United States
Department of
Agriculture

Forest
Service

February 2016

Supplemental Draft Environmental Impact Statement

Ochoco Summit Trail System

Ochoco National Forest
Crook and Wheeler Counties, Oregon

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Ochoco Summit Trail System Project
Supplemental Draft
Environmental Impact Statement
Crook County, Oregon

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Abstract: This supplemental Draft Environmental Impact Statement analyzes five alternatives related to the development of a trail for motorized off-highway vehicles (OHVs) on the Ochoco National Forest. Alternative 1 is the no action alternative, which would not develop or designate trail for OHVs. Alternative 2 is the proposed action; it would create a 170-mile trail network, providing areas intended for use by motorcycles, ATVs, and Jeeps and 4 x 4 trucks. Alternative 3 would create a 101-mile trail network, providing areas intended for use by motorcycles and ATVs, and would not designate a trail system intended for jeeps and 4 x 4s. Alternative 4 would create a 212-mile trail network, providing areas intended for use by motorcycles, ATVs, and Jeeps and 4 x 4 trucks. Alternative 5 would create a 135-mile trail network, providing areas intended for use by motorcycles, ATVs, Jeeps and 4x4 trucks, and side-by-side buggies. The Responsible Official has identified Alternative 5 as the preferred alternative. Forest Plan amendments (FPAs) would be required to implement any action alternative.

Reviewers should provide the Forest Service with their comments during the review period of the draft environmental impact statement. This will enable the Forest Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the final environmental impact statement, thus avoiding undue delay in the decision-making process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewers' position and contentions. Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 553 (1978). Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the final environmental impact statement. City of Angoon v. Hodel (9th Circuit, l986) and Wisconsin Heritages, Inc. v. Harris, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980). Comments on the draft environmental impact statement should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3).

Send Comments to: **Ochoco Summit Trail System ID Team**
3160 NE 3rd Street
Prineville, OR 97754

Date Comments Must Be Received: **45 days following the publication of the Notice of Availability in the Federal Register**

Reader's Guide

This Draft Environmental Impact Statement (DEIS) contains information about a project proposal that would create and designate a trail system intended for motorized recreation. The information in this DEIS is organized to facilitate consideration of the environmental effects by the public and by the Forest Supervisor of the Ochoco National Forest, who is responsible for deciding whether or not to implement the Proposed Action or another alternative considered for this proposal.

Understanding the structure of this document is important to an overall understanding of the information required in an EIS. The following provides an overview of the components of this document.

Table of Contents: A table of contents is provided at the beginning of the document. Lists of tables and figures are also included.

Executive Summary: The summary of the DEIS provides a concise overview of the Purpose and Need for action, the Key Issues that became apparent during the public scoping period, and a comparison of the environmental effects of the alternatives.

Chapter 1. Purpose and Need for Action: Chapter 1 describes the Purpose and Need for the proposal, and the Proposed Action. It includes Management Direction for the project, and the Decision Framework. Public Involvement and the Issues generated by public comments are explained here.

Chapter 2. Alternatives, including the Proposed Action: Chapter 2 includes a description of the alternative development process, and discussions on alternatives and actions considered but eliminated from detailed analysis. The focus of this chapter is Alternatives Considered in Detail, including the No Action (Alternative 1), the Proposed Action (Alternative 2) as developed by the Forest Service that focused the analysis for this project, and three additional alternatives, Alternative 3, Alternative 4 and Alternative 5, which respond to several planning issues. Project design criteria that are intended to reduce potential resource impacts are documented in this chapter. Also included in this chapter is a comparison of alternatives that summarizes data in a table format. Finally, a monitoring plan is described that will provide important information regarding the specificity and effectiveness of project activities.

***Chapter 3. Affected Environment and Environmental Consequences*:** Chapter 3 describes current physical, biological, and social and economic environments within the area of influence of the Proposed Actions. This information provides the baseline for assessment and comparison of the potential impacts of the action alternatives. In addition, this chapter provides a comprehensive scientific and analytical comparison of the potential environmental impacts of the action alternatives to the No Action Alternative. In order to facilitate comparison of information provided, this chapter is organized and subdivided into resource areas/disciplines in a manner appropriate to the affected environment for this area.

Chapter 4. Consultation and Coordination: Chapter 4 lists the individuals, Federal, State and local agencies and tribes that the Forest Service consulted during the development of this DEIS. It also discloses the distribution of the document including Federal Agencies, federally recognized tribes, State and local governments and organizations and individuals representing a wide range of views. The references, glossary, and index are in the last part of this chapter.

Appendices: The Appendix includes project area maps; other information, including more detailed analyses of project-area resources, may be found in the project planning record located at the Ochoco National Forest, Prineville, Oregon.

