; ½ to 4 acre group selection to initiate new cohort of seral species (PP/WL)

- Uneven age thinning and group selection would be used to establish openings between individual trees and tree clumps, thin tree clumps, and create regeneration openings.
- Establish ½ to 4 acre regeneration openings within up to 20% of each GS unit to initiate new cohort of ponderosa pine/western larch. Regeneration opening size and shape is dependent on extent of grand fir/Douglas-fir cohort that is being replaced, extent of available ponderosa pine/western larch seed trees, and sunlight requirement of species that is being regenerated.
- Leave old trees and available ponderosa pine and western larch seed trees within regeneration openings.

Single Tree Selection - Low, Moderate and High Intensity Treatments

ICO variable density thinning within all age classes present.

- Uneven age thinning would be used to establish openings between individual trees and tree clumps, and thin tree clumps.

Single Tree Selection Old Growth – Low and Moderate Intensity Treatments

ICO variable density thinning within all age classes present.

- Retain existing old growth characteristics as described in the WW Forest Plan MA15 description and the R6 Interim Old Growth Definition.

Intermediate Treatment - Low, Moderate and High Intensity Treatments

ICO variable density thinning within all age classes present with emphasis on isolating mistletoe infections and creating conditions that reduce intensification of infection.

- Favor non-host species as leave trees.
- Tree clumps/individuals would be managed to improve tree vigor and growth by retaining the best growing dominant and co-dominant trees with the least amount of mistletoe within each clump.
- Isolate mistletoe infected clumps or individuals with a host tree buffer of approximately 50 feet beginning at the last visible sign of infection

Stand Improvement – Seed/Sap and Pole Treatments

ICO variable density thinning within young, post disturbance stands.

- Thinning would be used to establish openings between individual trees and tree clumps, and thin tree clumps.
- **Savanna Treatment/Meadow Restoration Treatment**
- Reestablishment of grassland/forest edges and historic grasslands that have conifer encroachment.
- Restore pre-settlement tree density and pattern using pre-settlement evidence as guidance.
- Tree group arrangement, size, and density are a function of existing pre-settlement trees and evidence. Retain old trees and the largest young trees that most closely resemble old trees in size and form as replacement trees

Prescribed Fire

Fire - 1

Minimize construction of fire control line by utilizing wet line or existing barriers to fire spread as much as possible.

Best Management Practices – Water Quality

General Planning Activities

- Plan-1 Forest and Grassland Planning
- Plan-2 Project Planning and Analysis
- Plan-3 Aquatic Management Zone Planning

Plan-1 Forest and Grassland Planning	
Manual or Handbook Reference	Forest Service Manual (FSM) 1900, FSM 1920, Forest Service Handbook (FSH) 1909.12, and FSM 2511.
Objective	Use the land management planning and decision making processes to incorporate direction for water quality management consistent with laws, regulation, and policy into land management plans.

Practices	Establish desired conditions, goals, and objectives for soil, water quality, and riparian resources that contribute to the overall sustainability of social, economic, and ecological systems in the plan area consistent with established State or national water quality goals for the plan area. Consider the water quantity, quality, location, and timing of flows needed to provide water supplies for municipal, agricultural, commercial, and industrial uses; hydropower generation; water recreation, transportation, and spiritual uses; aesthetic appreciation; and tourism to contribute to social and economic sustainability. Consider the water quantity, quality, location, and timing of flows needed to provide the ecological conditions to support diversity of native and desired nonnative plants and animal species in the plan area to contribute to ecological sustainability. Include plan objectives to maintain or, where appropriate, improve or restore watershed conditions to achieve desired conditions of soil, water quality, and riparian resources. Consider watershed characteristics, current and expected environmental conditions (including climate change), and potential effects of land uses when determining suitability of NFS lands within the planning area for various uses. Include standards and guidelines to maintain and, where appropriate, improve over time the quality of soil, water resources, and riparian areas when implementing site-specific projects and activities. Include monitoring questions and associated performance measures to address watershed condition and water quality goals and objectives.
Local / Site Specific BMP or PDC	To protect any raptor nests discovered during unit marking, implementation of disturbing activities will only occur after the young have fledged and are mobile at the end of August. This restriction should be extended to not later than September 30 if monitoring indicates that fledglings are still present in the nest stand after August 30
	Plan-2 Project Planning and Analysis
Manual or Handbook Reference	Forest Service Manual (FSM) 1950, Forest Service Handbook (FSH) 1909.15, and FSM 2524.
Objective	Use the project planning, environmental analysis, and decision making processes to incorporate water quality management BMPs into project design and implementation.
Practices	Include watershed specialists (hydrologist, soil scientist, geologist, and fish biologist) and other trained and qualified individuals on the interdisciplinary team for project planning, environmental analysis, and decision making to evaluate onsite watershed characteristics and the potential environmental consequences of the proposed activity(s). Determine water quality management objectives for the project area. Identify water quality management desired conditions and objectives from the land management plan. Identify and evaluate the condition of water features in the project area (e.g., streams, lakes, ponds, reservoirs, wetlands, riparian areas, springs, groundwater-dependent ecosystems, recharge areas, and floodplains). Identify State-designated beneficial uses of waterbodies and the water quality parameters that are critical to those uses. Identify locations of dams and diversions for municipal or irrigation water supplies, fish hatcheries, stockwater, fire protection, or other water uses within the project area. Identify any impaired (e.g., 303[d] listed) waterbodies in the project area and associated Total Maximum Daily Load (TMDL) analyses or other restoration plans that may exist. Identify threatened, endangered, or sensitive species in or near water, wetlands, and riparian areas in the project area and their habitat needs related to water quality. Determine potential or likely direct and indirect impacts to chemical, physical, and biological water quality, and watershed condition from the proposed activity. Always assume hydrological connections exist between groundwater and surface water in each watershed, unless it can reasonably be shown none exist in a local situation. Consider the impacts of current and expected environmental conditions such as atmospheric deposition and climate change in the project area when analyzing effects of the proposed activities.

	Evaluate sources of waterbody impairment, including water quantity, streamflows, and water quality, and the likelihood that proposed activities would contribute to current or future impairment or restoration to achieve desired watershed conditions. Identify and delineate unstable areas in the project area. Identify soil limitations and productivity impacts of proposed activities. Verify preliminary findings by inspecting the sites in the field. Develop site-specific BMP prescriptions, design criteria, and mitigation measures to achieve water quality management objectives. Consult local, regional, State, or other agencies' required or recommended BMPs that are applicable to the activity. Consider enhanced BMPs identified in a TMDL or other watershed restoration plan to protect impaired waterbodies within the project area. Use site evaluations, professional experience, monitoring results, and land management plan standards, guidelines, and other requirements. Identify Federal, State, and local permits or requirements needed to implement the project. Examples include water quality standards, CWA 401 certification, CWA 402 permits (including stormwater permits), CWA 404 permits, and Coastal Zone Management Act requirements. Plan to limit surface disturbance to the extent practicable while still achieving project objectives. Designate specific AMZs around water features in the project area (see BMP Plan-3 [AMZ Planning]). Design activities on or near unstable areas and sensitive soils to minimize management induced impacts. Use local direction and requirements for prevention and control of terrestrial and aquatic invasive species. Use suitable tools to analyze the potential for cumulative watershed effects (CWE) to occur from the additive impacts of the proposed project and past, present, and reasonably foreseeable future activities on NFS and neighboring lands within the project watersheds. Consider the natural sensitivity or tolerance of the watershed based on geology, climate, and other relevant factors. Consider the existing condition of the watershed and water quality as a reflection of past land management activities and natural disturbances. Estimate the potential for adverse effects to soil, water quality, and riparian resources from current and reasonably foreseeable future activities on all lands within the watershed relative to existing watershed conditions. Use land management plan direction; Federal, State, or local water quality standards; and other regulations to determine acceptable limits for CWE. Modify the proposed project or activity as necessary by changing project design, location, and timing to reduce the potential for CWE to occur. Consider including additional mitigation measures to reduce project effects. Identify and implement opportunities for restoration activities to speed recovery of watershed condition before initiating additional anthropogenic disturbance in the watershed. Coordinate and cooperate with other Federal, State, and private landowners in assessing and preventing CWE in multiple ownership watersheds. Integrate restoration and rehabilitation needs into the project plan. Consider water quality improvement actions identified in a TMDL or other watershed restoration plan to restore impaired waterbodies within the project area. Identify project-specific monitoring needs. Document site-specific BMP prescriptions, design criteria, mitigation measures, and restoration, rehabilitation, and monitoring needs in the applicable National Environmental Policy Act (NEPA) documents, design plans, contracts, permits, authorizations, and operation and maintenance plans. Delineate all protected or excluded areas, including, for example, AMZs and waterbodies, 303(d) listed and TMDL waterbodies, and municipal supply watersheds, on the project map.
Local / Site Specific BMP	No Additional BMPs
Plan-3 Aquatic Management Zone Planning	
Manual or Handbook	Forest Service Manual (FSM) 2526

Reference	
Objective	To maintain and improve or restore the condition of land around and adjacent to waterbodies in the context of the environment in which they are located, recognizing their unique values and importance to water quality while implementing land and resource management activities.
Practices	Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment. Proactively manage the AMZ to maintain or improve long-term health and sustainability of the riparian ecosystem and adjacent waterbody consistent with desired conditions, goals, and objectives in the land management plan. Balance short-term impacts and benefits with long-term goals and desired future conditions, considering ecological structure, function, and processes, when evaluating proposed management activities in the AMZ. Determine the width of the AMZ for waterbodies in the project area that may be affected by the proposed activities: Evaluate the condition of aquatic and riparian habitat and beneficial riparian zone functions and their estimated response to the proposed activity in determining the need for and width of the AMZ. Use stream class and type, channel condition, aspect, side slope steepness, precipitation and climate characteristics, soil erodibility, slope stability, groundwater features, and aquatic and riparian conditions and functions to determine appropriate AMZ widths to achieve desired conditions in the AMZ. Include riparian vegetation within the designated AMZ and extend the AMZ to include steep slopes, highly erodible soils, or other sensitive or unstable areas. Establish wider AMZ areas for waters with high resource value and quality. Design and implement project activities within the AMZ to: Avoid or minimize unacceptable impacts to riparian vegetation, groundwater recharge areas, steep slopes, highly erodible soils, or unstable areas. Maintain or provide sufficient ground cover to encourage infiltration, avoid or minimize erosion, and to filter pollutants. Avoid, minimize, or restore detrimental soil compaction. Retain trees necessary for shading, bank stabilization, and as a future source of large woody debris. Retain floodplain function. Restore existing disturbed areas that are eroding and contributing sediment to the waterbody. Mark the boundaries of the AMZ and sensitive areas like riparian areas, wetlands, and unstable areas on the ground before land disturbing activities.
Local / Site Specific BMP	Utilize PACFISH RHCA buffers to protect stream course, wetlands and waterways in the project area in areas not identified for riparian management. Protect all no-harvest stream and wetland buffers with directional felling, and waive debris cleanout of streams. Trees that are in no-harvest buffers and are damaged during timber harvest or road activities will be left on site.

Aquatic Ecosystems Management Activities

- **AqEco-2. Operations in Aquatic Ecosystems**
- **AqEco-3. Ponds and Wetlands**
- **AqEco-4. Stream Channels and Shorelines**

AqEco-2. Operations in Aquatic Ecosystems	
Manual or Handbook Reference	None known.
Objective	Avoid, minimize, or mitigate adverse impacts to water quality when working in aquatic ecosystems.
Practices	Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment. Use applicable practices of BMP Plan-2 (Project Planning and Analysis) and BMP Plan-3 (AMZ Planning) when planning operations in aquatic ecosystems. Identify the aquatic and aquatic-dependent species that live in the waterbody, Aquatic Management Zone (AMZ), or on the floodplain and their life histories to determine protection strategies, such as timing of construction, sediment management, species relocation, and monitoring during construction. Coordinate stream channel, shoreline, lake, pond, and wetland activities with appropriate State and Federal agencies. Incorporate Clean Water Act (CWA) 404 permit requirements and other Federal, State, and local permits or requirements into the project design and plan. Use suitable measures to protect the waterbody when preparing the site for construction or maintenance activities. Clearly delineate the work zone. Locate access and staging areas near the project site but outside of work area boundaries, AMZs, wetlands, and sensitive soil areas. Refuel and service equipment only in designated staging areas (see BMP Road-10 [Equipment Refueling and Servicing]). Develop an erosion and sediment control plan to avoid or minimize downstream impacts using measures appropriate to the site and the proposed activity (see BMP Fac-2 [Facility Construction and Stormwater Control]). Prepare for unexpected failures of erosion control measures. Consider needs for solid waste disposal and worksite sanitation. Consider using small, low ground pressure equipment, and hand labor where practicable. Ensure all equipment operated in or adjacent to the waterbody is clean of aquatic invasive species, as well as oil and grease, and is well maintained. Use vegetable oil or other biodegradable hydraulic oil for heavy equipment hydraulics wherever practicable when operating in or near water. Schedule construction or maintenance operations in waterbodies to occur in the least critical periods to avoid or minimize adverse effects to sensitive aquatic and aquatic-dependent species that live in or near the waterbody. Avoid scheduling instream work during the spawning or migration seasons of resident or migratory fish and other important life history phases of sensitive species that could be affected by the project. Avoid scheduling instream work during periods that could be interrupted by high flows. Consider the growing season and dormant season for vegetation when scheduling activities within or near the waterbody to minimize the period of time that the land would remain exposed, thereby reducing erosion risks and length of time when aesthetics are poor. Use suitable measures to protect the waterbody when clearing the site. Clearly delineate the geographic limits of the area to be cleared. Use suitable drainage measures to improve the workability of wet sites. Avoid or minimize unacceptable damage to existing vegetation, especially plants that are stabilizing the bank of the waterbody. Use suitable measures to avoid or minimize impacts to the waterbody when implementing construction and maintenance activities.

	Minimize heavy equipment entry into or crossing water as is practicable. Conduct operations during dry periods. Stage construction operations as needed to limit the extent of disturbed areas without installed stabilization measures. Promptly install and appropriately maintain erosion control measures. Promptly install and appropriately maintain spill prevention and containment measures. Promptly rehabilitate or stabilize disturbed areas as needed following construction or maintenance activities. Stockpile and protect topsoil for reuse in site revegetation. Minimize bank and riparian area excavation during construction to the extent practicable. Keep excavated materials out of the waterbody. Use only clean, suitable materials that are free of toxins and invasive species for fill. Properly compact fills to avoid or minimize erosion. Balance cuts and fills to minimize disposal needs. Remove all project debris from the waterbody in a manner that will cause the least disturbance. Identify suitable areas offsite or away from waterbodies for disposal sites before beginning operations. Contour site to disperse runoff, minimize erosion, stabilize slopes, and provide a favorable environment for plant growth. Use suitable species and establishment techniques to revegetate the site in compliance with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species. Use suitable measures to divert or partition channelized flow around the site or to dewater the site as needed to the extent practicable. Remove aquatic organisms from the construction area before dewatering and prevent organisms from returning to the site during construction. Return clean flows to channel or waterbody downstream of the activity. Restore flows to their natural stream course as soon as practicable after construction or before seasonal closures. Inspect the work site at suitable regular intervals during and after construction or maintenance activities to check on quality of the work and materials and identify need for midproject corrections. Consider short- and long-term maintenance needs and unit capabilities when designing the project. Develop a strategy for providing emergency maintenance when needed. Include implementation and effectiveness monitoring to evaluate success of the project in meeting design objectives and avoiding or minimizing unacceptable impacts to water quality. Consider long-term management of the site and nearby areas to promote project success. Use suitable measures to limit human, vehicle, and livestock access to site as needed to allow for recovery of vegetation.
Local / Site Specific BMP	The following are the recommended minimum no-harvest buffer width recommendations to ensure protection of unmapped streams and wet areas identified during project implementation. The district hydrologist or fish biologist will be consulted to assign appropriate stream buffers and these individuals may modify the recommended buffers but must assure compliance with PACFISH and the Lower Grande Ronde (2010) Temperature TMDL Implementation Strategy by providing the following minimum buffers: Class 1, 2, 3 = 100 feet (except for 31 Acres along Swamp Creek in Alt 2) Class 4 = 25 feet (variable) - Alt 2, 100 feet in Alt 3

AqEco-3. Ponds and Wetlands	
Manual or Handbook Reference	None known.

Objective	Design and implement pond and wetlands projects in a manner that increases the potential for success in meeting project objectives and avoids, minimizes, or mitigates adverse effects to soil, water quality, and riparian resources.
Practices	Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment. Use applicable practices of BMP AqEco-2 (Operations in Aquatic Ecosystems) when working in or near waterbodies. Obtain and manage water rights. Clearly define goals and objectives in the project plan appropriate to the site for desired hydrology, wetland plant community associations, intended purpose, and function of the pond or wetland and expected values. Select sites based on an analysis of landscape structure and associated ecological functions and values. Construct ponds and wetlands on sites that have easy construction access where practicable. Construct wetlands in landscape positions and soil types capable of supporting desired wetland functions and values. Construct ponds outside of active floodplain to minimize overflow of groundwater-fed ponds into adjacent streams and avoid or minimize erosion of pond embankments by floods, unless location in the floodplain is integral to achieving project objectives. Construct ponds with surface water supply off-channel rather than placing a dam across a stream. Construct ponds and wetlands on sites with soils suitable to hold water with minimal seepage loss and that provide a stable foundation for any needed embankments. Construct ponds and wetlands in locations where polluted surface water runoff or groundwater discharge do not reach the pond. Consider the consequences of dam or embankment failure and resulting damage from sudden release of water on potentially affected areas. Ensure that the natural water supply for the pond or wetland is sufficient to meet the needs of the intended use and that it will maintain the desired water levels and water quality. Design the wetland to create hydrologic conditions (including the timing of inflow and outflow, duration, and frequency of water level fluctuations) that provide the desired wetland functions and values. Avoid or minimize drawdown effects in a stream source by limiting timing and rate of water withdrawal to allow sufficient downstream water flow to maintain desired conditions in the source stream (see BMP WatUses-1 [Water Uses Planning]). Design the wetland project to create a biologically and hydrologically functional system. Design for function, not form. Keep the design simple and avoid over engineering. Design the project for minimal maintenance needs. Use natural energies, such as gravity flow, in the design. Avoid use of hard engineering structures or the use of supplemental watering to support system hydrology. Plan to allow wetland system time to develop after construction activities are complete. Design the pond or wetland to be of sufficient size and depth appropriate for the intended use and to optimize hydrologic regimes and wetland plant community development. Size the pond or wetland appropriately for the contributing drainage area such that a desired water level can be maintained during drought conditions and that excess runoff during large storms can be reasonably accommodated without constructing large overflow structures. Size the pond or wetland to an adequate depth to store sufficient amounts of water for the intended use and offset probable evaporation and seepage losses. Integrate design with the natural topography of the site to minimize site disturbance. Design the pond or wetland to have an irregular shape to reduce wind and wave impacts, disperse water flows, maximize retention times, and better mimic natural systems. Create microtopography and macrotopography in wetlands to mimic natural conditions and achieve hydrologic and vegetative diversity.

	Avoid creating large areas of shallow water to minimize excessive evaporation losses and growth of noxious aquatic plants. Avoid steep-sloped shorelines in areas with potential substrate instability problems to reduce erosion and sedimentation. Include water control structures to manage water levels as necessary. Design spillway or outlet to maintain desired water level under normal inflows from snowmelt, groundwater flow, and precipitation. Design discharge capacity using a suitable hydrologic analysis of the drainage area to be sufficient to safely pass the flow resulting from the design storm event. Size the spillway to release floodwaters in a volume and velocity that do not erode the spillway, the area beyond the outlet, or the downstream channel. Consider the need for suitable measures to drain the pond or wetland. Return overflow back to the original source to the extent practicable. Use suitable measures to maintain desired downstream temperatures, dissolved oxygen levels, and aquatic habitats when water is released from the pond or impoundment. Use materials appropriate for the purpose of the pond and site. Select materials for a dam or embankment that will provide sufficient strength and, when properly compacted, will be tight enough to avoid or minimize excessive or harmful percolation of water through the dam or embankment. Design the side slopes appropriately for the material being used to ensure stability of the dam or embankment. Use wetland vegetation species and establishment methods suitable to the project site and objectives, consistent with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species. Consider the timing of planting to achieve maximum survival, proposed benefit of each plant species, methods of planting, proposed use of mulch, potential soil amendment (organic material or fertilizer), and potential supplemental watering to help establish the plant community. Properly maintain dams, embankments, and spillways to avoid or minimize soil erosion and leakage problems. Use suitable measures to avoid or minimize erosion of dams and shores due to wind and wave action. Design sufficient freeboard to avoid or minimize overtopping by wave action or other causes. Stabilize or armor spillways for ponds with continuous flow releases or overflow during heavy rainfall events. Manage uplands and surrounding areas to avoid or minimize unacceptable impacts to water quality in the pond or wetland.
Local / Site Specific BMP	Road work at perennial streams, to be done under the timber sale contract, will be constructed during the inwater workwindow as prescribed by Oregon Department of Fish & Wildlife and approved by NOAA Fisheries

AqEco-4. Stream Channels and Shorelines	
Manual or Handbook Reference	None known.
Objective	Design and implement stream channel and lake shoreline projects in a manner that increases the potential for success in meeting project objectives and avoids, minimizes, or mitigates adverse effects to soil, water quality, and riparian resources.
Practices	Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment. *All Activities* Use applicable practices of BMP AqEco-2 (Operations in Aquatic Ecosystems) when working in or near waterbodies.

	Stream Channels Determine stream type and classification using suitable accepted protocols. Determine need to control channel grade to avoid or minimize erosion of channel bed and banks before selecting measures for bank stabilization or protection. Incorporate grade control measures into project design as needed. Determine design flows based on the value or safety of area to be protected, repair cost, and the sensitivity and value of the ecological system involved. Obtain peak flow, low flow, channel forming flow, and flow duration estimates. Use these estimates to determine the best time to implement the project, as well as to select design flows. Determine design velocities appropriate to the site. Limit maximum velocity to the velocity that is nonscouring on the least resistant streambed and bank material. Consider needs to transport bedload through the reach when determining minimum velocities. Maintain the depth-area-velocity relationship of the upstream channel through the project reach. Consider the effects of design velocities on desired aquatic organism habitat and passage. Avoid changing channel alignment unless the change is to reconstruct the channel to a stable meander geometry consistent with stream type. Design instream and streambank stabilization and protection measures suitable to channel alignment (straight reach versus curves). Consider the effects of ice and freeze and thaw cycles on streambank erosion processes. Consider the effects that structures may have on downstream structures and stream morphology, including streambanks, in the maintenance of a natural streambed. Design channels with natural stream pattern and geometry and with stable beds and banks; provide habitat complexity where reconstruction of stream channels is necessary. Consider sediment load (bedload and suspended load) and bed material size to determine desired sediment transport rate when designing channels. Avoid relocating natural stream channels. Return flow to natural channels, where practicable. Include suitable measures to protect against erosion around the edges of stabilization structures. Design revetments and similar structures to include sufficient freeboard to avoid or minimize overtopping at curves or other points where high-flow velocity can cause waves. Use suitable measures to avoid or minimize water forces undermining the toe of the structure. Tie structures into stable anchorage points, such as bridge abutments, rock outcrops, or well-vegetated stable sections, to avoid or minimize erosion around the ends. Add or remove rocks, wood, or other material in streams only if such action maintains or improves stream condition, provides for safety and stability at bridges and culverts, is needed to avoid or minimize excessive erosion of streambanks, or reduces flooding hazard. Leave rocks and portions of wood that are embedded in beds or banks to avoid or minimize channel scour and maintain natural habitat complexity. Choose vegetation appropriate to the site to provide streambank stabilization and protection adequate to achieve project objectives. Use vegetation species and establishment methods suitable to the project site and objectives, consistent with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species. *Shorelines* Use mean high- and low-water levels to determine the design water surface. Consider the effects of fluctuating water levels, freeze or thaw cycles, and floating ice on erosion processes at the site. Design stabilization and protection measures suitable to the site.

	Determine the shoreline slope configuration above and below the waterline. Consider the effects of offshore depth, dynamic wave height, and wave action on shoreline erosion processes. Determine the nature of the bank soil material to aid in estimating erosion rates. Consider foundation material at the site when selecting structural measures. Use vegetation species and establishment methods suitable to the project site and objectives and consistent with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species. Consider the rate, direction, supply, and seasonal changes in littoral transport when choosing the location and design of structural measures. Consider the effect structures may have on adjacent shoreline or other nearby structures. Adequately anchor end sections to existing stabilization measures or terminate in stable areas.
Local / Site Specific BMP	The following are the recommended minimum no-harvest buffer width recommendations to ensure protection of unmapped streams and wet areas identified during project implementation. The district hydrologist or fish biologist will be consulted to assign appropriate stream buffers and these individuals may modify the recommended buffers but must assure compliance with PACFISH and the Lower Grande Ronde (2010) Temperature TMDL Implementation Strategy by providing the following minimum buffers: Class 1, 2, 3 = 100 feet (except for 58 Acres along Swamp Creek in Alt 2) Class 4 = 25 feet (variable) - Alt 2, 100 feet in Alt 3

Chemical Use Management Activities

Pertaining to the use of Magnesium Chloride and Water for Dust Abatement

- **Chem-1. Chemical Use Planning**
- **Chem-3. Chemical Use Near Waterbodies**
- **Chem-6. Chemical Application Monitoring and Evaluation**

Chem-1. Chemical Use Planning	
Manual or Handbook Reference	Forest Service Manual (FSM) 2153; Forest Service Handbook (FSH) 2109.14, chapter 10.
Objective	Use the planning process to develop measures to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from chemical use on NFS lands.
Practices	Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment. Use applicable practices of BMP Plan-2 (Project Planning and Analysis) and BMP Plan-3 (Aquatic Management Zone [AMZ] Planning) when planning activities that involve use of chemicals. Identify municipal supply watersheds; private domestic water supplies; fish hatcheries; and threatened, endangered, and sensitive aquatic dependent species and fish populations near or downstream of chemical treatment areas. Use Integrated Pest Management as the basis for all pesticide-use prescriptions in consultation with the unit Pesticide Use Coordinator. Select chemical products suitable for use on the target species or that meet project objectives. (The Lower Joseph Creek Restoration Project is not analyzing the use of chemical herbicides.) Use chemicals that are registered for the intended uses.

	Consult the Materials Safety Data Sheet and product label for information on use, hazards, and safe handling procedures for chemicals products under consideration for use. Consider chemical solubility, absorption, breakdown rate properties, and site factors when determining which chemical products to use. Use chemicals with properties such that soil residual activity will persist only as long as needed to achieve treatment objectives. Consider soil type, chemical mobility, distance to surface water, and depth to groundwater to avoid or minimize surface water and groundwater contamination. Use a suitable pressure, nozzle size, and nozzle type combination to minimize off-target drift or droplet splatter. (The Lower Joseph Creek Restoration Project is not analyzing the use of chemical herbicides.) Use selective treatment methods for target organisms to the extent practicable. (The Lower Joseph Creek Restoration Project is not analyzing the use of chemical herbicides.) Specify management direction and appropriate site-specific response measures in project plans and safety plans (FSH 2109.14, chapter 60). Ensure that planned chemical use projects conform to all applicable local, State, Federal, and agency laws, regulations, and policies. Obtain necessary permits, including Clean Water Act (CWA) 402 permit coverage. Develop spill contingency plans. Obtain or provide training and licensing as required by the label and State regulations.
Local / Site Specific BMP	No Additional BMPs

Chem-3. Chemical Use Near Waterbodies	
Manual or Handbook Reference	Forest Service Handbook (FSH) 2109.14 Chapters 10, 50.
Objective	Avoid or minimize the risk of chemical delivery to surface water or groundwater when treating areas near waterbodies.
Practices	Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment. Identify during project planning those perennial and intermittent surface waters, wetlands, springs, riparian areas, and groundwater recharge areas that may be impacted by the chemical use. Use field observations to verify the extent of these areas identified from aerial observations, maps, or geographic information system data, as needed. Determine the width of a buffer zone, if needed, based on a review of the project area, characteristics of the chemical to be used, and application method. Consider the designated uses of water, adjacent land uses, expected rainfall, wind speed and direction, terrain, slope, soils, and geology. Consider the persistence, mobility, toxicity profile, and bioaccumulation potential of any chemical formulation proposed for use. Consider the type of equipment, spray pattern, droplet size, application height, and experience in similar projects. Prescribe chemicals and application methods in the buffer zone suitable to achieve project objectives while minimizing risk to water quality. Flag or otherwise mark or identify buffer zones as needed. Clearly communicate to those applying the chemical what areas are to be avoided or where alternative treatments are to be used. Locate operation bases on upland areas, outside of wetlands or areas with channel or ditch connection to surface water and AMZs.

	Use clean equipment and personnel to collect water needed for mixing. Calibrate application equipment to apply chemicals uniformly and in the correct quantities. Evaluate weather conditions before beginning spray operations and monitor throughout each day to avoid or minimize chemical drift. Apply chemicals only under favorable weather conditions as identified in the label instructions. Avoid applying chemicals before forecasted severe storm events to limit runoff and ensure the chemical reaches intended targets. Suspend operations if project prescription or weather limitations have been exceeded. Apply fertilizers during high nutrient-uptake periods to avoid or minimize leaching and translocation. Base fertilizer type and application rate on soils and foliar analysis. Use slow release fertilizers that deliver fertilizer to plants during extended periods in areas with long growing seasons when appropriate to meet project objectives. (The Lower Joseph Creek Restoration Project is not analyzing the use of fertilizers.) Monitor during chemical applications to determine if chemicals are reaching surface waters (see BMP Chem-6 [Chemical Application Monitoring and Evaluation]). Implement the chemical spill contingency plan elements within the project safety plan if a spill occurs (FSH 2109.14, chapter 60).
Local / Site Specific BMP	No Additional BMPs

Chem-6. Chemical Application Monitoring and Evaluation	
Manual or Handbook Reference	Forest Service Manual (FSM) 2150.1; Forest Service Handbook (FSH) 2109.14, chapter 50.
Objective	1. Determine whether chemicals have been applied safely, have been restricted to intended targets, and have not resulted in unexpected nontarget effects. 2. Document and provide early warning of possible hazardous conditions resulting from potential contamination of water or other nontarget resources or areas by chemicals.
Practices	Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment. Identify the following elements in all water resource monitoring plans and specify the rationale for each: What are the monitoring questions? Who will be involved and what are their roles and responsibilities? What parameters will be monitored and analyzed? When and where will monitoring take place? What methods will be used for sampling and analyses? How will Chain of Custody requirements for sample handling be met? What are the criteria for quality assurance and quality control? Consider the following factors when developing monitoring questions: The physical or biological resource of concern, including human health. Applicable Federal, State, and local laws and regulations. Type of chemical. Type of application equipment used and method of application. Site-related difficulties that affect both application and monitoring. Public concerns. Potential benefits of the application.

	Availability of analytic methods, detection limits, tools, and laboratories. Costs of monitoring and resources available to implement monitoring plan. Choose monitoring methods and sample locations suitable to address the monitoring questions. Consider the need to take random batch or tank samples for future testing in the event of treatment failure or an unexpected adverse effect. Monitor sensitive environments during and after chemical applications to detect and evaluate unanticipated events. Use U.S. Environmental Protection Agency-certified laboratories for chemical sample analysis. Use appropriate containers, preservation, and transportation to meet Standard Methods requirements. Implement proper Chain of Custody procedures for sample handling. Evaluate and interpret the results of monitoring in terms of compliance with, and adequacy of, treatment objectives and specifications.
Local / Site Specific BMP	

Road Management Activities

- **Road-1. Travel Management Planning and Analysis**
- **Road-2. Road Location and Design**
- **Road-3. Road Construction and Reconstruction**
- **Road-4. Road Operations and Maintenance**
- **Road-5. Temporary Roads**
- **Road-6. Road Storage and Decommissioning**
- **Road-7. Stream Crossings**
- **Road-8. Snow Removal and Storage**
- **Road-9. Parking and Staging Areas**
- **Road-10. Equipment Refueling and Servicing**
- **Road-11. Road Storm-Damage Surveys**

Road-1. Travel Management Planning and Analysis	
Manual or Handbook Reference	Forest Service Manual (FSM) 7710; Forest Service Handbook (FSH) 7709.55; and FSH 7709.59, chapter 10.
Objective	Use the travel management planning and analysis processes to develop measures to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during road management activities.
Practices	Use applicable practices of BMP Plan-2 (Project Planning and Analysis) and BMP Plan-3 (Aquatic Management Zone [AMZ] Planning) when conducting travel management planning and analysis. Use interdisciplinary coordination for travel planning and project-level transportation analysis, including engineers, hydrologists, soil scientists, and other resource specialists as needed, to balance protection of soil, water quality, and riparian resources with transportation and access needs.

	Design the transportation system to meet long-term land management plan desired conditions, goals, and objectives for access rather than to access individual sites. Limit roads to the minimum practicable number, width, and total length consistent with the purpose of specific operations, local topography, geology, and climate to achieve land management plan desired conditions, goals, and objectives for access and water quality management. Use existing roads when practicable. Use system roads where access is needed for long-term management of an area or where control is needed in the location, design, or construction of the road to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources. Use temporary roads for short-term access needs if the road can be constructed, operated, and obliterated without specific control of techniques to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources (See BMP Road-5 [Temporary Roads]). Decommission temporary roads and return to resource production when the access is no longer needed (See BMP Road-6 [Road Storage and Decommissioning]). Consider placing roads in storage (Maintenance Level 1) when the time between intermittent uses exceeds 1 year and the costs of annual maintenance (both economic and potential disturbance) or potential failures due to lack of maintenance exceed the benefits of keeping the road open in the interim (See BMP Road-6 [Road Storage and Decommissioning]). Consider decommissioning unneeded existing roads within a planning area when planning new system roads to reduce cumulative impacts to soil, water quality, and riparian resources (See BMP Road-6 [Road Storage and Decommissioning]). Plan road networks to have the minimum number of waterbody crossings as is practicable and necessary to achieve transportation system desired conditions, goals, and objectives. Develop or update RMOs for each system road to include design criteria, operation criteria, and maintenance criteria to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources. Use applicable practices of BMP Road-2 (Road Location and Design) to establish design elements and standards. Use applicable practices of BMP Road-4 (Road Operations and Maintenance) to establish criteria on how the road is to be operated and maintained. Revise RMOs as needed to meet changing conditions. Identify and evaluate road segments causing, or with the potential to cause, adverse effects to soil, water quality, and riparian resources. Identify and prioritize suitable mitigation measures to avoid, minimize, or mitigate adverse effects (see BMPs Road-2 (Road Location and Design), Road-3 (Road Construction and Reconstruction), Road-4 (Road Operations and Maintenance), Road-6 (Road Storage and Decommissioning), and Road-7 (Stream Crossings) for potential mitigation measures).
Local / Site Specific BMP / PDC	All new temporary road construction will be done using outslope designs, with drain dips and grade sags as needed, so that no new ditchlines will be built. Under the timber sale contract, native-surfaced system roads, and level 1 roads, will have water bars installed and will be closed with road barriers to prevent damage after commercial use is complete, as appropriate. Level 1 aggregate surfaced system roads to be closed following use will be barricaded and treated with water bars if needed to prevent drainage problems. Water bars sufficient to disperse water shall be designated by the Forest Service to prevent future traffic and disperse subsurface water on all Maintenance Level 1 system roads that are re-opened and subsequently blocked. The timber sale purchasers are required to obliterate temporary spur roads under the timber sale contract. This involves subsoiling the road as appropriate, seeding as needed, and pulling displaced soil and duff back over the road surface. Slash will be pulled over the top of the road to provide additional ground cover and bare soil protection. Obliteration of temporary roads (new or legacy) shall meet specifications of the Forest Service, for depth of treatment and use of effective ground cover on treatment area. All opened temporary roads within RHCAs that are not further needed for project implementation would be obliterated, and those still needed to complete project implementation would be winterized with all erosion control measures in place, and barricaded or blocked. Erosion control, at a minimum, would include water bars and ground cover equivalent to 1.5 tons weed free straw

	per acre.. All temporary roads would remain closed to winter access by the public, unless otherwise agreed to by the Forest Service. To retain snags and reduce disturbance, currently closed roads that are needed for log haul, and other road closures included within the ROD, would be closed immediately after project implementation (harvest/thinning, and pile burning).

Road-2. Road Location and Design	
Manual or Handbook Reference	FSM 7720 and FSH 7709.56.
Objective	Locate and design roads to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources.
Practices	*Location* Locate roads to fit the terrain, follow natural contours, and limit the need for excavation. Avoid locations that require extended steep grades, sharp curves, or switchbacks. Locate roads on stable geology with well-drained soils and rock formations that dip into the slope. Avoid hydric soils, inner gorges, overly steep slopes, and unstable landforms to the extent practicable. Locate roads as far from waterbodies as is practicable to achieve access objectives, with a minimum number of crossings and connections between the road and the waterbody. Avoid sensitive areas such as riparian areas, wetlands, meadows, bogs, and fens, to the extent practicable. Provide an AMZ of suitable width between the road and a waterbody to maintain desired conditions, goals, and objectives for structure, function, and processes of the AMZ and associated waterbody when a road must parallel a waterbody (See BMP Plan-3 [AMZ Planning]). Relocate existing routes or segments that are causing, or have the potential to cause, adverse effects to soil, water quality, and riparian resources, to the extent practicable. Obliterate the existing road or segment after the relocated section is completed (see BMP Road-6 [Road Storage and Decommissioning]). *Predesign* Consider design criteria relative to soil, water quality, and riparian resources from the decision document and associated National Environmental Policy Act (NEPA) analysis document. Consider the road RMOs and likely future maintenance schedule in the initial design. Conduct suitable site investigations, data collection, and evaluations commensurate with the anticipated design and sensitivity of the area to soil, water quality, and riparian resource impacts. Consider subsurface conditions and conduct suitable investigations and stability analyses for road and ridge locations where slope instability can occur due to road construction. Conduct a suitable soils and geotechnical evaluation to identify susceptibility to erosion and stable angles of repose. *Design* Design the road to fit the ground and terrain with the least practicable impacts to soil, water quality, and riparian resources considering the purpose and life of the road, safety, and cost. Use road standards that minimize impacts for grade and alignment (e.g., width, turning radius, and maximum slope). Use low impact development treatments that reduce long-term maintenance needs wherever practicable. Design the road to maintain stable road prism, cut, and fill slopes. Design cut and fill slope ratios to reduce soil loss from mass failures. Use structural or nonstructural measures as necessary to stabilize cut and fill slopes.

	Design the road surface drainage system to intercept, collect, and remove water from the road surface and surrounding slopes in a manner that minimizes concentrated flow in ditches, culverts, and over fill slopes and road surfaces Use structural or nonstructural measures suitable to the road materials, road gradient, and expected traffic levels. Use an interval between drainage features that is suitable for the road gradient, surface material, and climate. Use suitable measures to avoid or minimize erosion of ditches. Design the road subsurface drainage system to intercept, collect, and remove groundwater that may flow into the base course and subgrade, lower high-water tables, and drain water pockets. Use suitable subsurface dispersion or collection measures to capture and disperse locally shallow groundwater flows intercepted by road cuts. Use suitable measures to release groundwater into suitable areas without causing erosion or siltation. Design the road for minimal disruption of natural drainage patterns and to minimize the hydrologic connection of the road segment or network with nearby waterbodies. Use suitable structural or nonstructural measures to avoid or minimize gully formation and erosion of fill slopes at outfalls of road surface drainage structures. Use suitable measures to avoid, to the extent practicable, or minimize direct discharges from road drainage structures to nearby waterbodies. Provide sufficient buffer distance at the outfalls of road surface drainage structures for water to infiltrate before reaching the waterbody. Use applicable practices of BMP Road-7 (Stream Crossings) to limit the number and length of water crossing connected areas to the extent practicable. Design road surface treatment to support wheel loads, stabilize the roadbed, reduce dust, and control erosion consistent with anticipated traffic and use. Consider whether road closures or roadway surface drainage and erosion protection can adequately mitigate adverse effects to soil, water quality, and riparian resources. Design roads within the AMZ (when no practicable alternative exists outside of the AMZ to achieve access objectives) to maintain desired conditions, goals, and objectives for AMZ structure, function, and processes (See BMP Plan-3 [AMZ Planning]). Use suitable measures to minimize or mitigate effects to waterbodies and other sensitive areas when adverse impacts cannot be practicably avoided. Design waterbody crossings to avoid or minimize adverse effects to soil, water quality, and riparian resources to the extent practicable consistent with road use, legal requirements, and cost considerations (See BMP Road-7 [Stream Crossings]). Design a post-construction site vegetation plan, including short- and long-term objectives, using suitable species and establishment techniques to revegetate the site in compliance with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species.
Local / Site Specific BMP	Under the timber sale contract, native-surfaced system roads, and level 1 roads, will have water bars installed and will be closed with road barriers to prevent damage after commercial use is complete, as appropriate. Level 1 aggregate surfaced system roads to be closed following use will be barricaded and treated with water bars if needed to prevent drainage problems. Avoid blading ditches that are vegetated, functioning and effectively draining. Remove vegetation from swales, ditches, shoulders, and cut and fill slopes only when it impedes adequate drainage, vehicle passage, or obstructs necessary sight distance to avoid or minimize unnecessary or excessive vegetation disturbance. Aggregate will be placed on access roads into water sources to reduce sedimentation to streams, as needed. Relief culvert locations will be located, flagged, and approved by the Forest Service before installation to ensure that water is routed only onto stable soil/vegetation. Water bars sufficient to disperse water shall be designated by the Forest Service to prevent future traffic and disperse subsurface water on all Maintenance Level 1 system roads that are re-opened and subsequently blocked.