Acronyms used in this Document

ATV	All-terrain vehicle
BCC	Birds of Conservation Concern
BE	Biological Evaluation
BI	Beneficial Impact
BMP	Best Management Practices
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CWA	Clean Water Act
CWD	Coarse Woody Debris
CWM	Coarse Woody Material
DEIS	Draft Environmental Impact Statement
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act of 1973
FPA	Forest Plan Amendment
FS	Forest Service
FSH	Forest Service Handbook
FSM	Forest Service Manual
GIS	Geographical Information Systems
IDT	Interdisciplinary Team
INFISH	Inland Native Fish Strategy
IRA	Inventoried Roadless Area
LRMP	Ochoco National Forest Land and Resource Management Plan
MA	Management Area
MIIH	May Impact Individuals or Habitat but Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species
MIS	Management Indicator Species
NE	No Effect
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NHPA	National Historic Preservation Act
NI	No Impact
NOA	Notice of Availability
NOI	Notice of Intent
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
OHV	Off-Highway Vehicle
PAG	Plant Association Group
PDC	Project Design Criteria
PETS	Proposed, Endangered, Threatened, and Sensitive Species
PFA	Post Fledging Area
PM	Particulate Matter
PWA	Potential Wilderness Area
RHCA	Riparian Habitat Conservation Area
S&G	Standard and Guide
SSRA	Smoke Sensitive Receptor Area
TES	Threatened, Endangered, Sensitive
UMZ	Upper Management Zone
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service

Table of Contents

Executive Summary ..... **xiii**

Chapter 1. Purpose of and Need for Action **1**
Background 1
Purpose and Need for Action 2
Forest Plan Direction and Other Guidance 3
Forest Plan Management Areas 3
INFISH 5
Proposed Action 6
Decision Framework 6
Public and Intergovernmental Involvement 6
Pre-Scoping 6
Public and Intergovernmental Scoping 7
Issues 8

Chapter 2. Alternatives, Including the proposed action **12**
Introduction 12
Alternatives Considered in Detail 12
Alternative 1 (No Action) 12
Alternative 2 (Proposed Action) 12
Alternative 3 16
Alternative 4 19
Alternative 5 24
Other Information for all Action Alternatives 28
Resource Protection Measures 29
Project Design Criteria Common to All Action Alternatives 29
Mitigation Measures Common to All Action Alternatives 37
Education, Enforcement, Safety, and Operational Maintenance Plan 38
Monitoring 44
Alternatives Considered but Eliminated from Detailed Study 46
Comparison of Alternatives 48

Chapter 3. Affected Environment and Environmental Consequences **51**
Cumulative Effects 51
Transportation 56
Existing Condition 56
Environmental Effects 64
Recreation 74
Introduction 74
Existing Condition 77
Environmental Effects 81
Geology 103
Existing Condition 103
Environmental Effects 105
Soils 110
Management Direction 110
Existing Condition 111
Environmental Effects 113
Hydrology and Aquatic Species 123
Introduction 123

Pertinent Rules and Regulations 124
Analysis Design 129
Existing Condition 144
Direct and Indirect Effects 179
Viability Analysis for Aquatic Species 242
Consistency with Forest Plan Direction and Other Laws/Regulations 243
Wildlife 244
General Effects to Wildlife 244
Threatened, Endangered and Sensitive Species 254
Management Indicator Species (LRMP) 274
Other Wildlife Species (LRMP) 313
Land Birds 323
Botany 350
Introduction 350
Threatened, Endangered and Sensitive Plants 351
Non-native Invasive Plants 378
Special Plant Habitats 387
Cultural Resources 400
History 400
Management Direction 401
Desired Condition 401
Existing Condition 401
Direct and Indirect Effects 403
Cumulative Effects 405
Monitoring 405
Range Resources 406
Introduction 406
Environmental Effects 408
Cumulative Effects 412
Wilderness, Inventoried Roadless and Unroaded Areas 413
Wilderness and Inventoried Roadless Areas 413
Lands with Wilderness Characteristics 416
Unroaded Areas Identified by Commenters 417
Visual Quality 420
Air Quality 420
Affected Environment 420
Direct and Indirect Effects 423
Cumulative Effects 425
Climate Change and Carbon Cycling 425
Assessing the Effect of the Ochoco Summit Trail System project on Climate Change 425
Assessing the Effect of Climate Change on the Ochoco Summit Trail System Project 427
Social and Economic Analysis 427
General Information and Population Estimates 428
Employment 430
Population Characteristics of OHV Users 431
Cost Estimates 433
Effects of Forest Plan Amendments 435
Old Growth Management Area Forest Plan Amendments 435
Scabland Forest Plan Amendments 436
Civil Rights and Environmental Justice 442

Short-term Uses and Long-term Productivity 442
Unavoidable Adverse Effects 443
Soils 443
Invasive Plants 443
Sedimentation/Turbidity 443
Irreversible and Irretrievable Commitments of Resources 444
Incomplete and Unavailable Information 445
Energy Requirements 445
Effects on Laws, Regulations, Plans, Policies, and Procedures 446
The National Environmental Policy Act (NEPA) 446
National Forest Management Act 446
Part 212-Travel Management 448
The National Historic Preservation Act 452
Endangered Species Act 453
Clean Water Act 453
The Clean Air Act 454
Executive Orders 454

Chapter 4. Consultation and Coordination 458
Preparers and Contributors 458
References 461
Glossary 479
Index 492

Appendix A – Maps 493

List of Tables

Table ES-1. Comparison of the alternatives. xiii
Table ES-2. Summary of some measured effects on recreation, by alternative, of the Ochoco Summit Trail System project. xiv
Table ES-3. Summary of some measures related to water quality in the Ochoco Summit project area. xiv
Table ES-4. Summary of effects determinations to Threatened, Endangered and Sensitive species, other wildlife and habitatas by alternative for the Ochoco Summit project. xv
Table 1. Summary of proposed motorized trails and areas, Alternative 2, Ochoco Summit Trail System project. 16
Table 2. Summary of proposed Ochoco Summit Trail System, Alternative 3, motorized trails and areas. 19
Table 3. Summary of proposed Ochoco Summit Trail System, Alternative 4, motorized trails and areas. 23
Table 4. Summary of proposed Ochoco Summit Trail System, Alternative 5, motorized trails and areas. 28
Table 5. Seasonal restrictions on trail construction and maintenance for active raptor nest sites. 34
Table 6. Comparison of alternatives. 48
Table 7. Past, present and reasonable foreseeable future actions. 53
Table 8. Miles of road by maintenance level. 59
Table 9. Road density for 5th and 6th order watersheds, all open roads, mi/mi^2. 59

Table 10. Roads proposed for decommissioning under Howard, Johnson, Elliot and Porter Creek Subwatershed Roads Analysis. 61
Table 11. Total miles proposed to decommission for each subwatershed. 61
Table 12. Operational Maintenance Level 2 roads proposed to change to Operational Maintenance Level 1 – Closed under the Howard, Johnson, Elliot and Porter Subwatersheds Roads Analysis. 61
Table 13. Total miles for each subwatershed proposed for closure. 62
Table 14. Roads proposed for closure or decommissioning under Deep Creek Roads Analysis and Deep Restoration Environmental Analysis. 63
Table 15. Roads proposed for closure under Spears Roads Analysis. 63
Table 16. Roads proposed for decommissioning under Spears Roads Analysis. 63
Table 17. Intersections between the alternative routes and highway legal only routes. 64
Table 18. Alternative 2 trail system, miles of existing road and new route by vehicle class. 66
Table 19. Alternative 2 (Proposed Action) crossing type for stream class and vehicle class. 66
Table 20. Alternative 2 road density open roads and proposed trails - subwatershed basis (miles/sq. mile). 67
Table 21. Alternative 2 subwatersheds with open road and trail density at or over 3 miles/sq. mile for general forest. 68
Table 22. Alternative 3 Routes for Class I and Class III vehicles, miles. 68
Table 23. Alternative 3 road density - subwatershed (miles/square mile). 68
Table 24. Alternative 3 subwatersheds with open road and trail density at or over 3 miles/sq. mile for general forest or general forest winter range. 69
Table 25. Alternative 4 Class I, Class II and Class III routes, miles. 70
Table 26. Alternative 4 road density – subwatershed basis (miles/sq. mile). 70
Table 27. Alternative 4 subwatersheds with open road and trail density at or over 3 miles/sq. mile for general forest or general forest winter range. 71
Table 28. Alternative 5 routes for class I-IV vehicles (miles). 71
Table 29. Alternative 5 road density - subwatershed (miles/sq. mile). 71
Table 30. Alternative 5 subwatersheds with open road and trail density at or over 3 miles/sq. mile for general forest or general forest winter range. 72
Table 31. Comparison of the action alternatives. 73
Table 32. Frequency of Motorized Trail Participation in Oregon among Households Reporting OHV Participation. 76
Table 33. OHV Ownership, Permits, In-state, by County, Percent of County Ownership by Class (Lindberg 2009). 76
Table 34. OHV riding days by vehicle class (Lindberg, Bertone-Riggs, 2015). 76
Table 35. Oregon Parks and Recreation Department Historical ATV permit sales by class (Hughes, 2015). 76
Table 36. Value of OHV experience by vehicle class based on miles of trail. 82
Table 37. Value of an OHV Area Based on Play Areas and Scenic View Points. 82
Table 38. Description of Staging and Camping Areas. 83
Table 39. Miles of OHV trail and assigned value by vehicle class by alternative. 88
Table 40. Riding areas and scenic viewpoints by alternative. 89
Table 41. Staging areas and trailheads by alternative. 90
Table 42. Site-specific staging area information by alternative. 90
Table 43. Decision points and opportunities near staging areas by alternative. 90
Table 44. Summary of trail miles proposed in Alternative 2 of the Ochoco Summit Trail System project. 91
Table 45. Summary of trail miles proposed in Alternative 3 of the Ochoco Summit Trail