	No new temporary roads without previous ground disturbance will be constructed on slopes exceeding 35% slope. No dust abatement chemicals will be applied within one foot of the outside edge of road ditch lines (See Chem-X). Cease chemical dust abatement application within 25' of streams. Application of dust abatement will not be applied when raining and will only be applied if there is a 3-day forecast of clear weather. All opened temporary roads within RHCAs that are not further needed for project implementation would be obliterated, and those still needed to complete project implementation would be winterized with all erosion control measures in place, and barricaded or blocked. Erosion control, at a minimum, would include water bars and ground cover equivalent to 1.5 tons weed free straw per acre. All temporary roads would remain closed to winter access, unless otherwise agreed to by the Forest Service.

Road-3. Road Construction and Reconstruction	
Manual or Handbook Reference	FSM 7720, FSH 7709.56, and FSH 7709.57
Objective	Avoid or minimize adverse effects to soil, water quality, and riparian resources from erosion, sediment, and other pollutant delivery during road construction or reconstruction.
Practices	Use applicable practices of BMP Fac-2 (Facility Construction and Stormwater Control) for stormwater management and erosion control when constructing or reconstructing system roads. Use suitable construction techniques to create stable fills. Use full bench construction techniques or retaining walls where stable fill construction is not possible. Avoid incorporating woody debris in the fill portion of the road prism. Leave existing rooted trees or shrubs at the toe of the fill slope to stabilize the fill. Avoid use of road fills for water impoundment dams unless specifically designed for that purpose. Identify and locate waste areas before the start of operations. Deposit and stabilize excess and unsuitable materials only in designated sites. Do not place such materials on slopes with a risk of excessive erosion, sediment delivery to waterbodies, mass failure, or within the AMZ. Provide adequate surface drainage and erosion protection at disposal sites. Do not permit sidecasting within the AMZ. Avoid or minimize excavated materials from entering waterbodies or AMZs. Develop and follow blasting plans when necessary. Use restrictive blasting techniques in sensitive areas and in sites that have high landslide potential. Avoid blasting when soils are saturated. Remove slash and cull logs to designated sites outside the AMZ for storage or disposal. Consider using cull logs in aquatic ecosystem projects to achieve aquatic resource management objectives as opportunities arise. Use suitable measures in compliance with local direction to prevent and control invasive species. Construct pioneer roads using suitable measures to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources. Confine construction of pioneer roads to the planned roadway limits unless otherwise specified. Locate and construct pioneering roads to avoid or minimize undercutting of the designated final cut slope. Avoid deposition of materials outside the designated roadway limits. Use suitable crossing structures, or temporarily dewater live streams, where pioneer roads intersect streams. Use suitable erosion and stormwater control measures as needed (see BMP Fac-2 [Facility Construction and Stormwater Control]).

	Reconstruct existing roads to the degree necessary to provide adequate drainage and safety. Avoid disturbing stable road surfaces. Use suitable measures to avoid, to the extent practicable, or minimize direct discharges from road drainage structures to nearby waterbodies.
Local / Site Specific BMP	Under the timber sale contract, native-surfaced system roads, and level 1 roads, will have water bars installed and will be closed with road barriers to prevent damage after commercial use is complete, as appropriate. Level 1 aggregate surfaced system roads to be closed following use will be barricaded and treated with water bars if needed to prevent drainage problems. S Avoid blading ditches that are vegetated, functioning and effectively draining. Remove vegetation from swales, ditches, shoulders, and cut and fill slopes only when it impedes adequate drainage, vehicle passage, or obstructs necessary sight distance to avoid or minimize unnecessary or excessive vegetation disturbance. During construction and reconstruction activities, unsuitable or excess excavated soil material shall be placed in Forest Service approved waste sites. Spread and shape material to drain. Finish slopes on waste no steeper than 1V:1.5H. Utilize hydromulch or weedfree mulch and place uniformly on finished slopesRelief culvert locations will be located, flagged, and approved by the Forest Service before installation to ensure that water is routed only onto stable soil/vegetation. Water bars sufficient to disperse water shall be designated by the Forest Service to prevent future traffic and disperse subsurface water on all Maintenance Level 1 system roads that are re-opened and subsequently blocked.

Road-4. Road Operations and Maintenance	
Manual or Handbook Reference	FSM 7732 and FSH 7709.59, chapter 60.
Objective	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling road use and operations and providing adequate and appropriate maintenance to minimize sediment production and other pollutants during the useful life of the road.
Practices	*Operations* Designate season of use to avoid or restrict road use during periods when use would likely damage the roadway surface or road drainage features. Designate class of vehicle and type of uses suitable for the road width, location, waterbody crossings, and road surfaces to avoid or minimize adverse effects to soil, water quality, or riparian resources to the extent practicable. Use suitable measures to communicate and enforce road use restrictions. Use suitable measures to avoid or minimize adverse effects to soil, water quality, or riparian resources when proposed operations involve use of roads by traffic and during periods for which the road was not designed. Strengthen the road surface in areas where surfaces are vulnerable to movement such as corners and steep sections. Upgrade drainage structures to avoid, to the extent practicable, or minimize direct discharges into nearby waterbodies. Restrict use to low-ground-pressure vehicles or frozen ground conditions. Strengthen the road base if roads are tending to rut. Adjust maintenance to handle the traffic while minimizing excessive erosion and damage to the road surface. Ensure that drainage features are fully functional on completion of seasonal operations. Shape road surfaces to drain as designed. Construct or reconstruct drainage control structures as needed. Ensure that ditches and culverts are clean and functioning. Remove berms unless specifically designed for erosion control purposes.

	Consider potential for water quality effects from road damage when granting permits for oversize or overweight loads. Use suitable road surface stabilization practices and dust abatement supplements on roads with high or heavy traffic use (See FSH 7709.56 and FSH 7709.59). Use applicable practices of Chemical Use Management Activities BMPs when chemicals are used in road operations. *Inspection* Periodically inspect system travel routes to evaluate condition and assist in setting maintenance and improvement priorities. Give inspection priority to roads at high risk of failure to reduce risk of diversions and cascading failures. Inspect drainage structures and road surfaces after major storm events and perform any necessary maintenance (see BMP Road-11 [Road Storm-Damage Surveys]). Repair and temporarily stabilize road failures actively producing and transporting sediment as soon as practicable and safe to do so. Inspect roads frequently during all operations. Restrict use if road damage such as unacceptable surface displacement or rutting is occurring. *Maintenance Planning* Develop and implement annual maintenance plans that prioritize road maintenance work for the forest or district. Increase priority for road maintenance work on road sections where road damage is causing, or potentially would cause, adverse effects to soil, water quality, and riparian resources. Consider the risk and consequence of future failure at the site when prioritizing repair of road failures. Develop and implement annual road maintenance plans for projects where contractors or permittees are responsible for maintenance activities. Define responsibilities and maintenance timing in the plan. *Maintenance Activities* Maintain the road surface drainage system to intercept, collect, and remove water from the road surface and surrounding slopes in a manner that reduces concentrated flow in ditches, culverts, and over fill slopes and road surfaces. Clean ditches and catch basins only as needed to keep them functioning. Do not undercut the toe of the cut slope when cleaning ditches or catch basins. Use suitable measures to avoid, to the extent practicable, or minimize direct discharges from road drainage structures to nearby waterbodies. Identify diversion potential on roads and prioritize for treatment. Minimize diversion potential through installation and maintenance of dips, drains, or other suitable measures. Maintain road surface treatments to stabilize the roadbed, reduce dust, and control erosion consistent with anticipated traffic and use. Grade road surfaces only as necessary to meet the smoothness requirements of the assigned operational maintenance level and to provide adequate surface drainage. Do not undercut the toe of the cut slope when grading roads. Do not permit sidecasting of maintenance-generated debris within the AMZ to avoid or minimize excavated materials entering waterbodies or riparian areas. Avoid overwidening of roads due to repeated grading over time, especially where sidecast material would encroach on waterbodies. Use potential sidecast or other waste materials on the road surface where practicable. Dispose of unusable waste materials in designated disposal sites. Remove vegetation from swales, ditches, and shoulders, and cut and fill slopes only when it impedes adequate drainage, vehicle passage, or obstructs necessary sight distance to avoid or minimize unnecessary or excessive vegetation disturbance. Maintain permanent stream crossings and associated fills and approaches to reduce the likelihood that water would be diverted onto the road or erode the fill if the structure becomes obstructed.

	Identify waterbody-crossing structures that lack sufficient capacity to pass expected flows, bedload, or debris, or that do not allow for desired aquatic organism passage, and prioritize for treatment. Use applicable practices of BMP Road-7 (Stream Crossings) to improve crossings. Use applicable practices of BMP Road-6 (Road Storage and Decommissioning) for maintenance and management of Maintenance Level 1 roads. Ensure the necessary specifications concerning prehaul maintenance, maintenance during haul, and posthaul maintenance (putting the road back in storage) are in place when maintenance level 1 roads are opened for use on commercial resource management projects or other permitted activities. Require the commercial operator or responsible party to leave roads in a satisfactory condition when project is completed.
Local / Site Specific BMP	Erosion control measures (e.g. silt fences, weed-free straw/straw bales, etc.) will be placed and maintained at sites that have potential to deliver sediment to the stream network during the wet season. If sediment delivery is noted, additional erosion control measures will be placed and maintained. All new temporary road construction should have outslope designs, with drain dips and grade sags as needed so that no new ditchlines will be built. Road construction or reconstruction operations (including culvert replacements) will occur during minimal runoff periods and within the instream work window as prescribed by Oregon Department of Fish & Wildlife and approved by NOAA Fisheries. Roadwork contractors will have spill prevention and recovery equipment on site during all road construction operations as agreed to by the Forest Service. Under the timber sale contract, native-surfaced system roads, and level 1 roads, will have water bars installed and will be closed with road barriers to prevent damage after commercial use is complete, as appropriate. Level 1 aggregate surfaced system roads to be closed following use will be barricaded and treated with water bars if needed to prevent drainage problems. Avoid blading ditches that are vegetated, functioning and effectively draining. Remove vegetation from swales, ditches, shoulders, and cut and fill slopes only when it impedes adequate drainage, vehicle passage, or obstructs necessary sight distance to avoid or minimize unnecessary or excessive vegetation disturbance. During construction and reconstruction activities, unsuitable or excess excavated soil material shall be placed in Forest Service approved waste sites. Spread and shape material to drain. Finish slopes on waste no steeper than 1V:1.5H. Utilize hydromulch or weed free mulch and place uniformly. Aggregate will be placed on access roads into water sources to reduce sedimentation to streams, as needed. Haul on native surfaced roads should not occur during the wet season. Surface rock placement may be done outside the normal operating season as weather and road conditions permit, but no surface rock can be added to extend the season of haul on any of the abandoned roads that are to be obliterated after use. Relief culvert locations will be located, flagged, and approved by the Forest Service before installation to ensure that water is routed only onto stable soil/vegetation. All exposed soils will have required erosion control treatments completed the same year they are constructed even if they are not completed to final acceptance specifications. If the same area requires further disturbance to complete the road construction, it will be treated for erosion control and re-vegetated as needed to insure surface soil protection. Construction activities that may expose new soil (including clearing, grubbing, excavating, and fill placement) will be limited to the normal operating season. However, construction activities may be suspended anytime during wet weather to protect water quality of affected streams. Construction sites will be treated for erosion control and re-vegetated as needed to ensure surface soil protection. Water bars sufficient to disperse water shall be designated by the Forest Service to prevent future traffic and disperse subsurface water on all Maintenance Level 1 system roads that are re-opened and subsequently blocked. No chemical dust abatement will be applied within 25 feet of perennial streams or any other stream crossing in which water is flowing during chemical application.

	No dust abatement chemicals will be applied within one foot of the outside edge of road ditch lines. Application of dust abatement will occur when streams are at their seasonal baseflow. Dust abatement will not be applied when raining and will only be applied if there is a 3-day forecast of clear weather. , all opened temporary roads within RHCAs that are not further needed for project implementation would be obliterated, and those still needed to complete project implementation would be winterized with all erosion control measures in place, and barricaded or blocked. Erosion control, at a minimum, would include water bars and ground cover equivalent to 1.5 tons of mulch. All temporary roads would remain closed to winter access , unless otherwise agreed to by the Forest Service, Rock quarry benches, access roads and work areas should be sloped to drain and disperse surface water without ponding. Runoff should not flow directly into streams. Road work at perennial streams, to be done under the timber sale contract, will be completed during low flow conditions when the potential for delivery of construction-related sediment can be minimized. During construction, stream water will be diverted around the work site and back into the channel. Stream crossing culvert locations will be located, flagged, and approved by the Forest Service before installation.

Road-5. Temporary Roads	
Manual or Handbook Reference	None known.
Objective	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from the construction and use of temporary roads.
Practices	Use applicable practices of BMP Road-2 (Road Location and Design) to locate temporary roads. Use applicable practices of BMP Fac-2 (Facility Construction and Stormwater Control) for stormwater management and erosion control when constructing temporary roads. Install sediment and stormwater controls before initiating surface-disturbing activities to the extent practicable. Schedule construction activities to avoid direct soil and water-disturbance during periods of the year when heavy precipitation and runoff are likely to occur. Routinely inspect temporary roads to verify that erosion and stormwater controls are implemented, functioning, and appropriately maintained. Maintain erosion and stormwater controls as necessary to ensure proper and effective functioning. Use suitable measures in compliance with local direction to prevent and control invasive species. Use temporary crossings suitable for the expected uses and timing of use (See BMP Road-7 [Stream Crossings]). Use applicable practices of BMP Road-6 (Road Storage and Decommissioning) to obliterate the temporary road and return the area to resource production after the access is no longer needed.
Local / Site Specific BMP	All new temporary road construction will be done using outslope designs, with drain dips and grade sags as needed, so that no new ditchlines will be built. Road construction or reconstruction operations (including culvert replacements) will occur during minimal runoff periods. All exposed soils will have required erosion control treatments completed the same year they are constructed even if they are not completed to final acceptance specifications. If the same area requires further disturbance to complete the road construction, it will be treated for erosion control and re-vegetated as needed to insure surface soil protection. The timber sale purchasers are required to obliterate temporary spur roads under the timber sale contract. This involves subsoiling the road as appropriate (See PDC Soils-8), seeding as needed, and pulling displaced soil and duff back over the road surface. Slash will be pulled over the top of the road to provide additional ground cover and bare soil protection. Obliteration of temporary roads (new or legacy) shall meet specifications of the Forest Service, for depth of treatment and use of effective ground cover on treatment area.

	No new temporary roads without previous ground disturbance will be constructed on slopes exceeding 35% slope. All opened temporary roads within RHCAs that are not further needed for project implementation would be obliterated, and those still needed to complete project implementation would be winterized with all erosion control measures in place, and barricaded or blocked. Erosion control, at a minimum, would include water bars and ground cover equivalent to 1.5 tons of weed free mulch per acre. All temporary roads would remain closed to winter access unless otherwise agreed to by the Forest Service, A watershed specialist shall review all temporary roads prior to treatment to initiate and finalize the treatment prescription; the effectiveness of the temporary road restoration prescription in preventing erosion and providing suitable plant habitat shall be monitored.

Road-6. Road Storage and Decommissioning	
Manual or Handbook Reference	FSH 7709.59, chapter 60 and FSM 7734.
Objective	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by storing closed roads not needed for at least 1 year (Intermittent Stored Service) and decommissioning unneeded roads in a hydrologically stable manner to eliminate hydrologic connectivity, restore natural flow patterns, and minimize soil erosion.
Practices	*All Activities* Implement suitable measures to close and physically block the road entrance so that unauthorized motorized vehicles cannot access the road. Remove the road from the Motor Vehicle Use Map (MVUM) to include the change in the annual forestwide order associated with the MVUM. Establish effective ground cover on disturbed sites to avoid or minimize accelerated erosion and soil loss. Use suitable species and establishment techniques to stabilize and revegetate the site in compliance with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species. *Road Storage* Evaluate all stream and waterbody crossings for potential for failure or diversion of flow if left without treatment. Use suitable measures to reduce the risk of flow diversion onto the road surface. Consider leaving existing crossings in low-risk situations where the culvert is not undersized, does not present an undesired passage barrier to aquatic organisms, and is relatively stable. Remove culverts, fill material, and other structures that present an unacceptable risk of failure or diversion. Reshape the channel and streambanks at the crossing-site to pass expected flows without scouring or ponding, minimize potential for undercutting or slumping of streambanks, and maintain continuation of channel dimensions and longitudinal profile through the crossing site. Use suitable measures to avoid or minimize scour and downcutting. Use suitable measures to ensure that the road surface drainage system will intercept, collect, and remove water from the road surface and surrounding slopes in a manner that reduces concentrated flow in ditches, culverts, and over fill slopes and road surfaces without frequent maintenance. Use suitable measures to stabilize unstable road segments, seeps, slumps, or cut or fill slopes where evidence of potential failure exists. *Road Conversion to Trail* Reclaim unneeded road width, cut, and fill slopes when converting a road for future use as a trail.

	Use suitable measures to stabilize reclaimed sections to avoid or minimize undesired access and to restore desired ecologic structures or functions. Use suitable measures to ensure that surface drainage will intercept, collect, and remove water from the trail surface and surrounding slopes in a manner that minimizes concentrated flow and erosion on the trail surfaces without frequent maintenance. Use applicable practices of BMP Road-7 (Stream Crossings) to provide waterbody crossings suitable to the expected trail uses. *Road Decommissioning* Use existing roads identified for decommissioning as skid roads in timber sales or land stewardship projects before closing the road, where practicable, as the opportunity arises. Evaluate risks to soil, water quality, and riparian resources and use the most practicable, costeffective treatments to achieve long-term desired conditions and water quality management goals and objectives. Use applicable practices of BMP Fac-2 (Facility Construction and Stormwater Control) for stormwater management and erosion control when obliterating system roads. Implement suitable measures to re-establish stable slope contours and surface and subsurface hydrologic pathways where necessary to the extent practicable to avoid or minimize adverse effects to soil, water quality, and riparian resources. Remove drainage structures. Recontour and stabilize cut slopes and fill material. Reshape the channel and streambanks at crossing sites to pass expected flows without scouring or ponding, minimize potential for undercutting or slumping of streambanks, and maintain continuation of channel dimensions and longitudinal profile through the crossing site. Restore or replace streambed materials to a particle size distribution suitable for the site. Restore floodplain function. Implement suitable measures to promote infiltration of runoff and intercepted flow and desired vegetation growth on the road prism and other compacted areas. Use suitable measures in compliance with local direction to prevent and control invasive species.
Local / Site Specific BMP	Under the timber sale contract, native-surfaced system roads, and level 1 roads, will have water bars installed and will be closed with road barriers to prevent damage after commercial use is complete, as appropriate. Level 1 aggregate surfaced system roads to be closed following use will be barricaded and treated with water bars if needed to prevent drainage problems. Haul on native surfaced roads should not occur during the wet season. Surface rock placement may be done outside the normal operating season as weather and road conditions permit, but no surface rock can be added to extend the season of haul on any of the abandoned roads that are to be obliterated after use. All exposed soils will have required erosion control treatments completed the same year they are constructed even if they are not completed to final acceptance specifications. If the same area requires further disturbance to complete the road construction, it will be treated for erosion control and re-vegetated as needed to insure surface soil protection. Water bars sufficient to disperse water shall be designated by the Forest Service to prevent future traffic and disperse subsurface water on all Maintenance Level 1 system roads that are re-opened and subsequently blocked. The timber sale purchasers are required to obliterate temporary spur roads under the timber sale contract. This involves subsoiling the road as appropriate, seeding as needed, and pulling displaced soil and duff back over the road surface. Slash will be pulled over the top of the road to provide additional ground cover and bare soil protection. Obliteration of temporary roads (new or legacy) shall meet specifications of the Forest Service, for depth of treatment and use of effective ground cover on treatment area. All opened temporary roads within RHCAs that are not further needed for project implementation would be obliterated, and those still needed to complete project implementation would be winterized with all erosion control measures in place, and barricaded or blocked. Erosion control, at a minimum, would include water bars and ground cover equivalent to 1.5 of mulch per acre. All temporary roads would remain closed to winter access, unless otherwise agreed to by the Forest Service.