System project. 92
Table 46. Summary of trail miles proposed in Alternative 4 of the Ochoco Summit Trail System project. 93
Table 47. Summary of trail miles proposed in Alternative 5 of the Ochoco Summit OHV Trail System project. 94
Table 48. Sites/Areas from which sounds of OHVs might be audible at > 45 db. 96
Table 49. Selected OHV opportunities close to the Ochoco Summit project area. 98
Table 50. Lithology across the Ochoco Summit Trail System Project Area by watershed. 103
Table 51. Landslide terrain by subwatershed (acres) in the Ochoco Summit Project Area. 104
Table 52. Lithology for each proposed trail type in Alternative 2 of the Ochoco Summit Project (acres). 105
Table 53. Acres of dormant and active landslide terrain for each trail type in all action alternatives of the Ochoco Summit Project. 106
Table 54. Lithology for each proposed trail type in Alternative 3 of the Ochoco Summit Project (acres). 106
Table 55. Lithology for each proposed trail type in Alternative 4 of the Ochoco Summit Project (acres). 107
Table 56. Alternative 5 lithology (acres) for class 1, class 2, class 3, and class 4 routes. 108
Table 57. Alternative 5 crossing type for stream class and vehicle class. 108
Table 58. Comparison of the action alternatives. 109
Table 59. Effective ground cover objectives from the Ochoco Forest Plan (page 4-196). 111
Table 60. Major landtypes in the Ochoco Summit Trail System project area (from Paulson, 1977, ONF SRI). 112
Table 61. Miles/acres of proposed trails by alternative. 118
Table 62. Determination for threatened, endangered and sensitive aquatic species. 123
Table 63. Riparian Management Objectives for the Ochoco Summit Trail System project area (INFISH 1995). 128
Table 64. Name and HUCs for subwatersheds not analyzed within the Ochoco Summit project boundary. 129
Table 65. Criteria for habitat indicator condition rating. Some criteria were defined by the National Marine Fisheries Service in the Matrix of Pathways and Indicators (NMFS 1996), some criteria were established by the interim Riparian Management Objectives in PACFISH, and some were modified based on site-specific conditions. 131
Table 66. Interim objectives for pool frequency (PACFISH, USDA 1995). 132
Table 67. Width to depth ratio by channel type (Rosgen 1996). 132
Table 68. Generalized sensitivity to disturbance and recovery potential by stream type (Rosgen 2009). 141
Table 69. Hydrologic Unit Codes for the Ochoco Summit project area. 144
Table 70. List of streams in the Ochoco Summit project area by watershed and subwatershed.* 145
Table 71. Stream class miles by watershed and subwatershed. 145
Table 72. Miles of perennial, intermittent, and ephemeral streams. 146
Table 73. Summary of existing condition in the Lower Beaver Creek Watershed. 147
Table 74. Habitat indicator condition rating by surveyed reach in the North Wolf Subwatershed. 148
Table 75. Stream temperature rating by location and year in the North Wolf Subwatershed. 148
Table 76. Summary of stream condition and impairments in North Wolf Creek Subwatershed. 149

Table 77. Summary of existing condition in the Upper North Fork Crooked River Watershed. ... 149
Table 78. Habitat indicator condition rating by surveyed reach in the Elliott Creek Subwatershed ... 150
Table 79. Stream temperature rating by location and year in the Elliott Creek Subwatershed. ... 151
Table 80. Summary of stream condition and impairments in Elliott Creek Subwatershed. ... 152
Table 81. Habitat indicator condition rating by surveyed reach in the Howard Creek Subwatershed. ... 153
Table 82. Stream temperature rating by location and year in the Howard Creek Subwatershed. ... 154
Table 83. Summary of stream condition and impairments in Howard Creek Subwatershed. ... 155
Table 84. Habitat indicator condition rating by surveyed reach in the Peterson Creek Subwatershed. ... 157
Table 85. Stream temperature rating by location and year in the Peterson Creek Subwatershed. ... 158
Table 86. Summary of stream condition and impairments in Peterson Creek Subwatershed. ... 160
Table 87. Habitat indicator condition rating by surveyed reach in the Porter Creek Subwatershed. ... 160
Table 88. Stream temperature rating by location and year in the Porter Creek Subwatershed. ... 162
Table 89. Summary of stream condition and impairments in Porter Creek Subwatershed. ... 162
Table 90. Summary of Existing Condition in the Deep Creek Watershed. ... 163
Table 91. Habitat indicator condition rating by surveyed reach in the Jackson Creek Subwatershed. ... 166
Table 92. Stream temperature rating by location and year in the Jackson Creek Subwatershed. ... 168
Table 93. Summary of stream condition and impairments in Jackson Creek Subwatershed. ... 169
Table 94. Habitat indicator condition rating by surveyed reach in the Little Summit Prairie Creek Subwatershed. ... 171
Table 95. Stream temperature rating by location and year in the Little Summit Prairie Creek Subwatershed. ... 172
Table 96. Summary of stream condition and impairments in Little Summit Prairie Creek Subwatershed. ... 173
Table 97. Habitat indicator condition rating by surveyed reach in the Lower Deep Creek Subwatershed. ... 175
Table 98. Stream temperature rating by location and year in the Lower Deep Creek Subwatershed. ... 175
Table 99. Summary of stream condition and impairments in Lower Deep Creek Subwatershed. ... 177
Table 100. Summary of existing condition in the Upper Ochoco Creek Watershed. ... 177
Table 101. Habitat indicator condition rating by surveyed reach in the Upper Marks Creek Subwatershed. ... 178
Table 102. Stream temperature rating by location and year in the Upper Marks Creek Subwatershed. ... 178

Table 103. Summary of stream condition and impairments in Upper Marks Creek Subwatershed. 179
Table 104. Sediment contribution from road/trail crossing and adjacent road/trail segments (tons/year) compared to estimated natural background hillslope sediment (tons/year) by subwatershed for Alternative 2. 204
Table 105. A summary of information related to Alternative 2 stream crossings by subwatershed. 205
Table 106. Comparison of Alternative 2 and Alternative 3 road plus new trail densities by subwatershed. 207
Table 107. Comparison of Alternative 2 and Alternative 3 road plus trail stream crossing densities by subwatershed. 207
Table 108. Miles of existing roads and proposed trail miles within 300' of streams, comparison between Alternative 2 and Alternative 3. 209
Table 109. Comparison of trail and intermittent and perennial stream crossings between Alternative 2 and Alternative 3. 209
Table 110. Sediment contribution from road/trail crossing and adjacent road/trail segments (tons/year) compared to estimated natural background sediment (tons/year) by subwatershed for Alternative 3. 210
Table 111. A summary of information related to Alternative 3 stream crossings by subwatershed. 211
Table 112. Comparison of Alternative 2 and Alternative 4 road plus new trail densities by subwatershed. 213
Table 113. Comparison of Alternative 2 and Alternative 4 road plus trail stream crossing densities by subwatershed. 214
Table 114. Miles of Existing Roads and proposed trail miles within 300' of streams, comparison between Alternative 2 and Alternative 4. 215
Table 115. Comparison of Trail and Intermittent and Perennial Stream Crossings between Alternative 2 and Alternative 4. 216
Table 116. Sediment contribution from road/trail crossing and adjacent road/trail segments (tons/year) compared to estimated natural background hillslope sediment (tons/year) by subwatershed for Alternative 4. 216
Table 117. A summary of information related to Alternative 4 stream crossings by subwatershed. 217
Table 118. Comparison of Alternative 3 and Alternative 5 road plus trail densities by subwatershed. 221
Table 119. Comparison of Alternative 3 and Alternative 5 road plus trail stream crossing densities by subwatershed. 221
Table 120. Miles of existing roads and proposed trail miles within 300' of streams, comparison between Alternative 3 and Alternative 5. 223
Table 121. Comparison of trail and intermittent and perennial stream crossings between Alternative 3 and Alternative 5. 223
Table 122. Sediment contribution from road/trail crossing and adjacent road/trail segments (tons/year) for Alternative 3 and Alternative 5. 224
Table 123. A summary of information related to Alternative 5 stream crossings by subwatershed. 225
Table 124. Proposed Ochoco Summit trail system within the Bailey Butte fire perimeter by burn severity. 226
Table 125. Alternative 2 flow and sediment regime cumulative effects summary by watershed. 233
Table 126. Cumulative road/trail densities with implementation of future and ongoing projects. 233

Table 127. Cumulative stream crossing density with implementation of future and ongoing projects. 234
Table 128. Cumulative road/trail densities within 300 feet of streams with the implementation of future and ongoing projects. 235
Table 129. Cumulative road/trail densities within GDE RHCAs with the implementation of future and ongoing projects. 235
Table 130. Deep Creek Restoration Plan planned decommisioned roads converted to trail. 235
Table 131. Flow and sediment regime summary of direct/indirect effects by alternatives. 240
Table 132. Sediment and turbidity summary of direct/indirect effects by alternative. 241
Table 133. Specific locations with hydrologic concerns. 241
Table 134. Comparison of alternative actions. 250
Table 135. Comparison of alternatives, acres within distance bands of motorized routes. 251
Table 136. Comparison of alternatives, total area within 1 mile and beyond 1 mile from a motorized route. 251
Table 137. Regional TES terrestrial animal species for the Ochoco National Forest. 255
Table 138. Bald eagle territories and historical nesting status 2002-2015 within Ochoco Summit Trail System project area. 258
Table 139. Summary of conclusion of effects to Region 6 Sensitive Animal Species. 274
Table 140. Ochoco National Forest Management Indicator Species. 274
Table 141. Annual travel-generated estimated expenditures toward hunting and wildlife viewing in Crook and Wheeler Counties, Oregon (overnight or day trips 50+ miles one way, or non-residents). 285
Table 142. Annual local estimated expenditures toward hunting and wildlife viewing in Crook and Wheeler Counties, Oregon (residents and day trips less than 50 miles one way). 285
Table 143. Numbers of deer hunters, hunter days and predicted reproductive success in the Ochoco Wildlife Management Unit (Years 2010-2012). 285
Table 144. April mule deer populations expressed as a percentage of the Management Objective (MO), Ochoco Wildlife Management Unit. 286
Table 145. Numbers of elk hunters, estimated population and hunter success in the Ochoco Wildlife Management Unit (Years 2008-2012). 286
Table 146. Winter elk populations expressed as a percentage of the Management Objective (4,600) in the Ochoco Management Unit. 287
Table 147. Total combined open motorized density of roads and trails expressed in miles per square mile, by alternative and watershed (National Forest System lands only) without mitigation. 294
Table 148. Acres of elk security area greater than ½ mile from any open motorized routes, acres in ( ) are in blocks greater than 250 in size. 295
Table 149. Comparison of alternatives for hiding and thermal cover (more than ½ mile from open motorized route and within 2 miles of private land). 307
Table 150. Summary comparison of key indicators for big game by alternative. 307
Table 151. Ochoco National Forest Other Species (LRMP). 313
Table 152. Comparison of alternatives for length of trail (miles) in potential pronghorn antelope habitat. 314
Table 153. Reproductive history of goshawks within the Ochoco Summit Project Area. 315
Table 154. Raptor nest buffer impacts within the Ochoco Summit project area. 321
Table 155. Seasonal restrictions on trail construction and maintenance for active nest sites. 322
Table 156. Bird Conservation Regions 9 and 10 (combined) 2008 list. 325