Road-7. Stream Crossings	
Manual or Handbook Reference	Manual or Handbook Reference: FSM 7722 and FSH 7709.56b.
Objective	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when constructing, reconstructing, or maintaining temporary and permanent waterbody crossings.
Practices	*All Crossings* Plan and locate surface water crossings to limit the number and extent to those that are necessary to provide the level of access needed to meet resource management objectives as described in the RMOs. Use applicable practices of BMP AqEco-2 (Operations in Aquatic Ecosystems) when working in or near waterbodies. Use crossing structures suitable for the site conditions and the RMOs. Design and locate crossings to minimize disturbance to the waterbody. Use suitable measures to locate, construct, and decommission or stabilize bypass roads to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources. Use suitable surface drainage and roadway stabilization measures to disconnect the road from the waterbody to avoid or minimize water and sediment from being channeled into surface waters and to dissipate concentrated flows. Use suitable measures to avoid, minimize, or mitigate damage to the waterbody and banks when transporting materials across the waterbody or AMZ during construction activities. *Stream Crossings* Locate stream crossings where the channel is narrow, straight, and uniform, and has stable soils and relatively flat terrain to the extent practicable. Select a site where erosion potential is low. Orient the stream crossing perpendicular to the channel to the extent practicable. Keep approaches to stream crossings to as gentle a slope as practicable. Consider natural channel adjustments and possible channel location changes over the design life of the structure. Design the crossing to pass a normal range of flows for the site. Design the crossing structure to have sufficient capacity to convey the design flow without appreciably altering streamflow characteristics. Install stream crossings to sustain bankfull dimensions of width, depth, and slope and maintain streambed and bank resiliency and continuity through the structure. Bridge, culvert, or otherwise design road fill to prevent restriction of flood flows. Use site conditions and local requirements to determine design flood flows. Use suitable measures to protect fill from erosion and to avoid or minimize failure of the crossing at flood flows. Use suitable measures to provide floodplain connectivity to the extent practicable. Use suitable measures to avoid or minimize scour and erosion of the channel, crossing structure, and foundation to maintain the stability of the channel and banks. Design and construct the stream crossing to maintain the desired migration or other movement of fish and other aquatic life inhabiting the waterbody. Consider the use of bottomless arch culverts where appropriate to allow for natural channel migration and desired aquatic organism passage. Install or maintain fish migration barriers only where needed to protect endangered, threatened, sensitive, or unique native aquatic populations, and only where natural barriers do not exist. Use stream simulation techniques where practicable to aid in crossing design. Bridges Use an adequately long bridge span to avoid constricting the natural active flow channel and minimize constriction of any overflow channel.

	Place foundations onto nonscour-susceptible material (e.g., bedrock or coarse rock material) or below the expected maximum depth of scour. Set bridge abutments or footings into firm natural ground (e.g., not fill material or loose soil) when placed on natural slopes. Use suitable measures as needed in steep, deep drainages to retain approach fills or use a relatively long bridge span. Avoid placing abutments in the active stream channel to the extent practicable. Place in-channel abutments in a direction parallel to the streamflow where necessary. Use suitable measures to avoid or minimize, to the extent practicable, damage to the bridge and associated road from expected flood flows, floating debris, and bedload. Inspect the bridge at regular intervals and perform maintenance as needed to maintain the function of the structure. Culverts Align the culvert with the natural stream channel. Cover culvert with sufficient fill to avoid or minimize damage by traffic. Construct at or near natural elevation of the streambed to avoid or minimize potential flooding upstream of the crossing and erosion below the outlet. Install culverts long enough to extend beyond the toe of the fill slopes to minimize erosion. Use suitable measures to avoid or minimize water from seeping around the culvert. Use suitable measures to avoid or minimize culvert plugging from transported bedload and debris. Regularly inspect culverts and clean as necessary. Low-Water Crossings Consider low-water crossings on roads with low traffic volume and slow speeds, and where water depth is safe for vehicle travel. Consider low-water crossings to cross ephemeral streams, streams with relatively low baseflow and shallow water depth or streams with highly variable flows or in areas prone to landslides or debris flows. Locate low-water crossings where streambanks are low with gentle slopes and channels are not deeply incised. Select and design low-water crossing structures to maintain the function and bedload movement of the natural stream channel. Locate unimproved fords in stable reaches with a firm rock or gravel base that has sufficient load-bearing strength for the expected vehicle traffic. Construct the low-water crossing to conform to the site, channel shape, and original streambed elevation and to minimize flow restriction, site disturbance, and channel blockage to the extent practicable. Use suitable measures to stabilize or harden the streambed and approaches, including the entire bankfull width and sufficient freeboard, where necessary to support the design vehicle traffic. Use vented fords with high vent area ratio to maintain stream function and aquatic organism passage. Construct the roadway-driving surface with material suitable to resist expected shear stress or lateral forces of water flow at the site. Consider using temporary crossings on roads that provide short-term or intermittent access to avoid, minimize, or mitigate erosion, damage to streambed or channel, and flooding. Design and install temporary crossings suitable for the expected users, loads, and timing of use. Design and install temporary crossing structures to pass a design storm determined based on local site conditions and requirements. Install and remove temporary crossing structures in a timely manner as needed to provide access during use periods and minimize risk of washout. Use suitable measures to stabilize temporary crossings that must remain in place during high runoff seasons. Monitor temporary crossings regularly while installed to evaluate condition. Remove temporary crossings and restore the waterbody profile and substrate when the need for the crossing no longer exists.

	Standing Water and Wetland Crossings Disturb the least amount of area as practicable when crossing a standing waterbody. Provide for sufficient cross drainage to minimize changes to, and avoid restricting, natural surface and subsurface water flow of the wetland under the road to the extent practicable. Locate and design roads or road drainage to avoid dewatering or polluting wetlands. Avoid or minimize actions that would significantly alter the natural drainage for flow patterns on lands immediately adjacent to wetlands. Use suitable measures to increase soil-bearing capacity and reduce rutting from expected vehicle traffic. Construct fill roads only when necessary. Construct fill roads parallel to water flow and to be as low to natural ground level as practicable. Construct roads with sufficient surface drainage for surface water flows.
Local / Site Specific BMP	Erosion control measures (e.g. silt fences, weed-free straw/straw bales, etc.) will be placed and maintained at sites that have potential to deliver sediment to the stream network during the wet season if haul is going to take place. If sediment delivery is noted, additional erosion control measures will be placed and maintained Or haul will cease until conditions dry. Application of dust abatement will occur when streams are at their seasonal baseflow. Dust abatement will not be applied when raining and will only be applied if there is a 3-day forecast of clear weather. Road work at perennial streams, to be done under the timber sale contract, will be completed during low flow conditions when the potential for delivery of construction-related sediment can be minimized. During construction, stream water will be diverted around the work site and back into the channel. Stream crossing culvert locations will be located, flagged, and approved by the Forest Service before installation.

Road-8. Snow Removal and Storage	
Manual or Handbook Reference	FS-7700-41 and FSH 7709.59, chapter 24.11.
Objective	Avoid or minimize erosion, sedimentation, and chemical pollution that may result from snow removal and storage activities.
Practices	Develop a snow removal plan for roads plowed for recreation, administrative, or other access to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources. Use existing standard contract language (C5.316# or similar) for snow removal during winter logging operations to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources. Limit use of approved deicing and traction control materials to areas where safety is critical (e.g., intersections, steep segments, and corners). Use site-specific characteristics such as road width and design, traffic concentration, and proximity to surface waters to determine suitable amount of de-icing material to apply. Use effective plowing techniques to optimize chemical de-icer use. Consider use of alternative materials to chemical de-icers, such as sand or gravel, in sensitive areas. Use properly calibrated controllers to ensure material application rates are accurately regulated. Limit spray distribution of chemical de-icers when near surface waters. Design paved roads and parking lots to facilitate sand removal (e.g., curbs or paved ditches). Use suitable measures when storing de-icing materials to avoid or minimize mobility of the materials. Store de-icing materials on a flat, upland, impervious area of adequate size to accommodate material stockpiles and equipment movement.

	Stockpile de-icing materials under cover and provide runoff collection, containment, and treatment, as necessary, to avoid or minimize offsite movement. Move snow in a manner that will avoid or minimize disturbance of or damage to road surfaces and drainage structures. Mark drainage structures to avoid damage during plowing. Conduct frequent inspections to ensure road drainage is not adversely affecting soil or water resources. Control areas where snow removal equipment can operate to avoid or minimize damage to riparian areas, floodplains, and stream channels. Install snow berms where such placement will preclude concentration of snowmelt runoff and will serve to dissipate melt water. Provide frequent drainage through snow berms to avoid concentration of snowmelt runoff on fillslopes and other erosive areas, to dissipate melt water, and to avoid or minimize sediment delivery to waterbodies. Store snow in clearly delineated pre-approved areas where snowmelt runoff will not cause erosion or deliver snow, road de-icers, or traction-enhancing materials directly into surface waters. Store or dispose of snow adjacent to or on pervious surfaces in upland areas away from waterbodies to the extent practicable. Do not store or dispose of snow in riparian areas, wetlands, or streams unless no other practicable alternative exists. Manage discharge of meltwater to avoid or minimize runoff of pollutants into surface waterbodies or groundwater. Use suitable measures to filter and treat meltwater before reaching surface water or groundwater. Use suitable measures to disperse meltwater to avoid creating concentrated overland flow. Collect and properly dispose of onsite litter, debris, and sediment from meltwater settling areas. Discontinue road use and snow removal when use would likely damage the roadway surface or road drainage features. Modify snow removal procedures as necessary to meet water quality concerns. Replace lost road surface materials with similar quality material and repair structures damaged in snow removal operations as soon as practicable.
Local / Site Specific BMP	No Additional BMPs

Road-9. Parking and Staging Areas	
Manual or Handbook Reference	FSM 7710, FSM 7720, and FSM 7730.
Objective	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when constructing and maintaining parking and staging areas.
Practices	Design and locate parking and staging areas of appropriate size and configuration to accommodate expected vehicles and avoid or minimize adverse effects to adjacent soil, water quality, and riparian resources. Consider the number and type of vehicles to determine parking or staging area size. Use applicable practices of BMP Fac-2 (Facility Construction and Stormwater Control) for stormwater management and erosion control when designing, constructing, reconstructing, or maintaining parking or staging areas. Use suitable measures to harden and avoid or minimize damage to parking area surfaces that experience heavy use or are used during wet periods. Use and maintain suitable measures to collect and contain oil and grease in larger parking lots with high use and where drainage discharges directly to streams.

	Connect drainage system to existing stormwater conveyance systems where available and practicable. Conduct maintenance activities commensurate with parking or staging area surfacing and drainage requirements as well as precipitation timing, intensity, and duration. Limit the size and extent of temporary parking or staging areas Take advantage of existing openings, sites away from waterbodies, and areas that are apt to be more easily restored to the extent practicable. Use temporary stormwater and erosion control measures as needed. Use applicable practices of BMP Fac-10 (Facility Site Reclamation) to rehabilitate temporary parking or staging areas as soon as practicable following use.
Local / Site Specific BMP	Parking and Staging areas should not be located within 300 ft of perennial streams, unless approved by the Forest Service. Botany design features specific to parking and staging – lithosols, meadows and grasslands.

Road-10. Equipment Refueling and Servicing	
Manual or Handbook Reference	FSM 2160 and FSH 7109.19, chapter 40.
Objective	Avoid or minimize adverse effects to soil, water quality, and riparian resources from fuels, lubricants, cleaners, and other harmful materials discharging into nearby surface waters or infiltrating through soils to contaminate groundwater resources during equipment refueling and servicing activities.
Practices	Plan for suitable equipment refueling and servicing sites during project design. Allow temporary refueling and servicing only at approved locations, located well away from the AMZ, groundwater recharge areas, and waterbodies. Develop or use existing fuel and chemical management plans (e.g., Spill Prevention Control and Countermeasures [SPCC], spill response plan, and emergency response plan) when developing the management prescription for refueling and servicing sites. Locate, design, construct, and maintain petroleum and chemical delivery and storage facilities consistent with applicable local, State, and Federal regulations. Use suitable measures around vehicle service, storage and refueling areas, chemical storage and use areas, and waste dumps to fully contain spills and avoid or minimize soil contamination and seepage to groundwater. Provide training for all agency personnel handling fuels and chemicals in their proper use, handling, storage, and disposal. Ensure that contractors and permit holders provide documentation of proper training in handling hazardous materials. Use suitable measures to avoid spilling fuels, lubricants, cleaners, and other chemicals during handling and transporting. Prohibit excess chemicals or wastes from being stored or accumulated in the project area. Remove service residues, used oil, and other hazardous or undesirable materials from NFS land and properly dispose them as needed during and after completion of the project. Clean up and dispose of spilled materials according to specified requirements in the appropriate guiding document. Report spills and initiate suitable cleanup action in accordance with applicable State and Federal laws, rules, and regulations. Remove contaminated soil and other material from NFS lands and dispose of this material in a manner consistent with controlling regulations. Prepare and implement a certified SPCC Plan for each facility, including mobile and portable facilities, as required by Federal regulations. Use applicable practices of BMP Fac-10 (Facility Site Reclamation) to reclaim equipment refueling and services site when the need for them ends.

Local / Site Specific BMP	Roadwork contractors will have spill prevention and recovery equipment on site during all road construction operations as agreed to by the Forest Service. Fuel shall not be stored or equipment refueled within 300 feet of any stream channel or surface water feature.

Road-11. Road Storm-Damage Surveys	
Manual or Handbook Reference	FSM 7730 and FSM 2350.
Objective	Monitor road conditions following storm events to detect road failures; assess damage or potential damage to waterbodies, riparian resources, and watershed functions; determine the causes of the failures; and identify potential remedial actions at the damaged sites and preventative actions at similar sites.
Practices	*ERFO-Related Damage Surveys* Complete a Damage Survey Report (DSR) at damaged sites potentially eligible for ERFO funds. Complete the Forest Service-developed supplemental form DSR+ in the field to more thoroughly describe, in categorical terms, the cause(s) and consequences of the damage. The DSR+ form and instructions may be found at http://www.stream.fs.fed.us/bmp/damagesurveys. Record the following information from damage sites that have been documented on the DSR and DSR+ forms in appropriate corporate database(s), including geographic information systems: The geographic locations (points or road segments) where damage occurred. The date of occurrence (year and month, if available). The type of failure and its cause. *Special Storm Damage Surveys* Determine the need to do more comprehensive surveys and analysis of road damage after particularly large storm events. Survey all roads in the area, typically an entire watershed, ranger district, or national forest or grassland, affected by the storm or those roads that may be particularly susceptible to failure. *All Damage Surveys* Analyze results from EFRO surveys, routine damage reconnaissance, and special surveys for patterns of damage and causes. Use these patterns of road damage to formulate recommendations of practice changes to reduce the incidence of future damage. Consider practice changes such as— Locating or relocating roads to more stable terrain (see BMP Road-2 [Road Location and Design]); Disconnecting road surface drainage from crossings and channels (see BMP Road-3 [Road Construction and Reconstruction]); Using special protections in locations on unstable landforms or areas with high erosion potential (see BMP Road-3 [Road Construction and Reconstruction]); Increasing the capacity of stream-crossing structures to pass water, debris, and sediment to reduce the probabilities of failure (see BMP Road-7 [Stream Crossings]); Building or rebuilding stream crossings to eliminate or reduce diversion potential (see BMP Road-7 [Stream Crossings]); Building or rebuilding stream crossings to improve aquatic species passage (see BMP Road-7 [Stream Crossings]); or Decommissioning or storing roads in a hydrologically benign condition (see BMP Road-6 [Road Storage and Decommissioning]). Enter and store the results of data analysis in corporate data management systems to facilitate sharing among units that have similar terrain and road practices.
Local / Site Specific BMP	No Additional BMPs

Facilities and Nonrecreation Special Uses Management

- **Fac-2. Facility Construction and Stormwater Control**

Fac-2. Facility Construction and Stormwater Control	
Manual or Handbook Reference	None known.
Objective	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling erosion and managing stormwater discharge originating from ground disturbance during construction of developed sites
Practices	Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment. Obtain Clean Water Act (CWA) 402 stormwater discharge permit coverage from the appropriate State agency or the U.S. Environmental Protection Agency (EPA) when more than 1 acre of land will be disturbed through construction activities. Obtain CWA 404 permit coverage from the U.S. Army Corps of Engineers when dredge or fill material will be discharged to waters of the United States. Establish designated areas for equipment staging, stockpiling materials, and parking to minimize the area of ground disturbance (see BMP Road-9 [Parking Sites and Staging Areas] and BMP Road-10 [Equipment Refueling and Servicing]). Establish and maintain construction area limits to the minimum area necessary for completing the project and confine disturbance to within this area. Develop and implement an erosion control and sediment plan that covers all disturbed areas, including borrow, stockpile, fueling, and staging areas used during construction activities. Calculate the expected runoff generated using a suitable design storm to determine necessary stormwater drainage capacity. Use site conditions and local requirements to determine design storm. Include run-on from any contributing areas. Refer to State or local construction and stormwater BMP manuals, guidebooks, and trade publications for effective techniques to: Apply soil protective cover on disturbed areas where natural revegetation is inadequate to prevent accelerated erosion during construction or before the next growing season. Maintain the natural drainage pattern of the area wherever practicable. Control, collect, detain, treat, and disperse stormwater runoff from the site. Divert surface runoff around bare areas with appropriate energy dissipation and sediment filters. Stabilize steep excavated slopes. Develop and implement a postconstruction site vegetation plan using suitable species and establishment techniques to revegetate the site in compliance with local direction and requirements per Forest Service Manual (FSM) 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species. Install sediment and stormwater controls before initiating surface-disturbing activities to the extent practicable. Do not use snow or frozen soil material in facility construction.

	Schedule, to the extent practicable, construction activities to avoid direct soil and water disturbance during periods of the year when heavy precipitation and runoff are likely to occur. Limit the amount of exposed or disturbed soil at any one time to the minimum necessary to complete construction operations. Limit operation of equipment when ground conditions could result in excessive rutting, soil puddling, or runoff of sediments directly into waterbodies. Install suitable stormwater and erosion control measures to stabilize disturbed areas and waterways before seasonal shutdown of project operations or when severe or successive storms are expected. Use low-impact development practices where practicable. Maintain erosion and stormwater controls as necessary to ensure proper and effective functioning. Prepare for unexpected failures of erosion control measures. Implement corrective actions without delay when failures are discovered to prevent pollutant discharge to nearby waterbodies. Routinely inspect construction sites to verify that erosion and stormwater controls are implemented and functioning as designed and are appropriately maintained. Use suitable measures in compliance with local direction to prevent and control invasive species.
Local / Site Specific BMP	

Wildland Fire Management Activities

- **Fire-1 Wildland Fire Management Planning**
- **Fire-2 Use of Prescribed Fire**

Fire-1 Wildland Fire Management Planning	
Manual or Handbook Reference	FSM 5120; FSM 5150; FSH 5109.19 Ch. 50
Objective	Use the fire management planning process to develop measures to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during wildland fire management activities.
Practices	Consider the beneficial and adverse effects of wildland fire on water quality and watershed condition when developing desired conditions and goals for the plan area. Identify areas where the adverse effects of unplanned wildland fire to water quality and watershed condition outweigh the benefits. Include plan objectives and strategies that allow the use of wildland fire where suitable to restore watershed conditions. Include design criteria, standards, and guidelines for fire management activities to avoid or minimize adverse effects to soil, water quality, and riparian resources. Consider the need to establish a network of permanent water sources in the plan area for fire control and suppression. Use applicable practices of BMP Plan-2 (Project Planning and Analysis) and BMP Plan-3 (Aquatic Management Zone [AMZ] Planning) when planning prescribed fire treatments. Consider prescription elements and ecosystem objectives at the appropriate watershed scale to determine the optimum and maximum burn unit size, total burn area, burn intensity, disturbance thresholds for local downstream water resources, area or length of water resources to be affected, and contingency strategies.