Table 157. Priority habitat features and associated focal species for Northern Rocky Mountains Planning Unit, Blue Mountains Subprovince. 327
Table 158. Acres within 200 m (660') of any open road or trail. 329
Table 159. Direct impacts to habitat of landbird focal species. 329
Table 160. Summary of Prefield Review for Sensitive Plants in the Ochoco Summit Project Area. 352
Table 161. Populations of sensitive species that occur, or are likely to occur, within the Ochoco Summit project area. 359
Table 162. COMAC routes within sensitive plant populations. 360
Table 163. Length of trail proposed within sensitive plant populations by alternative in the Ochoco Summit Trail System project. 364
Table 164. Proposed trails within riparian sensitive species habitat, perennial streams. 365
Table 165. Trails proposed within scabland sensitive species habitat. 366
Table 166. Trails and OHV areas proposed within forest sensitive species habitat. 367
Table 167. Alternative effects summary to sensitive plant populations and habitat for the Ochoco Summit Trail System Project Area. 377
Table 168. Invasive plant infestations within the Ochoco Summit project area. 380
Table 169. Miles of designated trail, and number of gathering areas by alternative. 381
Table 170. Summary of proposed trails within invasive weed infestations. 384
Table 171. Summary of proposed trails and gathering areas within invasive plant infestations. 384
Table 172. Acres of special habitat within the Ochoco Summit project area. 390
Table 173. Acres (assuming 10' zone of influence) and miles of proposed trails located within special habitats (not on existing roads). 392
Table 174. Number of gathering areas within special habitat. 392
Table 175. Allotment Information. 406
Table 176. Loss of Suitable Rangeland on New Routes (Acres of Forage lost by Alternative). 410
Table 177. Loss of Suitable Rangeland on New Routes for Forage by Alternative & Allotment. 410
Table 178. Range Improvements in the Ochoco Summit Trail System Project Area that are Adjacent to or Intersect Proposed Trail Segments. 412
Table 179. Pollutants and standards. 423
Table 180. Population data in the seven Zone of Influence counties for the Ochoco Summit Trail System project. 430
Table 181. Changes in civilian labor force in the Zone of Influence for the Ochoco Summit Trail System project. 430
Table 182. Comparative costs per alternative based on new route length, ground slope and proposed culverts and bridges. 434

List of Figures

Figure 1. Planning areas (recent and current) for OHV trail projects on the Deschutes and Ochoco National Forest. 100
Figure 2. Central Oregon OHV opportunities. 101
Figure 3. Changes in channel morphology and water table. 140
Figure 4. Linear fish densities (fish/33m) for Lower Howard Creek, 2006 and 2009 (ODFW 2014). Trendline for data is included. 152