	Consider the extent, severity, and recovery of fire disturbance a watershed has experienced in the past to evaluate cumulative effects and re-entry intervals. Identify environmental conditions favorable for achieving desired condition or treatment objectives of the site while minimizing detrimental mechanical and heat disturbance to soil and water considering the following factors. Existing and desired conditions for vegetation and fuel type, composition, structure, distribution, and density. Short- and long-term site objectives. Acceptable fire weather parameters. Desirable soil, duff, and fuel moisture levels. Existing duff and humus depths. Site factors such as slope and soil conditions. Expected fire behavior and burn severity based on past burn experience in vegetation types in the project area. Extent and condition of roads, fuel breaks, and other resource activities and values. Develop burn objectives that avoid or minimize creating water-repellent soil conditions to the extent practicable considering fuel load, fuel and soil moisture levels, fire residence times, and burn intensity. Use low-intensity prescribed fire on steep slopes or highly erodible soils when prescribed fire is the only practicable means to achieve project objectives in these areas. Set target levels for desired ground cover remaining after burning based on slope, soil type, and risk of soil and hillslope movement. Plan burn areas to use natural or in-place barriers that reduce or limit fire spread, such as roads, canals, utility rights-of-way, barren or low fuel hazard areas, streams, lakes, or wetland features, where practicable, to minimize the need for fireline construction. Identify the type, width, and location of firebreaks or firelines in the prescribed fire plan. Use fire initiation techniques, control methods, and access locations for ignition and control (holding versus escape conditions) that minimize potential effects to soil, water quality, and riparian resources. Use prescribed fire in the AMZ only when suitable to achieve long-term AMZ-desired conditions and management objectives (see BMP Plan-3 [AMZ Planning]).
Local / Site Specific BMP	Air quality would be emphasized during prescribed fire planning. Mitigating measures would be considered including extending the burning season to spread emissions throughout the year. All burning would be planned and conducted to comply with applicable air quality laws and regulations and coordinated with appropriate air quality regulatory agencies. Equipment used to machine pile slash would use legacy skid trails, and temporary and permanent roads on slopes less than 35%, as much as possible. Burning would be carried out when fuel moistures are sufficient to help retain existing snags and down wood to the extent feasible. Maximum depth of slash on temporary roads and landings is 12 inches. Grapple piles would be constructed to the following specifications: All slash from 1 inch in diameter up to 6 inches in diameter and exceeding 3 feet in length shall be piled. Piles would be constructed compactly with minimal soil in the piles and covered to shed water so they remain dry for burning during the fall or winter; height would be at least 6 feet and no greater than 12 feet; width would be at least 6 feet and no greater than 10 feet. Piles would be evenly spaced between trees and snags left after harvest. Piles would be placed on temporary roads or designated equipment trails when possible. Piles would be placed at least 50 feet away from live streams. Machine piles at landings will be built by grapple or shovel to keep dirt and rock debris out. No cat piling or pushing of piles. Where the volume of landing and roadside slash exceeds the ability to create piles and meet pile size and location specifications above, slash would be returned to temporary roads and designated forwarding corridors for piling or dispersal after subsoiling, if needed.

	Slash pile construction and burning in and around riparian areas should be consistent with Blue Mountain PDCs.

Fire-2 Use of Prescribed Fire	
Manual or Handbook Reference	FSM 5140
Objective	Avoid, minimize, or mitigate adverse effects of prescribed fire and associated activities on soil, water quality, and riparian resources that may result from excessive soil disturbance as well as inputs of ash, sediment, nutrients, and debris.
Practices	Conduct the prescribed fire in such a manner as to achieve the burn objectives outlined in the Prescribed Fire Plan (see BMP Fire-1 [Wildland Fire Management Planning]). Locate access and staging areas near the project site but outside of AMZs, wetlands, and sensitive soil areas. Keep staging areas as small as possible while allowing for safe and efficient operations. Store fuel for ignition devices in areas away from surface water bodies and wetlands. Install suitable measures to minimize and control concentrated water flow and sediment from staging areas. Collect and properly dispose of trash and other solid waste. Restore and stabilize staging areas after use (see BMP Veg-6 [Landings]). Conduct prescribed fires to minimize the residence time on the soil while meeting the burn objectives. Manage fire intensity to maintain target levels of soil temperature and duff and residual vegetative cover within the limits and at locations described in the prescribed fire plan. Construct fireline to the minimum size and standard necessary to contain the prescribed fire and meet overall project objectives. Locate and construct fireline in a manner that minimizes erosion and runoff from directly entering waterbodies by considering site slope and soil conditions, and using and maintaining suitable water and erosion control measures. Consider alternatives to ground-disturbing fireline construction such as using wet lines, rock outcrops, or other suitable features for firelines. Establish permanent fireline with suitable water and erosion control measures in areas where prescribed fire treatments are used on a recurring basis. Maintain firebreaks in a manner that minimizes exposed soil to the extent practicable. Rehabilitate or otherwise stabilize fireline in areas that pose a risk to water quality. Alter prescribed fire prescriptions and control actions in the AMZs as needed to maintain ecosystem structure, function, and processes and onsite and downstream water quality. Pretreat AMZs and drainage ways to reduce excessive fuel loadings. Avoid building firelines in or around riparian areas, wetlands, marshes, bogs, fens, or other sensitive water-dependent sites unless needed to protect life, property, or wetlands. Construct any essential fireline in the AMZ in a manner that minimizes the amount of area and soil disturbed. Keep high-intensity fire out of the AMZ unless suitable measures are used to avoid or minimize adverse effects to water quality. Avoid or minimize complete removal of the organic layer when burning in riparian areas or wetlands to maintain soil productivity, infiltration capacity, and nutrient retention. Rehabilitate fireline in the AMZ after prescribed fire treatment is completed. Remove debris added to stream channels as a result of the prescribed burning unless debris is prescribed to improve fisheries habitat. Conduct prescribed fire treatments, including pile burning, for slash disposal in a manner that encourages efficient burning to minimize soil impacts while achieving treatment objectives.

	Pile and burn only the slash that is necessary to be disposed of to achieve treatment objectives. Locate slash piles in areas where the potential for soil effects is lessened (meadows, rock outcrops, etc.) and that do not interfere with natural drainage patterns. Remove wood products such as firewood or fence posts before piling and burning to reduce the amount of slash to be burned. Minimize the amount of dirt or other noncombustible material in slash piles to promote efficient burning. Construct piles in such a manner as to promote efficient burning. Avoid burning large stumps and sections of logs in slash piles to reduce the amount of time that the pile burns. Avoid burning when conditions will cause the fire to burn too hot and damage soil conditions. Avoid piling and burning for slash removal in AMZs to the extent practicable. Minimize effects on soil, water quality, and riparian resources by appropriately planning pile size, fuel piece size limits, spacing, and burn prescriptions in compliance with State or local laws and regulations if no practical alternatives for slash disposal in the AMZ are available. Evaluate the completed burn to identify sites that may need stabilization treatments or monitoring to minimize soil and site productivity loss and deterioration of water quality both on and off the site. Provide for rapid revegetation of all denuded areas through natural processes supplemented by artificial revegetation where necessary. Use suitable measures to promote water retention and infiltration or to augment soil cover where necessary. Use suitable species and establishment techniques to stabilize the site in compliance with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species. Clear streams and ditches of debris introduced by fire control equipment during the prescribed fire operation. Consider long-term management of the site and nearby areas to promote project success. Use suitable measures to limit human, vehicle, and livestock access to site as needed to allow for recovery of vegetation.

Local / Site Specific BMP / PDC	Burn plans would include water quality burn plans would include design that would mitigate adverse effects to water quality. Burn plans for each prescribed fire will be prepared in advance of ignition, reviewed by a hydrologist, fisheries biologist, botanist, cultural resource specialist, wildlife biologist, range specialist, recreation/lands specialist and silviculturist and approved by the appropriate line officer. As needed, fire lines would require water bars at slopes greater than 30%. Fire line water bars would deflect surface run-off from the trail down slope onto stable material such as rock surface cover. Fire line construction would generally avoid sensitive areas like unique habitats. Burning would be carried out when fuel moistures are sufficient to help retain existing snags and down wood to the extent prescribed burns are designed to maintain and enhance desired forest structure, tree densities, snag densities, and CWD levels. Burning would be conducted to meet air quality standards as outlined by Oregon DEQ, and air quality monitoring would be conducted in conjunction with the DEQ. Prescribed fire and mechanical hand treatments will follow the established Blue Mountain PDCs During any prescribed burning, the objective is to retain these logs, use passive burning in the area of these structures. To help retain wildlife snags during prescribed burning operations, there would be no ignition within 50 feet of standing dead trees greater than 12” DBH In moist forests, because we are deficient in large snags, and in areas with known pileated woodpecker nests, prior to prescribed burning, rake duff away from the base of large live old growth trees and large snags with accumulations of bark and duff and/or use other protection measures where economically viable and reasonable to do. To prevent spread of diseases to amphibians including Columbia spotted frogs, and Rock Mountain tailed frog, gear, hoses and dipping buckets used to transport or move water from streams, rivers, or ponds needs to be disinfected by drying in the sun (must be completely dry inside and out) or washing with a chemical disinfectant before changing to a different water source Raptors -Any raptor sightings or active raptor nests observed during reconnaissance, layout, marking, or project activities will be reported to the Unit Wildlife Biologist for further assessment and potential mitigation associated with project activities Pileated Woodpecker, White-headed Woodpecker, Flammulated Owl, Great Grey Owl Nest sites – Ensure that any known/ discovered nest tree is protected from harvest and during implementation of prescribed fire-only treatments. Also, conduct prescribed fire treatments within these stands outside the nesting season (after July 31), unless the nest tree is known to be unoccupied Protect known (and active) pileated woodpecker nests during all harvest or prescribed burning activities. Maintain a no-cut buffer within 50 feet. Rake duff from the base of nest tree and use other protection measures to protect during prescribed burning. Landbirds and Neotropical Migratory Birds - To reduce the potential for loss of snags during prescribed burning, employ passive lighting techniques near snags larger than 12 inches. Techniques include lighting at a slope position above snags, and avoid lighting directly adjacent to or at slope positions directly below snags. For larger snags (> 20 inches DBH) at higher risk due to heavy fuels accumulations at the base, pullback of fuels may be necessary prior to prescribed burning. Landbirds and Neotropical Migratory Birds -To reduce the potential for impacts to nesting landbirds, prescribed burning activities projected to occur on or after May 20, and/or past the onset of vegetation leaf-out, will be reviewed by a district or forest wildlife biologist. The biologist will then provide recommendations concerning prescribed burning after May 20 and/or past the onset of vegetation leaf-out Avoid lighting within 300 feet of any cave entrances if they are encountered. This would help protect the vegetative structure for bats and prevent potential smoke inhalation Do not directly ignite ant mounds – ants provide foraging habitat for many of the MIS woodpeckers, migratory birds, and species such as bears. Develop burning prescriptions that retain and recruit logs within the standards set in the Eastside Screens. These standards are as follows:

Table down_logs. Burning prescriptions following Eastside Screen Standards for retention and log recruitment

Species	Pieces per Acre	Diameter at Small End (inches)	Piece Length (feet)	Total Lineal Length (feet)
Ponderosa pine	3-6	12	>6	20 to 40
Mixed conifer	15-20	8	>8	120 to 160

Minerals Management Activities

- Min-1. Minerals Planning
- Min-5. Mineral Materials Resource Sites

Min-1. Minerals Planning	
Manual or Handbook Reference	FSM 2810, FSM 2820, FSM 2830, and FSM 2850.
Objective	Use the minerals planning process to develop measures to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during minerals exploration, production, operations, and reclamation activities.
Practices	Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment. **All Activities** ☐ Use applicable practices of BMP Plan-2 (Project Planning and Analysis) and BMP Plan-3 (Aquatic Management Zone [AMZ] Planning) when planning minerals activities. ☐ Identify potential environmental risks of the proposed minerals activities and include measures in project plans to manage risk by removing or eliminating

	the source of risk, changing the mining plan, or removing the resource at risk from harm's way. ☐ Inform proponent that a Clean Water Act (CWA) 402 permit may be required if the minerals operation causes a point source or stormwater discharge of any pollutant to waters of the United States. ☐ Inform proponent that a CWA 404 permit may be required if the mining operations will result in a discharge of dredge or fill material to waters of the United States. ☐ Evaluate plan of operations to ensure that reasonable measures, including appropriate BMPs are included to avoid and minimize adverse effects to soil, water quality, and riparian resources from the mining activities. o Require suitable geotechnical or stability analyses to ensure that facilities are constructed to acceptable factors of safety using standard engineering practices and considering foundation conditions and material; construction materials and techniques; the seismicity of the area; and the water-related resources at risk. o Require suitable characterization of ore, waste rock, and tailings using accepted protocols to identify materials that have the potential to release acidity or other contaminants when exposed during mining. o Require suitable characterization of mine site hydrology commensurate with the potential for impacts to surface water and groundwater resources, to include physical and chemical characteristics of surface and groundwater systems, as needed, for the range of expected seasonal variation in precipitation and potential stormflow events likely to occur at the site for the duration of the minerals activities. o Stipulate suitable requirements, including water treatment as needed, to avoid or minimize the development and release of acidic or other contaminants. o Use applicable practices from the Minerals Management Activities BMPs. o Evaluate the consumptive use of water in the mining operation and its effect on waterdependent ecosystems. o Evaluate the potential for direct and indirect impacts to morphology, stability, and function of waterbodies, riparian areas, and wetland habitats. o Identify suitable measures to avoid impacts to waterbodies, riparian areas, and wetland habitats through appropriate location, design, operation, and reclamation requirements. o Identify suitable interim and post-project surface water and groundwater monitoring where needed to confirm predictions of impacts, detect adverse changes at the earliest practicable time, and develop appropriate changes in operations or recommend closure where needed. o Request a copy of operator's CWA 401 Certification from designated Federal, State, or local entity before approving a plan of operations that may result in any discharge into waters of the United States. ☐ As outlined in the Forest Service Training Guide for Reclamation Bond Estimation and Administration for Minerals Plans of Operation, consider the direct and indirect costs of stabilizing, rehabilitating, and reclaiming the area of mineral operations to the appropriate standards for water quality and watershed condition as determined from the land management plan, State and Federal laws, regulations, plans, or permits when determining the reclamation bond amount. Include costs for: o Operation and maintenance of facilities designed to divert, convey, store, or treat water.

	o Decontaminating, neutralizing, disposing, treating, or isolating hazardous materials at the site to minimize potential for contamination of soil, surface water, and ground water. o Water treatment needs predicted during planning and discovered during operations to achieve applicable water quality standards. o Earthwork to reclaim roads; waste rock dumps; tailings; backfilling water features (diversions, ditches, and sediment ponds); and construction of diversion channels and drains, stream channels, and wetlands. o Revegetation to stabilize the site and minimize soil erosion. o Mitigation to restore natural function and value of streams, wetlands, and floodplains. o Long-term operations, monitoring, and maintenance of mineral production-related facilities that must perform as designed to avoid or minimize contamination of surface or groundwater resources, including roads, diversion ditches, dams, and water treatment systems. o Protection of the reclaimed area until long-term stability, erosion control, and revegetation has been established. **Locatable Minerals** ☐ Evaluate Notice of Intent to Operate proposal to determine if it will likely cause significant disturbance to soil, water quality, and riparian resources. o Require a plan of operation from the mineral operator, lessee, or purchaser as required by law and regulation if proposed activities might cause significant disturbance of surface resources including soil, water quality, or riparian resources. **Minerals Leasing** ☐ Include in the land management plan, or other area wide decision document, direction for surface occupancy. Use lease stipulations to avoid riparian areas, wetlands, and areas subject to mass soil movement; to avoid or minimize erosion and sediment production; and to avoid or minimize adverse effects to water quality and municipal supply watersheds, if these issues are not adequately addressed by provisions in regulations at 36 CFR 228.108. ☐ Use the applicable practices from the Minerals Activities BMPs for recommendations on post-lease approval of operations. ☐ Require or work with BLM to require appropriate contingency plans to avoid or minimize adverse impacts to surface waters. ☐ Coordinate with BLM to ensure the reclamation bond required for operations will be sufficient to guarantee reclamation work on NFS lands to the appropriate standards for water quality and watershed condition as determined from the land management plan, State and Federal laws, regulations, plans, or permits. **Mineral Materials** ☐ Include reasonable conditions and applicable practices of BMP Min-3 (Minerals Production) and BMP Min-5 (Mineral Materials Resource Sites) in the operating plan to ensure proper protection of soil, water quality, and riparian resources and timely reclamation of disturbed areas. ☐ Consider the direct and indirect costs of stabilizing, rehabilitating, and reclaiming the area of mineral materials operations to the appropriate standards for water quality and watershed condition as determined from the land management plan,

	State and Federal laws, regulations, plans, or permits when determining the reclamation bond amount. **Mineral Reservations and Outstanding Mineral Rights** ☐ Evaluate the Operating Plan for Mineral Reservation Operations to ensure that reasonable measures, including appropriate BMPs, consistent with the terms of the deed, are included to minimize damage to NFS surface resources that could affect soil, water quality, and riparian resources and that provide for restoration and reclamation of disturbed lands. ☐ Evaluate the Operating Plan for Outstanding Mineral Rights to ensure that reasonable measures, including appropriate BMPs, are included to control erosion, avoid or minimize water pollution, and reclaim the site consistent with land management plan direction for water quality management.
Local / Site Specific BMP	☐ No Additional BMPs

Min-5. Mineral Materials Resource Sites	
Manual or Handbook Reference	FSM 2850.
Objective	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when developing and using upland mineral materials resource sites or instream sand and gravel deposits.
Practices	Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment. **All Activities** ☐ Allow upland and instream sand and gravel mining where consistent with land management plan desired conditions, goals, and objectives for soils, aquatic and riparian habitats, and water quality. ☐ Use applicable practices of BMP Min-3 (Minerals Production) and BMP Fac-2 (Facility Construction and Stormwater Control) for sanitation, solid waste, and transport and storage of petroleum products or other hazardous materials and to control erosion, manage stormwater, keep the site dry, and protect the waterbody when clearing the extraction and processing areas. ☐ Use applicable practices of BMP Min-6 (Ore Stockpiles, Mine Waste Storage and Disposal, Reserve Pits, and Settling Ponds) and BMP Min-7 (Produced Water) to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when processing materials. **Upland Gravel Pits** ☐ Plan operations at the site in advance to minimize disturbance area and more effectively and efficiently open and operate the site. o Limit the area of the facility to the minimum necessary for efficient operations while providing sufficient area for materials processing and stockpiling. o Phase development where practicable. o Use suitable measures to avoid, mitigate, or treat metal leaching and formation of acid rock drainage. ☐ Conduct extraction activities in such a manner as to minimize the potential for slope failures, limit slope steepness and length, limit disturbed areas to those actively used for extraction, retain existing vegetation as long as possible, and allow for progressive reclamation of the site where practicable. **Instream Sand and Gravel Mining**

	☐ Use applicable practices of BMP AqEco-2 (Operations in Aquatic Ecosystems), BMP AqEco-3 (Ponds and Wetlands), and BMP AqEco-4 (Stream Channels and Shorelines) when working in or near waterbodies to prevent or minimize adverse impacts to water quality. ☐ Consider channel type and effects of the proposed operation on channel morphology and function when approving instream sand and gravel mining operations. ☐ Limit access disturbance to designated areas on one streambank to reduce the effort required for site reclamation. o Use suitable measures to protect the streambank at access points to minimize bank erosion. ☐ Locate the material processing and stockpile site at a suitable distance from the active channel to leave a buffer zone along the waterbody to reduce risk of flooding. o Consider historic channel migration patterns and site elevation when locating mineral processing and stockpile sites. o Avoid or minimize disturbance to valuable riparian areas; wetlands; and aquatic-dependent threatened, endangered, and sensitive species habitat. ☐ Include suitable measures to protect channel morphology and function when extracting sand and gravel deposits. o Specify the maximum depth of mining. o Limit extraction depth to minimize slope changes along the stream, avoid or minimize channel and bank erosion, and retain existing natural channel armoring. o Limit extraction amount to minimize upstream and downstream effects due to changes in bedload transport. o Avoid modifying point bars to the extent where the resultant channel changes cause unacceptable reduced sinuosity or increased stream gradient, velocity, stream power, and bank instability. o Schedule in-channel mining to occur during low-flow periods. o Avoid or minimize changes to channel shape and reduce effects of mining on aquatic habitats by establishing a low-flow buffer. o Avoid or minimize streambank erosion and instability during and after mining. o Avoid or minimize headward erosion of the channel at the upstream end of the instream pit. ☐ Design and construct diversion channels to handle anticipated flow volumes and to minimize upstream and downstream effects of changes in stream grade, width, depth, bed characteristics, bank instability, and groundwater inflows when temporarily or permanently dewatering stream channels to extract sand and gravel. o Ensure barrier is able to adequately protect the dewatered mining area from flood flows. ☐ Conduct excavation operations in such a manner as to avoid significant increases in downstream turbidity.
Local / Site Specific BMP	☐ No Additional BMPs

Mechanical Vegetation Management Activities

- ☐ **Veg-1 Vegetation Management Planning**
- ☐ **Veg-2 Erosion Prevention and Control**
- ☐ **Veg-3 Aquatic Management Zones**
- ☐ **Veg-4 Ground-Based Skidding and Yarding Operations**

- ☐ **Veg-5 Cable and Aerial Yarding Operations**
- ☐ **Veg-6 Landings**
- ☐ **Veg-7 Winter Logging**
- ☐ **Veg-8 Mechanical Site Treatment**

Veg-1 Vegetation Management Planning	
Manual or Handbook Reference	FSM 1921.12
Objective	Use the applicable vegetation management planning processes to develop measures to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during mechanical vegetation treatment activities.
Practices	Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment. ☐ Use applicable practices of BMP Plan-2 (Project Planning and Analysis) and BMP Plan-3 (Aquatic Management Zone (AMZ) Planning) when planning vegetation management projects. o Evaluate opportunities to use proposed mechanical vegetation treatment projects to achieve AMZ desired conditions, goals, and objectives in the project area. ☐ Evaluate and field verify site conditions in the project area to design mechanical vegetation treatment prescriptions that avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources. o Validate land management plan timber suitability decisions for the project area. o Design mechanical vegetation treatment prescriptions to limit site disturbance, soil exposure, and displacement to acceptable levels as determined from the land management plan desired conditions, standards, and guidelines or other local direction or requirements. o Evaluate direct, indirect, and cumulative effects of vegetation alteration on streamflow regimes and consequent channel responses at suitable watershed scales. o Use local direction or requirements for slope, erosion potential, mass wasting potential, and other soil or site properties to determine areas suitable for ground-based, cable, and aerial yarding systems (see BMP Veg-4 [Ground-Based Skidding and Yarding Operations] and BMP Veg-5 [Cable and Aerial Yarding Operations]). o Use the most economically practicable yarding system that will minimize road densities. o Consider site preparation and fuel treatment needs and options. o Use applicable practices of BMP Veg-8 (Mechanical Site Treatment) to determine areas suitable for mechanical treatments for site preparation, fuels treatment, habitat improvements, or other vegetation management purposes. o Evaluate the capabilities of the machinery likely to operate in the landscape under consideration. o Use preplanning to schedule entry or timing of mechanical and other vegetation treatments (e.g., prescribed fire or chemical treatments) when needed for large projects. ☐ Evaluate and field verify site conditions in the project area to design a transportation plan associated with the mechanical vegetation treatments to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources. o Use the logging system that best fits the topography, soil types, and season, while minimizing soil disturbance and road densities and that economically achieves silvicultural objectives. o Use applicable practices of BMP Road-2 (Road Location and Design), BMP Veg-4 (Ground-Based Skidding and Yarding Operations), BMP Veg-5 (Cable and Aerial Yarding Operations), and BMP Veg-6 (Landings) to determine proposed location and size of roads, landings, skid trails, and cable corridors. o Use applicable practices of BMP Road-1 (Travel Management Planning and Analysis) and BMP Road-5 (Temporary Roads) to determine the need for specified roads and temporary roads.

	o Evaluate the condition of system roads, including roads in storage, and unauthorized roads in the project area to determine their suitability for use in the project and any reconstruction or prehaul maintenance needs. o Evaluate the Road Management Objective of system roads to determine where log hauling should be prohibited or restricted. ☐ Identify sources of rock for roadwork, riprapping, and borrow materials (see BMP Min-6 [Mineral Materials Resource Sites]). ☐ Identify water sources available for purchasers' use (see BMP WatUses-3 [Administrative Water Developments]). ☐ Ensure the timber sale contract, stewardship contract, or other implementing document includes BMPs from the decision document to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources. o Use appropriate standard B and C provisions and regional or local provisions to address measures and responsibilities consistent with the BMPs in the decision document in the timber sale or stewardship contract. o Delineate all protected or excluded areas, including AMZs and waterbodies, on the sale area map or project map. o Delineate approved water locations, staging areas, and borrow areas on the sale area map or project map. o Ensure that the final unit location, layout, acreage, and logging system or mechanical treatment and Knutson-Vandenberg Act plans are consistent with the decision document. ☐ Use contract modification procedures to the extent practicable to modify unit design, treatment methods, or other project activities where necessary to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources based on new information or changed conditions discovered during project implementation.

Veg-2 Erosion Prevention and Control	
Manual or Handbook Reference	Forest Service Handbook (FSH) 2409.15.
Objective	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by implementing measures to control surface erosion, gully formation, mass slope failure, and resulting sediment movement before, during, and after mechanical vegetation treatments.
Practices	Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment. ☐ Establish designated areas for equipment staging and parking to minimize the area of ground disturbance (see BMP Road-9 [Parking Sites and Staging Areas]). ☐ Use provisions in the timber sale contract or land stewardship contract to implement and enforce erosion control on the project area. o Work with the contractor to locate landings, skid trails, and slash piles in suitable sites to avoid, minimize, or mitigate potential for erosion and sediment delivery to nearby waterbodies. ☐ Develop an erosion control and sediment plan that covers all disturbed areas including skid trails and roads, landings, cable corridors, temporary road fills, water source sites, borrow sites, or other areas disturbed during mechanical vegetation treatments. ☐ Refer to State or local forestry or silviculture BMP manuals, guidebooks, and trade publications for effective structural and nonstructural measures to— ☐ Apply soil protective cover on disturbed areas where natural revegetation is inadequate to prevent accelerated erosion before the next growing season. o Maintain the natural drainage pattern of the area wherever practicable. o Control, collect, detain, treat, and disperse stormwater runoff from disturbed areas. o Divert surface runoff around bare areas with appropriate energy dissipation and sediment filters. o Stabilize steep excavated slopes.

	☐ Use suitable species and establishment techniques to cover or revegetate disturbed areas in compliance with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species. ☐ Use suitable measures in compliance with local direction to prevent and control invasive species. ☐ Install sediment and stormwater controls before initiating surface-disturbing activities to the extent practicable. ☐ Operate equipment when soil compaction, displacement, erosion, and sediment runoff would be minimized. o Avoid ground equipment operations on unstable, wet, or easily compacted soils and on steep slopes unless operation can be conducted without causing excessive rutting, soil puddling, or runoff of sediments directly into waterbodies. o Evaluate site conditions frequently to assess changing conditions. o Adjust equipment operations as necessary to protect the site while maintaining efficient project operations. ☐ Install suitable stormwater and erosion control measures to stabilize disturbed areas and waterways on incomplete projects before seasonal shutdown of operations or when severe storm or cumulative precipitation events that could result in sediment mobilization to waterbodies are expected. ☐ Routinely inspect disturbed areas to verify that erosion and stormwater controls are implemented and functioning as designed and are suitably maintained. ☐ Maintain erosion and stormwater controls as necessary to ensure proper and effective functioning. o Prepare for unexpected failures of erosion control measures. ☐ Implement mechanical treatments on the contour of sloping ground to avoid or minimize water concentration and subsequent accelerated erosion.
Local / Site Specific BMP	☐ No Additional BMPs

Veg-3 Aquatic Management Zones	
Manual or Handbook Reference	Forest Service Manual (FSM) 2526, 2527
Objective	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when conducting mechanical vegetation treatment activities in the AMZ.
Practices	Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment. ☐ Use applicable practices of BMP Plan-3 (AMZ Planning) to determine the need for and width of the AMZ considering the proposed mechanical vegetation treatments. o Modify AMZ width as needed to provide assurance of leave-tree wind firmness where high windthrow risk is identified. ☐ Clearly delineate AMZ locations and boundaries in the project area using suitable markings and structures. o Maintain or reestablish these boundaries as necessary during project implementation or operation. o Specify AMZ layout, maintenance, and operating requirements in contracts, design plans, and other necessary project documentation. ☐ Use mechanical vegetation treatments in the AMZ only when suitable to achieve long-term AMZ-desired conditions and management objectives (see BMP Plan-3 [AMZ Planning]).

	☐ Modify mechanical vegetation treatment prescriptions and operations in the AMZs as needed to maintain ecosystem structure, function, and processes. ☐ Design silvicultural or other vegetation management prescriptions to maintain or improve the riparian ecosystem and adjacent waterbody. ☐ Use yarding systems or mechanical treatments that avoid or minimize disturbance to the ground and vegetation consistent with project objectives. o Conduct equipment operations in a manner that maintains or provides sufficient ground cover to meet land management plan desired conditions, goals, and objectives to minimize erosion and trap sediment. o Use suitable measures to avoid or minimize soil disturbance from equipment operations to stay within acceptable disturbance levels when conducting mechanical vegetation treatment operations. o Prescribe mechanical site preparation techniques and fuels and residual vegetation treatments that avoid or minimize excessive erosion, sediment delivery to nearby waterbodies, or damage to desired riparian vegetation. o Conduct operations in a manner that avoids or minimizes introduction of excess slash or other vegetative debris into the AMZ and waterbodies; damage to streambanks, shorelines, and edges of wetlands; and adverse effects to floodplain functioning. o Retain trees as necessary for canopy cover and shading, bank stabilization, and as a source of large woody debris within the AMZ. o Avoid felling trees into streams or waterbodies, except as planned to create habitat features. ☐ Locate transportation facilities for mechanical vegetation treatments, including roads, landings,and main skid trails, outside of the AMZ to the extent practicable. o Minimize the number of stream crossings to the extent practicable. o Evaluate options for routes that must cross waterbodies and choose the one (e.g., specified road vs. temporary road vs. skid road or trail) that avoids or minimizes adverse effects to soil, water quality, and riparian resources to the greatest extent practicable. o Do not use drainage bottoms as turn-around areas for equipment during mechanical vegetation treatments. ☐ Use suitable measures to disperse concentrated flows of water from road surface drainage features to avoid or minimize surface erosion, gully formation, and mass failure in the AMZ and sediment transport to the waterbody. ☐ Monitor the AMZ during mechanical operations to evaluate compliance with prescription and mitigation requirements in the authorizing document. o Adjust operations in the AMZ to avoid, minimize, or mitigate detrimental soil impacts where they are occurring. o Use suitable mitigation or restoration measures on areas in the AMZ that show signs of unacceptable erosion or those with high potential for erosion due to mechanical operations in the AMZ. o Remove unauthorized debris from waterbodies using techniques that will limit disturbance to bed and banks, riparian areas, aquatic-dependent species, and the waterbody unless significant damage would occur during its removal or leaving it in meets desired conditions for the waterbody.
Local / Site Specific BMP	☐ The stream crossing replacements in perennial streams, to be done under a separate contract after the timber sale, will be completed during low flow conditions when the potential for delivery of construction-related sediment can be minimized. Stream water will be diverted out of the channel during construction to minimize turbidity.

	☐ Equipment should not operate in any no cut buffers unless expressly analyzed through the NEPA analysis or consultation with local resource specialists. ☐ Burning within the riparian zone to reduce fuel hazard near stream channels will be carefully controlled to minimize fire intensity and will be in accordance to the established Blue Mountain PDCs. ☐ Implement PACFISH Buffers ☐ Where treatment in Category 4 streams is approve d a 25 ft no harvest buffer will be delineated on the ground by the silviculturist, the fish biologist or hydrologist.

Veg-4. Ground-Based Skidding and Yarding Operations	
Manual or Handbook Reference	FSH 2409.15
Objective	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during ground-based skidding and yarding operations by minimizing site disturbance and controlling the introduction of sediment, nutrients, and chemical pollutants to waterbodies.
Practices	Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment. ☐ Use ground-based yarding systems only where physical site characteristics are suitable to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources. o Use local direction or requirements for slope, erosion potential, mass wasting potential, and other soil or site properties to determine areas suitable for ground-based yarding systems. ☐ Use existing roads and skid trail networks to the extent practicable. o Create new roads and skid trail where re-use of existing ones would exacerbate soil, water quality, and riparian resource impacts. ☐ Design and locate skid trails and skidding operations to minimize soil disturbance to the extent practicable. o Designate skid trails to the extent practicable to limit site disturbance. o Locate skid trails outside of the AMZ to the extent practicable. o Locate skid trails to avoid concentrating runoff and provide breaks in grade. o Limit the grade of constructed skid trails on geologically unstable, saturated, highly erodible, or easily compacted soils. o Avoid long runs on steep slopes. ☐ Use suitable measures during felling and skidding operations to avoid or minimize disturbance to soils and waterbodies to the extent practicable. o Perform skidding or yarding operations when soil conditions are such that soil compaction, displacement, and erosion would be minimized. o Suspend skidding or yarding operations when soil moisture levels could result in unacceptable soil damage. o Avoid skidding logs in or adjacent to a stream channel or other waterbody to the extent practicable. o Skid across streams only at designated locations. o Use suitable measures at skid trail crossings to avoid or minimize damage to the stream channel and streambanks. o Directionally fell trees to facilitate efficient removal along predetermined yarding patterns with the least number of passes and least amount of disturbed area (e.g., felling-to-the-lead). o Directionally fell trees away from streambanks, shorelines, and other waterbody edges. o Remove logs from wet meadows or AMZs using suitable techniques to minimize equipment operations in the sensitive area and minimize dragging the logs on the ground.

	o Winch or skid logs upslope, away from waterbodies. o Use low ground pressure equipment when practicable, particularly on equipment traveling over large portions of units with sensitive soils or site conditions. ☐ Use applicable practices of BMP Veg-2 (Erosion Prevention and Control) to minimize and control erosion to the extent practicable. ☐ Use suitable measures to stabilize and restore skid trails after use. o Reshape the surface to promote dispersed drainage. o Install suitable drainage features. o Mitigate soil compaction to improve infiltration and revegetation conditions. o Apply soil protective cover on disturbed areas where natural revegetation is inadequate to prevent accelerated erosion before the next growing season. o Use suitable measures to promote rapid revegetation. o Use suitable measures in compliance with local direction to prevent and control invasive species.
Local / Site Specific BMP	☐ No Additional BMPs

Veg-5. Cable and Aerial Yarding Operations	
Manual or Handbook Reference	FSH 2409.15.
Objective	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during cable and aerial yarding operations by minimizing site disturbance and controlling the introduction of sediment, nutrients, and chemical pollutants to waterbodies.
Practices	Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment. ☐ Use cable or aerial yarding systems on steep slopes where ground-based equipment cannot operate without causing unacceptable ground disturbance. o Use local direction or requirements for slope, erosion potential, mass wasting potential, and other soil or site properties to determine areas suitable for cable or aerial yarding systems. o Consider slope shape, potential barriers, lift and deflection requirements, and availability of suitable landing locations when selecting cable-yarding systems. ☐ Identify areas requiring cable or aerial yarding during project planning and in the contract. ☐ Identify necessary equipment capabilities in the contract. ☐ Locate cable corridors to efficiently yard materials with the least soil damage. o Use suitable measures to minimize soil disturbance when yarding over breaks in slope. ☐ Fully suspend logs to the extent practicable when yarding over AMZs and streams. ☐ Postpone yarding operations when soil moisture levels are high if the specific type of yarding system results in unacceptable soil disturbance and erosion within cable corridors. ☐ Use applicable practices of BMP Veg-2 (Erosion Prevention and Control) to minimize and control erosion in cable corridors to the extent practicable.

Local / Site Specific BMP	☐ No Additional BMPs

Veg-6. Landings	
Manual or Handbook Reference	FSH 2409.15.
Objective	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from the construction and use of log landings.
Practices	Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment. ☐ Minimize the size and number of landings as practicable to accommodate safe, economical, and efficient operations. ☐ Locate landings to limit the potential for pollutant delivery to waterbodies. o Locate landings outside the AMZ and as far from waterbodies as reasonably practicable based on travel routes and environmental considerations. o Avoid locating landings near any type of likely flow or sediment transport conduit during storms, such as ephemeral channels and swales, where practicable. o Locate landings to minimize the number of required skid roads. o Avoid locating landings on steep slopes or highly erodible soils. o Avoid placing landings where skidding across drainage bottoms is required. ☐ Design roads and trail approaches to minimize overland flow entering the landing. ☐ Re-use existing landings where their location is compatible with management objectives and water quality protection. ☐ Use applicable practices of BMP Veg-2 (Erosion Prevention and Control) to minimize and control erosion as needed during construction and use of log landings. o Install and maintain suitable temporary erosion control and stabilization measures when the landing will be reused within the same year. ☐ Use applicable practices of BMP Fac-6 (Hazardous Materials) and BMP Road-10 (Equipment Refueling and Servicing) when managing fuels, chemicals, or other hazardous materials on the landing. ☐ Use suitable measures as needed to restore and stabilize landings after use. o Remove all logging machinery refuse (e.g., tires, chains, chokers, cable, and miscellaneous discarded parts) and contaminated soil to a proper disposal site. o Reshape the surface to promote dispersed drainage. o Install suitable drainage features. o Mitigate soil compaction to improve infiltration and revegetation conditions. o Apply soil protective cover on disturbed areas where natural revegetation is inadequate to prevent accelerated erosion before the next growing season. o Use suitable measures to promote rapid revegetation. o Use suitable species and establishment techniques to cover or revegetate disturbed areas in compliance with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species.
Local / Site Specific BMP	☐ No Additional BMPs

	Veg -7 Winter Logging
Manual or Handbook Reference	FSH 2409.15.
Objective	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from winter logging activities.

Practices	☐ Consider using snow-roads and winter harvesting in areas with high-water tables, sensitive ri- parian conditions, or other potentially significant soil erosion and compaction hazards. o Use snow roads for single-entry harvests or temporary roads. ☐ Mark existing culvert locations before plowing, hauling, or yarding operations begin to avoid or minimize damage from plowing or logging machinery. ☐ Ensure all culverts and ditches are open and functional during and after logging operations. ☐ Plow any snow cover off roadways to facilitate deep-freezing of the road grade before hauling. o Manage hauling to avoid or minimize unacceptable damage to the road surface. ☐ Use suitable measures to cross streams (see BMP Road-7 [Stream Crossings]). o Restore crossings to near preroad conditions to avoid or minimize ice dams when use of the snow-road is no longer needed. ☐ Conduct winter logging operations when the ground is frozen or snow cover and depth is ad- equate to avoid or minimize unacceptable rutting or displacement of soil. ☐ Suspend winter operations if ground and snow conditions change such that unacceptable soil disturbance, compaction, displacement, or erosion becomes likely. ☐ Compact the snow on skid trail locations when adequate snow depths exist before felling or skidding trees. ☐ Avoid locating skid trails on steep areas where frozen skid trails may be subject to soil erosion the next spring. ☐ Mark AMZ boundaries and stream courses before the first snow in a manner that will be clearly visible in heavy snows. ☐ Avoid leaving slash in streams or AMZs to the extent practicable. ☐ Install and maintain suitable erosion control on skid trails before spring runoff (see BMP Veg-2 [Erosion Prevention and Control]). o Install erosion control measures during the dry season if needed.
Local / Site Specific BMP	☐ No Additional BMPs
Veg-8. Mechanical Site Treatment	
Manual or Handbook Reference	None known,
Objective	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling the introduction of sediment, nutrients, chemical, or other pollutants to waterbodies during mechanical site treatment
Practices	Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment. ☐ Evaluate multiple site factors, including soil conditions, slope, topography, and weather, to prescribe the most suitable mechanical treatment and equipment to avoid or minimize unacceptable impacts to soil while achieving treatment objectives. o Consider the condition of the material and the site resulting from the treatment in comparison to desired conditions, goals, and objectives for the site when analyzing treatment options (e.g., a mastication treatment will result in a very different condition than a grapple pile and burn treatment). o Use land management plan direction, or other local guidance, to establish residual ground cover requirements and soil disturbance limits suitable to the site to minimize erosion. o Consider offsite use options for the biomass material to reduce onsite treatment and disposal. ☐ Use applicable practices of BMP Veg-3 (Aquatic Management Zones) when conducting mechanical treatments in the AMZ.