Figure 5. Linear fish densities (fish/33m) for Upper Howard Creek, 2006, 2009 and 2012 (ODFW 2014). Trendline for data is included. 153
Figure 6. Linear fish densities (fish/33m) for Lower Allen Creek, 2006, 2009 and 2012 (ODFW 2014). Trendline for data is included. 156
Figure 7. Linear fish densities (fish/33m) for Upper Allen Creek, 2006 and 2012(ODFW 2014). Trendline for data is included. 157
Figure 8. Linear fish densities (fish/33m) for Jackson Creek, 1997, 2003, 2006, 2009 and 2012(ODFW 2014). Trendline for data is included. 164
Figure 9. Linear fish densities (fish/33m) for Happy Camp Creek, 1997, 2000, 2003, 2006, 2009 and 2012 (ODFW 2014). Trendline for data is included. 165
Figure 10. Linear fish densities (fish/33m) for lower Double Corral Creek, 1997, 2000, and 2003 (ODFW 2014). Trendline for data is included. 165
Figure 11. Linear fish densities (fish/33m) for upper Double Corral Creek, 1997, 2000, 2003, 2006, 2009, and 2012 (ODFW 2014). Trendline for data is included. 165
Figure 12. Linear fish densities (fish/33m) for upper Little Summit Prairie Creek, 1997, 2000, 2003, 2006, 2009, and 2012 (ODFW 2014). Trendline for data is included. 169
Figure 13. Linear fish densities (fish/33m) for middle Little Summit Prairie Creek, 1997, 2000, 2003, 2006, 2009, and 2012 (ODFW 2014). Trendline for data is included. 170
Figure 14. Linear fish densities (fish/33m) for lower Little Summit Prairie Creek, 1997, 2000, 2003, 2006, 2009, and 2012 (ODFW 2014). Trendline for data is included. 170
Figure 15. Linear fish densities (fish/33m) for upper Deep Creek, 1997, 2000, 2003, 2006, 2009, and 2012 (ODFW 2014). Trendline for data is included. 173
Figure 16. Linear fish densities (fish/33m) for middle Deep Creek, 1997, 2000, 2003, 2006, 2009, and 2012 (ODFW 2014). Trendline for data is included. 174
Figure 17. Linear fish densities (fish/33m) for lower Deep Creek, 1997, 2000, 2003, 2006, 2009, and 2012 (ODFW 2014). Trendline for data is included. 174
Figure 18. Bird Conservation Regions. 325
Figure 19. Trail Density and Denuded Camping Area in the Mojave Desert. 365
Figure 20. Aspen stands (dark green) on the west end of the Ochoco Summit Project Area in relation to proposed trail locations and gathering areas. 399
Figure 21. Map of "unroaded areas" provided by Oregon Wild during the comment period on the DEIS. 418
Figure 22. Map of "areas greater than 1 mile from a road" provided by Wildlands CPR. 419
Figure 23. Proposed OHV trail in and in the vicinity of OG-D1-08, by alternative. 438
Figure 24. Proposed OHV trail in and in the vicinity of OG-D1-12, by alternative. 439
Figure 25. Proposed OHV trail in and in the vicinity of OG-D2-11, by alternative. 440
Figure 26. Proposed OHV trail in and in the vicinity of OG-D2-02, all action alternatives. 441

EXECUTIVE SUMMARY

This Supplemental Draft Environmental Impact Statement (EIS) discloses the effects of constructing and designating a motorized trail system within the Ochoco Summit Trail System project area on the Ochoco National Forest. The approximately 301,580-acre project area is in close proximity to the city of Prineville, Oregon.

Until recently, the Ochoco National Forest was open to cross-country motorized travel; the 2011 Travel Management Project Record of Decision authorized motorized travel only on designated routes. Elimination of cross-country motorized travel limited access for off-highway vehicle (OHV) recreationists on the Ochoco National Forest to open mixed-use roads and limited OHV trail areas. The Ochoco Summit project is needed to provide a designated and managed trail system designed for OHV recreation.

This section of the EIS will display a comparison of the actions proposed within the project alternatives and a brief summary of the expected effects of these actions.

Each action alternative includes resource protection measures, monitoring and mitigation to reduce or eliminate unwanted effects; resource protection measures include trail design features to reduce sedimentation, signage to improve safety for trail users and other recreationists, and a season of use (see EIS, Chapter 2). Each action alternative includes Forest Plan amendments. Four amendments in Alternatives 2 and 4 (three in Alternatives 3 and 5) would modifiy standards and guidelines in Old Growth Management Areas (MA-F6) to allow motorized recreation, and one amendment in all action alternatives would amend standards and guidelines to permit motorized trail to cross scabland.

The alternatives vary by miles of trail in the designated trail system; in all alternatives existing mixed-use roads identified in the Motor Vehicle Use Map would remain available for OHV travel. The alternatives were developed to address issues that arose during scoping. Chapter 1 of the EIS describes the issues that were raised by the public, which are:

1. The proposed action trail system is too small and lacks quality (complexity, range of difficulty levels, dispersion of users, etc).
2. The trail system could impact big game habitat.
3. The trail system could impact water quality or cause degradation of fish habitat.
4. The trail system could create or exacerbate conflict between motorized and non-motorized recreationists.

Based on the purpose and need and response to issues, the Responsible Official identified Alternative 5 as the preferred alternative.

Table ES-1. Comparison of the alternatives.

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Total miles in Designated System Routes (including mixed-use roads)	0	170	101	212	135
Total miles of OHV trail	0	124	88	158	105
Miles of Class I Trail	0	55	35	95	38
Miles of Class II Trail	0	20	0	18	12
Miles of Class III Trail	0	49	53	45	50
Miles of Class IV Trail	0	0	0	0	5
Miles of trail not on GIS roads (“new construction”)	0	69	50	84	51
Estimated Construction Cost	0	$978,500	$759,000	$1,071,000	$1,221,000

Chapter 3 of the EIS describes the direct, indirect and cumulative effects of implementing the actions. All action alternatives would create and designate a trail system for OHV recreation. The effects on recreation and on other resources such as soils, water quality, aquatic species, and wildlife are disclosed. Table ES-2 summarizes some of the measured effects on recreation; interpretation of these and other numbers is provided in Chapter 3 of the EIS.

Table ES-2. Summary of some measured effects on recreation, by alternative, of the Ochoco Summit Trail System project.