	☐ Use applicable practices of BMP Veg-2 (Erosion Prevention and Control) to minimize and control erosion. o Conduct mechanical activities when soil conditions are such that unacceptable soil disturbance, compaction, displacement, and erosion would be avoided or minimized. o Consider using low ground-pressure equipment, booms, or similar equipment to minimize soil disturbance. ☐ Operate mechanical equipment so that furrows and soil indentations are aligned on the contour. ☐ Scarify the soil only to the extent necessary to meet reforestation objectives. o Use site-preparation equipment that produces irregular surfaces. o Avoid or minimize damage to surface soil horizons to the extent practicable. ☐ Conduct machine piling of slash in such a manner to leave topsoil in place and to avoid displacing soil into piles. ☐ Re-establish vegetation as quickly as possible. o Evaluate the need for active and natural revegetation of exposed and disturbed sites. o Use suitable species and establishment techniques to revegetate the site in compliance with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species.
Local / Site Specific BMP	☐ No Additional BMPs

Appendix K – Roads Analysis

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
3000100	2 - HIGH CLEARANCE VEHICLES	1.1	Open	Open	Open	Open
3000105	2 - HIGH CLEARANCE VEHICLES	1.1	Open	Open	Open	Open
3000150	3 - SUITABLE FOR PASSENGER CARS	1.8	Open	Open	Open	Open
3000155	1 - BASIC CUSTODIAL CARE (CLOSED)	0.0	Closed	Closed	Closed	Closed
3000174	3 - SUITABLE FOR PASSENGER CARS	0.3	Open	Open	Open	Open
3000175	2 - HIGH CLEARANCE VEHICLES	0.2	Open	Open	Open	Open
3000180	1 - BASIC CUSTODIAL CARE (CLOSED)	0.1	Closed	Closed	Closed	Closed
3000225	1 - BASIC CUSTODIAL CARE (CLOSED)	0.4	Open	Closed	Closed	Open
3000232	1 - BASIC CUSTODIAL CARE (CLOSED)	0.3	Open	Closed	Closed	Open
3000244	DE - DECOMMISSIONED	0.5	Decommission	Decommission	Decommission	Decommission
3000246	DE - DECOMMISSIONED	0.1	Decommission	Decommission	Decommission	Decommission
3000248	DE - DECOMMISSIONED	0.3	Decommission	Decommission	Decommission	Decommission
3000250	2 - HIGH CLEARANCE VEHICLES	0.4	Open	Open	Open	Open
3000254	1 - BASIC CUSTODIAL CARE (CLOSED)	0.6	Open	Closed	Closed	Open

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
3000300	DE - DECOMMISSIONED	0.4	Decommission	Decommission	Decommission	Decommission
3000312	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Closed	Closed
3000314	1 - BASIC CUSTODIAL CARE (CLOSED)	0.8	Open	Closed	Closed	Open
3000346	1 - BASIC CUSTODIAL CARE (CLOSED)	0.9	Closed	Closed	Closed	Closed
3000347	1 - BASIC CUSTODIAL CARE (CLOSED)	0.3	Closed	Closed	Closed	Closed
3000349	1 - BASIC CUSTODIAL CARE (CLOSED)	0.3	Closed	Closed	Closed	Closed
3000400	2 - HIGH CLEARANCE VEHICLES	0.1	Open	Open	Open	Open
3000400	2 - HIGH CLEARANCE VEHICLES	0.1	Open	Open	Open	Open
3000410	1 - BASIC CUSTODIAL CARE (CLOSED)	0.6	Open	Closed	Closed	Open
3000420	2 - HIGH CLEARANCE VEHICLES	0.2	Open	Open	Open	Open
4600000	5 - HIGH DEGREE OF USER COMFORT	5.7	Open	Open	Open	Open
4600000	3 - SUITABLE FOR PASSENGER CARS	12.7	Open	Open	Open	Open
4600020	2 - HIGH CLEARANCE VEHICLES	0.7	Open	Open	Open	Open
4600021	1 - BASIC CUSTODIAL CARE (CLOSED)	0.7	Open	Closed	Closed	Open
4600022	2 - HIGH CLEARANCE VEHICLES	0.5	Open	Open	Open	Open
4600023	2 - HIGH CLEARANCE VEHICLES	1.5	Open	Open	Open	Open

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
4600026	2 - HIGH CLEARANCE VEHICLES	0.8	Open	Open	Open	Open
4600027	2 - HIGH CLEARANCE VEHICLES	0.7	Open	Open	Open	Open
4600028	2 - HIGH CLEARANCE VEHICLES	0.1	Open	Open	Open	Open
4600030	2 - HIGH CLEARANCE VEHICLES	0.1	Open	Open	Open	Open
4600035	2 - HIGH CLEARANCE VEHICLES	2.1	Open	Open	Open	Open
4600040	2 - HIGH CLEARANCE VEHICLES	1.0	Open	Open	Open	Open
4600040	2 - HIGH CLEARANCE VEHICLES	0.2	Open	Open	Closed	Closed
4600041	2 - HIGH CLEARANCE VEHICLES	0.2	Open	Open	Closed	Closed
4600044	1 - BASIC CUSTODIAL CARE (CLOSED)	1.0	Open	Closed	Closed	Open
4600045	2 - HIGH CLEARANCE VEHICLES	0.5	Open	Open	Open	Open
4600047	1 - BASIC CUSTODIAL CARE (CLOSED)	0.9	Open	Closed	Closed	Open
4600050	1 - BASIC CUSTODIAL CARE (CLOSED)	3.9	Open	Closed	Closed	Open
4600055	1 - BASIC CUSTODIAL CARE (CLOSED)	0.9	Closed	Closed	Closed	Closed
4600055	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Closed	Closed
4600055	1 - BASIC CUSTODIAL CARE (CLOSED)	1.7	Closed	Closed	Closed	Closed
4600060	1 - BASIC CUSTODIAL CARE (CLOSED)	5.1	Open	Open	Open	Open

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
4600061	2 - HIGH CLEARANCE VEHICLES	0.3	Open	Open	Open	Open
4600062	2 - HIGH CLEARANCE VEHICLES	0.5	Open	Open	Open	Open
4600063	1 - BASIC CUSTODIAL CARE (CLOSED)	0.7	Closed	Closed	Closed	Closed
4600064	1 - BASIC CUSTODIAL CARE (CLOSED)	1.3	Closed	Closed	Closed	Closed
4600067	1 - BASIC CUSTODIAL CARE (CLOSED)	0.6	Closed	Closed	Closed	Closed
4600069	2 - HIGH CLEARANCE VEHICLES	0.5	Open	Open	Open	Open
4600072	1 - BASIC CUSTODIAL CARE (CLOSED)	1.3	Closed	Closed	Closed	Closed
4600074	2 - HIGH CLEARANCE VEHICLES	0.6	Open	Open	Open	Open
4600075	1 - BASIC CUSTODIAL CARE (CLOSED)	0.7	Closed	Closed	Closed	Closed
4600079	1 - BASIC CUSTODIAL CARE (CLOSED)	0.6	Closed	Closed	Closed	Closed
4600080	2 - HIGH CLEARANCE VEHICLES	0.2	Open	Open	Open	Open
4600092	1 - BASIC CUSTODIAL CARE (CLOSED)	0.1	Open	Closed	Closed	Closed
4600109	2 - HIGH CLEARANCE VEHICLES	0.0	Open	Open	Open	Open
4600120	1 - BASIC CUSTODIAL CARE (CLOSED)	0.0	Open	Open	Open	Open
4600190	2 - HIGH CLEARANCE VEHICLES	6.0	Open	Open	Open	Open
4600190	2 - HIGH CLEARANCE VEHICLES	2.5	Open	Open	Open	Open

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
4600190	2 - HIGH CLEARANCE VEHICLES	1.0	Open	Open	Open	Open
4600190	2 - HIGH CLEARANCE VEHICLES	0.6	Open	Open	Decommission	Open
4600195	1 - BASIC CUSTODIAL CARE (CLOSED)	0.7	Open	Open	Open	Open
4600200	2 - HIGH CLEARANCE VEHICLES	0.3	Open	Open	Open	Open
4600200	2 - HIGH CLEARANCE VEHICLES	0.7	Open	Open	Open	Open
4600200	2 - HIGH CLEARANCE VEHICLES	0.1	Open	Open	Open	Open
4600202	2 - HIGH CLEARANCE VEHICLES	0.2	Open	Open	Open	Open
4600205	2 - HIGH CLEARANCE VEHICLES	0.5	Open	Open	Open	Open
4600210	2 - HIGH CLEARANCE VEHICLES	0.3	Open	Open	Open	Open
4600215	2 - HIGH CLEARANCE VEHICLES	0.2	Open	Open	Open	Open
4600220	2 - HIGH CLEARANCE VEHICLES	1.2	Open	Open	Open	Open
4600222	2 - HIGH CLEARANCE VEHICLES	0.3	Open	Open	Open	Open
4600250	2 - HIGH CLEARANCE VEHICLES	0.2	Open	Open	Open	Open
4600250	2 - HIGH CLEARANCE VEHICLES	1.1	Open	Open	Open	Open
4600265	2 - HIGH CLEARANCE VEHICLES	1.0	Open	Open	Open	Open
4600268	2 - HIGH CLEARANCE VEHICLES	0.3	Open	Open	Open	Open

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
4600270	1 - BASIC CUSTODIAL CARE (CLOSED)	1.2	Open	Closed	Closed	Closed
4600270	1 - BASIC CUSTODIAL CARE (CLOSED)	0.6	Open	Closed	Closed	Open
4600272	1 - BASIC CUSTODIAL CARE (CLOSED)	0.7	Open	Closed	Closed	Open
4600273	1 - BASIC CUSTODIAL CARE (CLOSED)	1.3	Closed	Closed	Decommission	Closed
4600274	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Decommission	Closed
4600275	1 - BASIC CUSTODIAL CARE (CLOSED)	0.0	Open	Closed	Closed	Open
4600280	1 - BASIC CUSTODIAL CARE (CLOSED)	0.1	Open	Closed	Closed	Open
4600286	2 - HIGH CLEARANCE VEHICLES	1.3	Open	Open	Open	Open
4600290	1 - BASIC CUSTODIAL CARE (CLOSED)	0.0	Open	Closed	Closed	Open
4600300	2 - HIGH CLEARANCE VEHICLES	0.3	Open	Open	Open	Open
4600300	2 - HIGH CLEARANCE VEHICLES	1.9	Open	Open	Open	Open
4600300	2 - HIGH CLEARANCE VEHICLES	2.1	Open	Open	Open	Open
4600305	2 - HIGH CLEARANCE VEHICLES	1.5	Open	Open	Open	Open
4600307	1 - BASIC CUSTODIAL CARE (CLOSED)	0.4	Closed	Closed	Closed	Closed
4600310	2 - HIGH CLEARANCE VEHICLES	0.6	Open	Open	Open	Open
4600317	2 - HIGH CLEARANCE VEHICLES	1.3	Open	Open	Open	Open

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
4600320	2 - HIGH CLEARANCE VEHICLES	0.8	Open	Open	Closed	Open
4600325	2 - HIGH CLEARANCE VEHICLES	0.3	Open	Open	Open	Open
4600330	2 - HIGH CLEARANCE VEHICLES	0.4	Open	Open	Open	Open
4600335	DE - DECOMMISSIONED	2.5	Closed	Closed	Decommission	Closed
4600336	DE - DECOMMISSIONED	0.1	Decommission	Decommission	Decommission	Decommission
4600338	D - DECOMMISSION	1.1	Closed	Decommission	Decommission	Decommission
4600340	2 - HIGH CLEARANCE VEHICLES	0.8	Open	Open	Closed	Open
4600343	2 - HIGH CLEARANCE VEHICLES	0.6	Open	Open	Closed	Open
4600347	1 - BASIC CUSTODIAL CARE (CLOSED)	3.2	Closed	Closed	Decommission	Closed
4600350	2 - HIGH CLEARANCE VEHICLES	1.4	Open	Open	Open	Open
4600352	1 - BASIC CUSTODIAL CARE (CLOSED)	1.3	Closed	Closed	Closed	Open
4600352	1 - BASIC CUSTODIAL CARE (CLOSED)	2.1	Open	Closed	Decommission	Closed
4600353	1 - BASIC CUSTODIAL CARE (CLOSED)	0.1	Closed	Closed	Closed	Closed
4600360	1 - BASIC CUSTODIAL CARE (CLOSED)	0.0	Open	Closed	Closed	Open
4600361	1 - BASIC CUSTODIAL CARE (CLOSED)	0.1	Open	Closed	Closed	Open
4600362	2 - HIGH CLEARANCE VEHICLES	0.9	Open	Open	Closed	Open

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
4600363	1 - BASIC CUSTODIAL CARE (CLOSED)	0.3	Closed	Closed	Closed	Closed
4600370	2 - HIGH CLEARANCE VEHICLES	4.6	Open	Open	Open	Open
4600371	1 - BASIC CUSTODIAL CARE (CLOSED)	0.4	Open	Closed	Closed	Open
4600372	1 - BASIC CUSTODIAL CARE (CLOSED)	1.6	Open	Closed	Closed	Open
4600373	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Closed	Closed
4600374	1 - BASIC CUSTODIAL CARE (CLOSED)	1.0	Closed	Closed	Closed	Closed
4600375	DE - DECOMMISSIONED	0.6	Closed	Closed	Decommission	Closed
4600377	1 - BASIC CUSTODIAL CARE (CLOSED)	0.3	Open	Closed	Closed	Closed
4600378	1 - BASIC CUSTODIAL CARE (CLOSED)	0.6	Open	Closed	Closed	Closed
4600379	1 - BASIC CUSTODIAL CARE (CLOSED)	0.7	Closed	Closed	Closed	Closed
4600381	1 - BASIC CUSTODIAL CARE (CLOSED)	1.1	Closed	Closed	Closed	Closed
4600382	1 - BASIC CUSTODIAL CARE (CLOSED)	0.9	Closed	Closed	Closed	Closed
4600383	1 - BASIC CUSTODIAL CARE (CLOSED)	0.4	Closed	Closed	Closed	Closed
4600387	1 - BASIC CUSTODIAL CARE (CLOSED)	1.0	Closed	Closed	Decommission	Closed
4600390	2 - HIGH CLEARANCE VEHICLES	2.5	Open	Open	Open	Open
4600390	2 - HIGH CLEARANCE VEHICLES	1.2	Open	Open	Closed	Open

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
4600392	1 - BASIC CUSTODIAL CARE (CLOSED)	0.8	Closed	Closed	Decommission	Closed
4600394	1 - BASIC CUSTODIAL CARE (CLOSED)	1.7	Closed	Closed	Decommission	Closed
4600405	1 - BASIC CUSTODIAL CARE (CLOSED)	2.4	Closed	Closed	Closed	Closed
4600420	2 - HIGH CLEARANCE VEHICLES	0.8	Open	Open	Open	Open
4600425	DE - DECOMMISSIONED	0.3	Decommission	Decommission	Decommission	Decommission
4600430	2 - HIGH CLEARANCE VEHICLES	0.0	Open	Open	Open	Open
4600431	2 - HIGH CLEARANCE VEHICLES	0.0	Open	Open	Open	Open
4600437	2 - HIGH CLEARANCE VEHICLES	0.3	Open	Open	Open	Open
4600440	1 - BASIC CUSTODIAL CARE (CLOSED)	0.1	Closed	Closed	Closed	Closed
4600440	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Closed	Closed
4600445	1 - BASIC CUSTODIAL CARE (CLOSED)	1.1	Open	Closed	Closed	Open
4600447	DE - DECOMMISSIONED	0.4	Decommission	Decommission	Decommission	Decommission
4600460	2 - HIGH CLEARANCE VEHICLES	0.3	Closed	Closed	Closed	Closed
4600461	1 - BASIC CUSTODIAL CARE (CLOSED)	0.3	Closed	Closed	Closed	Closed
4600472	1 - BASIC CUSTODIAL CARE (CLOSED)	0.6	Closed	Closed	Closed	Closed
4600473	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Closed	Closed

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
4600474	1 - BASIC CUSTODIAL CARE (CLOSED)	0.4	Closed	Closed	Closed	Closed
4600475	2 - HIGH CLEARANCE VEHICLES	1.6	Open	Open	Open	Open
4600477	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Closed	Closed
4600477	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Closed	Closed
4600478	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Closed	Closed
4600478	1 - BASIC CUSTODIAL CARE (CLOSED)	0.9	Closed	Closed	Closed	Closed
4600485	2 - HIGH CLEARANCE VEHICLES	0.7	Open	Open	Open	Open
4600490	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Closed	Closed
4600495	1 - BASIC CUSTODIAL CARE (CLOSED)	1.7	Open	Closed	Closed	Open
4600505	2 - HIGH CLEARANCE VEHICLES	3.2	Open	Closed	Closed	Open
4600505	1 - BASIC CUSTODIAL CARE (CLOSED)	3.0	Open	Closed	Closed	Open
4600505	1 - BASIC CUSTODIAL CARE (CLOSED)	2.7	Open	Closed	Closed	Closed
4600510	1 - BASIC CUSTODIAL CARE (CLOSED)	0.4	Closed	Closed	Closed	Closed
4600511	1 - BASIC CUSTODIAL CARE (CLOSED)	0.3	Closed	Closed	Closed	Closed
4600520	1 - BASIC CUSTODIAL CARE (CLOSED)	0.1	Closed	Closed	Closed	Closed
4600526	1 - BASIC CUSTODIAL CARE (CLOSED)	0.3	Closed	Closed	Closed	Closed

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
4600545	1 - BASIC CUSTODIAL CARE (CLOSED)	1.3	Closed	Decommission	Decommission	Closed
4600555	1 - BASIC CUSTODIAL CARE (CLOSED)	1.0	Closed	Decommission	Decommission	Decommission
4600560	1 - BASIC CUSTODIAL CARE (CLOSED)	4.3	Closed	Closed	Closed	Closed
4600570	D - DECOMMISSION	1.4	Open	Decommission	Decommission	Open
4600572	D - DECOMMISSION	0.4	Closed	Decommission	Decommission	Decommission
4600574	D - DECOMMISSION	0.4	Closed	Decommission	Decommission	Decommission
4600575	D - DECOMMISSION	0.2	Closed	Decommission	Decommission	Decommission
4600578	D - DECOMMISSION	0.3	Closed	Decommission	Decommission	Decommission
4600580	3 - SUITABLE FOR PASSENGER CARS	0.1	Open	Open	Open	Open
4600583	2 - HIGH CLEARANCE VEHICLES	0.3	Open	Open	Open	Open
4600594	2 - HIGH CLEARANCE VEHICLES	0.2	Open	Open	Open	Open
4600595	2 - HIGH CLEARANCE VEHICLES	0.5	Open	Open	Open	Open
4600595	2 - HIGH CLEARANCE VEHICLES	3.7	Open	Open	Open	Open
4600596	2 - HIGH CLEARANCE VEHICLES	0.1	Open	Open	Open	Open
4600596	2 - HIGH CLEARANCE VEHICLES	0.1	Open	Open	Open	Open
4600596	2 - HIGH CLEARANCE VEHICLES	0.1	Open	Open	Open	Open

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
4600596	2 - HIGH CLEARANCE VEHICLES	0.6	Open	Open	Open	Open
4600596	2 - HIGH CLEARANCE VEHICLES	0.0	Open	Open	Open	Open
4600596	2 - HIGH CLEARANCE VEHICLES	0.6	Open	Open	Open	Open
4600596	2 - HIGH CLEARANCE VEHICLES	0.0	Open	Open	Open	Open
4600596	2 - HIGH CLEARANCE VEHICLES	0.6	Open	Open	Open	Open
4600596	2 - HIGH CLEARANCE VEHICLES	0.1	Open	Open	Open	Open
4600596	2 - HIGH CLEARANCE VEHICLES	1.8	Open	Open	Open	Open
4600596	2 - HIGH CLEARANCE VEHICLES	0.1	Open	Open	Open	Open
4600596	2 - HIGH CLEARANCE VEHICLES	0.1	Open	Open	Open	Open
4600597	1 - BASIC CUSTODIAL CARE (CLOSED)	0.4	Closed	Closed	Closed	Closed
4600598	2 - HIGH CLEARANCE VEHICLES	0.4	Open	Open	Open	Open
4600599	2 - HIGH CLEARANCE VEHICLES	1.5	Open	Open	Open	Open
4600601	1 - BASIC CUSTODIAL CARE (CLOSED)	0.9	Closed	Closed	Closed	Closed
4600602	1 - BASIC CUSTODIAL CARE (CLOSED)	0.3	Open	Closed	Closed	Open
4600603	1 - BASIC CUSTODIAL CARE (CLOSED)	0.7	Closed	Closed	Closed	Closed
4600604	1 - BASIC CUSTODIAL CARE (CLOSED)	0.1	Closed	Closed	Closed	Closed

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
4600605	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Closed	Closed
4600607	1 - BASIC CUSTODIAL CARE (CLOSED)	0.0	Open	Closed	Closed	Open
4600608	1 - BASIC CUSTODIAL CARE (CLOSED)	1.0	Closed	Closed	Closed	Closed
4600609	2 - HIGH CLEARANCE VEHICLES	0.4	Open	Open	Open	Open
4600613	2 - HIGH CLEARANCE VEHICLES	0.3	Open	Closed	Closed	Open
4600625	2 - HIGH CLEARANCE VEHICLES	0.3	Open	Open	Open	Open
4600625	1 - BASIC CUSTODIAL CARE (CLOSED)	0.9	Closed	Closed	Closed	Closed
4600635	2 - HIGH CLEARANCE VEHICLES	0.0	Open	Open	Open	Open
4600653	1 - BASIC CUSTODIAL CARE (CLOSED)	0.0	Closed	Closed	Closed	Closed
4600670	2 - HIGH CLEARANCE VEHICLES	5.3	Open	Open	Open	Open
4600673	1 - BASIC CUSTODIAL CARE (CLOSED)	1.0	Closed	Closed	Closed	Closed
4600675	1 - BASIC CUSTODIAL CARE (CLOSED)	0.4	Closed	Closed	Closed	Closed
4600678	1 - BASIC CUSTODIAL CARE (CLOSED)	0.8	Closed	Closed	Closed	Closed
4600680	2 - HIGH CLEARANCE VEHICLES	0.8	Open	Open	Open	Open
4600685	2 - HIGH CLEARANCE VEHICLES	0.0	Open	Closed	Closed	Open
4600685	2 - HIGH CLEARANCE VEHICLES	0.1	Open	Closed	Closed	Open

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
4600687	2 - HIGH CLEARANCE VEHICLES	0.0	Open	Closed	Closed	Open
4600996	1 - BASIC CUSTODIAL CARE (CLOSED)	0.1	Closed	Closed	Closed	Closed
4602000	2 - HIGH CLEARANCE VEHICLES	5.9	Open	Open	Open	Open
4602040	2 - HIGH CLEARANCE VEHICLES	1.9	Open	Open	Open	Open
4602040	1 - BASIC CUSTODIAL CARE (CLOSED)	0.5	Open	Open	Closed	Open
4602040	1 - BASIC CUSTODIAL CARE (CLOSED)	2.4	Open	Open	Closed	Open
4602050	1 - BASIC CUSTODIAL CARE (CLOSED)	0.5	Closed	Closed	Decommission	Closed
4602060	DE - DECOMMISSIONED	0.2	Decommission	Decommission	Decommission	Decommission
4602080	2 - HIGH CLEARANCE VEHICLES	2.7	Open	Open	Open	Open
4602085	1 - BASIC CUSTODIAL CARE (CLOSED)	0.6	Open	Closed	Closed	Open
4602089	2 - HIGH CLEARANCE VEHICLES	0.3	Open	Open	Open	Open
4602090	2 - HIGH CLEARANCE VEHICLES	7.4	Open	Open	Open	Open
4602092	2 - HIGH CLEARANCE VEHICLES	0.2	Open	Open	Open	Open
4602094	2 - HIGH CLEARANCE VEHICLES	0.2	Open	Open	Open	Open
4602096	DE - DECOMMISSIONED	0.3	Decommission	Decommission	Decommission	Decommission
4602120	2 - HIGH CLEARANCE VEHICLES	2.4	Open	Open	Decommission	Open

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
4605000	2 - HIGH CLEARANCE VEHICLES	2.6	Open	Open	Open	Open
4605081	2 - HIGH CLEARANCE VEHICLES	0.1	Open	Open	Open	Open
4605100	1 - BASIC CUSTODIAL CARE (CLOSED)	0.6	Closed	Closed	Closed	Closed
4605200	2 - HIGH CLEARANCE VEHICLES	2.0	Open	Open	Open	Open
4605210	2 - HIGH CLEARANCE VEHICLES	0.4	Open	Open	Closed	Open
4605220	2 - HIGH CLEARANCE VEHICLES	0.3	Closed	Closed	Closed	Closed
4605225	2 - HIGH CLEARANCE VEHICLES	0.3	Open	Open	Closed	Open
4605230	2 - HIGH CLEARANCE VEHICLES	0.1	Open	Open	Closed	Open
4605240	2 - HIGH CLEARANCE VEHICLES	0.1	Open	Open	Open	Open
4605250	2 - HIGH CLEARANCE VEHICLES	1.0	Open	Open	Open	Open
4615000	2 - HIGH CLEARANCE VEHICLES	4.3	Open	Open	Open	Open
4615049	2 - HIGH CLEARANCE VEHICLES	0.3	Open	Open	Closed	Open
4615050	1 - BASIC CUSTODIAL CARE (CLOSED)	0.7	Open	Closed	Closed	Open
4615055	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Closed	Closed
4615056	1 - BASIC CUSTODIAL CARE (CLOSED)	0.9	Open	Closed	Closed	Closed
4615057	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Decommission	Closed

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
4615058	1 - BASIC CUSTODIAL CARE (CLOSED)	0.1	Closed	Closed	Decommission	Closed
4615065	1 - BASIC CUSTODIAL CARE (CLOSED)	0.8	Closed	Closed	Closed	Closed
4615068	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Closed	Closed
4615070	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Decommission	Closed
4615075	1 - BASIC CUSTODIAL CARE (CLOSED)	0.5	Closed	Closed	Decommission	Closed
4615090	1 - BASIC CUSTODIAL CARE (CLOSED)	1.3	Open	Closed	Closed	Open
4615095	1 - BASIC CUSTODIAL CARE (CLOSED)	1.0	Open	Closed	Closed	Open
4615150	2 - HIGH CLEARANCE VEHICLES	2.5	Open	Open	Open	Open
4615152	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Decommission	Closed
4615154	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Decommission	Closed
4615160	2 - HIGH CLEARANCE VEHICLES	0.5	Open	Open	Open	Open
4615165	2 - HIGH CLEARANCE VEHICLES	0.5	Open	Open	Open	Open
4615200	2 - HIGH CLEARANCE VEHICLES	0.0	Open	Open	Decommission	Open
4615200	2 - HIGH CLEARANCE VEHICLES	0.5	Open	Open	Open	Open
4615200	2 - HIGH CLEARANCE VEHICLES	0.6	Closed	Closed	Decommission	Closed
4615200	1 - BASIC CUSTODIAL CARE (CLOSED)	1.4	Open	Open	Open	Open

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
4615205	1 - BASIC CUSTODIAL CARE (CLOSED)	1.0	Closed	Closed	Closed	Closed
4615250	2 - HIGH CLEARANCE VEHICLES	1.3	Open	Open	Open	Open
4615275	1 - BASIC CUSTODIAL CARE (CLOSED)	0.5	Closed	Closed	Closed	Closed
4615280	1 - BASIC CUSTODIAL CARE (CLOSED)	0.3	Closed	Closed	Closed	Closed
4615300	1 - BASIC CUSTODIAL CARE (CLOSED)	0.5	Open	Closed	Closed	Open
4615305	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Open	Closed	Closed	Open
4615325	1 - BASIC CUSTODIAL CARE (CLOSED)	0.3	Closed	Closed	Decommission	Closed
4615326	1 - BASIC CUSTODIAL CARE (CLOSED)	0.3	Closed	Closed	Closed	Closed
4615327	1 - BASIC CUSTODIAL CARE (CLOSED)	0.3	Closed	Closed	Closed	Closed
4630300	2 - HIGH CLEARANCE VEHICLES	0.0	Open	Open	Open	Open
4650000	3 - SUITABLE FOR PASSENGER CARS	4.3	Open	Open	Open	Open
4650000	3 - SUITABLE FOR PASSENGER CARS	0.7	Open	Open	Open	Open
4650000	3 - SUITABLE FOR PASSENGER CARS	0.3	Open	Open	Open	Open
4650000	2 - HIGH CLEARANCE VEHICLES	1.7	Open	Open	Open	Open
4650000	2 - HIGH CLEARANCE VEHICLES	0.0	Open	Open	Open	Open
4650000	2 - HIGH CLEARANCE VEHICLES	0.0	Open	Open	Open	Open

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
4650015	3 - SUITABLE FOR PASSENGER CARS	0.3	Open	Open	Open	Open
4650020	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Closed	Closed
4650020	1 - BASIC CUSTODIAL CARE (CLOSED)	0.3	Closed	Closed	Closed	Closed
4650020	1 - BASIC CUSTODIAL CARE (CLOSED)	0.5	Closed	Closed	Closed	Closed
4650021	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Closed	Closed
4650027	1 - BASIC CUSTODIAL CARE (CLOSED)	0.3	Closed	Closed	Decommission	Closed
4650030	1 - BASIC CUSTODIAL CARE (CLOSED)	1.3	Open	Closed	Closed	Open
4650032	1 - BASIC CUSTODIAL CARE (CLOSED)	0.6	Open	Closed	Closed	Open
4650040	2 - HIGH CLEARANCE VEHICLES	0.3	Open	Open	Open	Open
4650045	1 - BASIC CUSTODIAL CARE (CLOSED)	0.5	Closed	Closed	Decommission	Closed
4650050	2 - HIGH CLEARANCE VEHICLES	0.5	Open	Open	Open	Open
4650050	2 - HIGH CLEARANCE VEHICLES	0.4	Open	Open	Closed	Open
4650052	2 - HIGH CLEARANCE VEHICLES	0.4	Open	Open	Closed	Open
4650053	1 - BASIC CUSTODIAL CARE (CLOSED)	0.1	Closed	Closed	Closed	Closed
4650055	1 - BASIC CUSTODIAL CARE (CLOSED)	1.5	Closed	Closed	Decommission	Closed
4650057	1 - BASIC CUSTODIAL CARE (CLOSED)	0.5	Closed	Closed	Decommission	Closed

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
4650060	2 - HIGH CLEARANCE VEHICLES	2.7	Open	Open	Open	Open
4650065	2 - HIGH CLEARANCE VEHICLES	0.3	Open	Open	Open	Open
4650070	2 - HIGH CLEARANCE VEHICLES	1.2	Open	Open	Open	Open
4650075	2 - HIGH CLEARANCE VEHICLES	0.3	Open	Open	Open	Open
4650080	2 - HIGH CLEARANCE VEHICLES	2.7	Open	Open	Open	Open
4650081	D - DECOMMISSION	0.4	Open	Decommission	Decommission	Decommission
4650081	D - DECOMMISSION	0.3	Open	Open	Open	Open
4650082	2 - HIGH CLEARANCE VEHICLES	0.4	Open	Open	Open	Open
4650083	2 - HIGH CLEARANCE VEHICLES	0.3	Closed	Closed	Closed	Closed
4650120	1 - BASIC CUSTODIAL CARE (CLOSED)	2.4	Open	Closed	Closed	Open
4650125	1 - BASIC CUSTODIAL CARE (CLOSED)	0.8	Closed	Closed	Closed	Closed
4650130	1 - BASIC CUSTODIAL CARE (CLOSED)	0.5	Open	Closed	Closed	Open
4650130	1 - BASIC CUSTODIAL CARE (CLOSED)	0.7	Open	Closed	Closed	Open
4650135	1 - BASIC CUSTODIAL CARE (CLOSED)	0.7	Open	Closed	Closed	Open
4650140	1 - BASIC CUSTODIAL CARE (CLOSED)	0.4	Closed	Closed	Closed	Closed
4650142	1 - BASIC CUSTODIAL CARE (CLOSED)	0.5	Closed	Closed	Closed	Closed

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
4650144	1 - BASIC CUSTODIAL CARE (CLOSED)	0.4	Closed	Closed	Closed	Closed
4650145	1 - BASIC CUSTODIAL CARE (CLOSED)	0.5	Closed	Closed	Closed	Closed
4650150	1 - BASIC CUSTODIAL CARE (CLOSED)	1.9	Open	Closed	Closed	Open
4650155	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Closed	Closed
4650157	1 - BASIC CUSTODIAL CARE (CLOSED)	0.7	Closed	Closed	Closed	Closed
4650160	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Closed	Closed
4650165	2 - HIGH CLEARANCE VEHICLES	0.1	Open	Open	Open	Open
4650170	1 - BASIC CUSTODIAL CARE (CLOSED)	0.3	Closed	Closed	Closed	Closed
4655000	2 - HIGH CLEARANCE VEHICLES	4.3	Open	Open	Open	Open
4655000	2 - HIGH CLEARANCE VEHICLES	3.5	Open	Open	Open	Open
4655025	1 - BASIC CUSTODIAL CARE (CLOSED)	1.4	Closed	Closed	Closed	Closed
4655025	2 - HIGH CLEARANCE VEHICLES	0.5	Open	Open	Open	Open
4655026	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Closed	Closed
4655027	DE - DECOMMISSIONED	0.2	Decommission	Decommission	Decommission	Decommission
4655045	2 - HIGH CLEARANCE VEHICLES	1.0	Open	Open	Open	Open
4655045	2 - HIGH CLEARANCE VEHICLES	0.1	Open	Open	Open	Open

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
4655045	2 - HIGH CLEARANCE VEHICLES	1.8	Open	Open	Open	Open
4655047	2 - HIGH CLEARANCE VEHICLES	0.2	Open	Open	Open	Open
4655048	1 - BASIC CUSTODIAL CARE (CLOSED)	1.0	Closed	Closed	Closed	Closed
4655049	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Closed	Closed
4655050	1 - BASIC CUSTODIAL CARE (CLOSED)	2.7	Open	Closed	Closed	Open
4655050	1 - BASIC CUSTODIAL CARE (CLOSED)	0.3	Open	Closed	Closed	Open
4655051	D - DECOMMISSION	0.4	Closed	Decommission	Decommission	Decommission
4655052	1 - BASIC CUSTODIAL CARE (CLOSED)	0.9	Open	Closed	Closed	Open
4655054	1 - BASIC CUSTODIAL CARE (CLOSED)	0.4	Closed	Closed	Closed	Closed
4655056	1 - BASIC CUSTODIAL CARE (CLOSED)	0.5	Closed	Closed	Closed	Closed
4655060	1 - BASIC CUSTODIAL CARE (CLOSED)	1.0	Closed	Closed	Closed	Closed
4655061	1 - BASIC CUSTODIAL CARE (CLOSED)	0.4	Closed	Closed	Decommission	Closed
4655065	2 - HIGH CLEARANCE VEHICLES	0.1	Closed	Decommission	Decommission	Decommission
4655065	1 - BASIC CUSTODIAL CARE (CLOSED)	0.8	Open	Open	Open	Open
4655070	1 - BASIC CUSTODIAL CARE (CLOSED)	0.4	Closed	Closed	Closed	Closed
4655075	1 - BASIC CUSTODIAL CARE (CLOSED)	0.6	Closed	Closed	Closed	Closed

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
4655080	1 - BASIC CUSTODIAL CARE (CLOSED)	0.9	Closed	Closed	Closed	Closed
4655085	1 - BASIC CUSTODIAL CARE (CLOSED)	0.6	Closed	Closed	Closed	Closed
4655090	1 - BASIC CUSTODIAL CARE (CLOSED)	1.3	Closed	Closed	Closed	Closed
4655095	2 - HIGH CLEARANCE VEHICLES	0.5	Open	Open	Open	Open
4655095	2 - HIGH CLEARANCE VEHICLES	0.1	Open	Open	Open	Open
4655095	2 - HIGH CLEARANCE VEHICLES	1.1	Open	Open	Open	Open
4655098	1 - BASIC CUSTODIAL CARE (CLOSED)	0.6	Closed	Closed	Closed	Closed
4655102	2 - HIGH CLEARANCE VEHICLES	0.3	Open	Open	Open	Open
4655102	2 - HIGH CLEARANCE VEHICLES	0.2	Open	Open	Open	Open
4655103	2 - HIGH CLEARANCE VEHICLES	0.4	Open	Open	Open	Open
4655105	DE - DECOMMISSIONED	0.4	Decommission	Decommission	Decommission	Decommission
4655110	DE - DECOMMISSIONED	0.1	Decommission	Decommission	Decommission	Decommission
4655112	2 - HIGH CLEARANCE VEHICLES	0.7	Open	Open	Open	Open
4655115	2 - HIGH CLEARANCE VEHICLES	0.3	Open	Open	Closed	Open
4655117	2 - HIGH CLEARANCE VEHICLES	0.1	Open	Decommission	Decommission	Open
4655117	D - DECOMMISSION	1.6	Open	Decommission	Decommission	Closed

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
4655120	1 - BASIC CUSTODIAL CARE (CLOSED)	1.3	Closed	Closed	Decommission	Closed
4655125	D - DECOMMISSION	1.3	Closed	Decommission	Decommission	Decommission
4655140	2 - HIGH CLEARANCE VEHICLES	0.2	Open	Closed	Closed	Closed
4655150	2 - HIGH CLEARANCE VEHICLES	0.2	Open	Closed	Closed	Closed
4655150	2 - HIGH CLEARANCE VEHICLES	2.2	Open	Open	Open	Open
4655150	2 - HIGH CLEARANCE VEHICLES	0.3	Open	Open	Open	Open
4655150	2 - HIGH CLEARANCE VEHICLES	0.4	Open	Open	Open	Open
4655155	1 - BASIC CUSTODIAL CARE (CLOSED)	1.6	Open	Closed	Closed	Open
4655160	1 - BASIC CUSTODIAL CARE (CLOSED)	0.7	Open	Closed	Closed	Closed
4655160	1 - BASIC CUSTODIAL CARE (CLOSED)	0.4	Open	Closed	Closed	Open
4655165	1 - BASIC CUSTODIAL CARE (CLOSED)	0.3	Open	Open	Open	Open
4655200	1 - BASIC CUSTODIAL CARE (CLOSED)	0.4	Closed	Closed	Closed	Closed
4665015	2 - HIGH CLEARANCE VEHICLES	0.1	Open	Open	Open	Open
4680000	3 - SUITABLE FOR PASSENGER CARS	2.0	Open	Open	Open	Open
4680000	2 - HIGH CLEARANCE VEHICLES	6.8	Open	Open	Open	Open
4680040	1 - BASIC CUSTODIAL CARE (CLOSED)	1.4	Closed	Closed	Closed	Closed

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
4680050	1 - BASIC CUSTODIAL CARE (CLOSED)	1.3	Closed	Closed	Closed	Closed
4680075	1 - BASIC CUSTODIAL CARE (CLOSED)	1.9	Closed	Closed	Closed	Closed
4680080	1 - BASIC CUSTODIAL CARE (CLOSED)	0.8	Closed	Closed	Closed	Closed
4680090	1 - BASIC CUSTODIAL CARE (CLOSED)	0.6	Closed	Closed	Closed	Closed
4680110	2 - HIGH CLEARANCE VEHICLES	0.0	Open	Open	Open	Open
4680120	1 - BASIC CUSTODIAL CARE (CLOSED)	0.3	Closed	Closed	Closed	Closed
4680123	1 - BASIC CUSTODIAL CARE (CLOSED)	0.2	Closed	Closed	Closed	Closed
4680126	1 - BASIC CUSTODIAL CARE (CLOSED)	0.3	Closed	Closed	Closed	Closed
4680135	1 - BASIC CUSTODIAL CARE (CLOSED)	0.4	Closed	Closed	Closed	Closed
4680140	2 - HIGH CLEARANCE VEHICLES	0.6	Open	Open	Open	Open
4680145	2 - HIGH CLEARANCE VEHICLES	0.2	Open	Open	Open	Open
4680150	2 - HIGH CLEARANCE VEHICLES	0.8	Open	Open	Open	Open
4680200	2 - HIGH CLEARANCE VEHICLES	3.9	Open	Open	Open	Open
4680208	2 - HIGH CLEARANCE VEHICLES	0.8	Open	Open	Closed	Open
4680212	2 - HIGH CLEARANCE VEHICLES	1.1	Open	Open	Open	Open
4680215	2 - HIGH CLEARANCE VEHICLES	0.3	Closed	Closed	Closed	Closed

ID	Objective Status	Miles	Exisitng Conditon	Alt. 1	Alt. 2	Alt. 3
4680219	2 - HIGH CLEARANCE VEHICLES	0.5	Open	Open	Closed	Open
4680220	2 - HIGH CLEARANCE VEHICLES	1.5	Open	Open	Closed	Open
4680250	1 - BASIC CUSTODIAL CARE (CLOSED)	0.3	Closed	Closed	Closed	Closed
4680500	1 - BASIC CUSTODIAL CARE (CLOSED)	1.9	Closed	Closed	Closed	Closed