Measure	Alt.1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Number of Dispersed Campsites within which OHV noise from the developed trail system might be greater than 45 db	0	35	18	37	38
Miles of Keeton Trail within the >45 db noiseband	0	0.03	0.02	0.02	0.1
Number of Developed Recreation Sites within which OHV noise from the developed trail system might be greater than 45 db	0	4	4	5	3
Crossings with highway legal only roads	0	20	16	23	13

All action alternatives would be expected to have localized effects on riparian areas and water quality. Table ES-3 summarizes the measures for some effects to riparian areas and water quality. Full discussion of effects is provided in Chapter 3 of the EIS.

Table ES-3. Summary of some measures related to water quality in the Ochoco Summit project area.

Measure	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Miles of trail system in RHCA	0	17.2	7.3	22.0	12.4
Total stream crossings (cl 1 – 4)	0	150	74	168	45
New stream crossings (cl 1 – 4)	0	62	30	69	17
Class 1 & 2 stream crossings	0	28	16	28	18
All perennial stream crossings	0	25	13	30	21
Intermittent stream crossings	0	69	34	85	34
Ephemeral draw crossings	0	53	27	52	7
Increased motorized route density – 6th Field (number of subwatersheds in the project area)	0	11 of 30	9 of 30	13 of 30	16 of 30

All alternatives would be expected to have localized effects on some wildlife, aquatic, and plant species within the project area. Continued viability of all Management Indicator Species is anticipated. Table ES-4 summarizes the effects determinations to Threatened, Endangered and Sensitive species, other wildlife species, and special habitat areas for each alternative, including the No Action alternative. Full discussion of effects is provided in Chapter 3 of the EIS.

Table ES-4. Summary of effects determinations to Threatened, Endangered and Sensitive species, other wildlife and habitatas by alternative for the Ochoco Summit project.

Species or Habitat	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Terrestrial Wildlife and Insects					
Bald Eagle	NI	NI	NI	NI	NI
Upland Sandpiper	NI	NI	NI	NI	NI
Bufflehead	MIIH	MIIH	MIIH	MIIH	MIIH
Horned Grebe	NI	NI	NI	NI	NI
American Peregrine Falcon	NI	NI	NI	NI	NI
Tricolored Blackbird	NI	NI	NI	NI	NI
Lewis' Woodpecker	NI	NI	NI	NI	NI
White-Headed Woodpecker	NI	NI	NI	NI	NI
Greater Sage-Grouse	NI	NI	NI	NI	NI
North American Wolverine	MIIH	MIIH	MIIH	MIIH	MIIH
Pygmy Rabbit	NI	NI	NI	NI	NI
Townsend's Big-Eared Bat	NI	NI	NI	NI	NI
Silver-Bordered Fritillary	NI	NI	NI	NI	NI
Johnson's Hairstreak	NI	MIIH	MIIH	MIIH	MIIH
Western bumblebee	NI	MIIH	MIIH	MIIH	MIIH
Aquatic Species					
Bull trout	NE	NE	NE	NE	NE
Mid-Columbia River steelhead trout	NE	NE	NE	NE	NE
Redband trout	NI	MIIH	MIIH	MIIH	MIIH
Columbia spotted frog	NI	MIIH	MIIH	MIIH	MIIH
Western ridged mussel	NI	NI	NI	NI	NI
Harney Basin duskysnail	NI	NI	NI	NI	NI
Shortface lanx	NI	NI	NI	NI	NI
Metolius pebblesnail	NI	NI	NI	NI	NI
Indian ford juga	NI	NI	NI	NI	NI
Blue Mountains juga	NI	NI	NI	NI	NI
Opal Springs (Crooked River) juga	NI	NI	NI	NI	NI
Pristine springsnail (mollusk)	NI	NI	NI	NI	NI
Columbia clubtail	NI	NI	NI	NI	NI
A caddisfly	NI	NI	NI	NI	NI
Sensitive Plants					
Achnatherum hendersonii	NI	MIIH	MIIH	MIIH	MIIH
Achnatherum wallowaensis	NI	MIIH	MIIH	MIIH	MIIH
Astragalus diaphanus* var. *diurnus	NI	NI	NI	NI	NI
Astragalus peckii	NI	NI	NI	NI	NI
Astragalus tegetarioides	NI	MIIH	MIIH	MIIH	MIIH
Botrychium ascendens	NI	MIIH	MIIH	MIIH	MIIH
Botrychium crenulatum	NI	MIIH	MIIH	MIIH	MIIH
Botrychium montanum	NI	MIIH	MIIH	MIIH	MIIH
Botrychium paradoxum	NI	MIIH	MIIH	MIIH	MIIH
Calochortus longebarbatus* var. *peckii	NI	MIIH	MIIH	MIIH	MIIH
Carex diandra	NI	NI	NI	NI	NI
Carex lasiocarpa* var. *americana	NI	MIIH	MIIH	MIIH	MIIH
Carex retrorsa	NI	MIIH	MIIH	MIIH	MIIH
Cheilanthes feei	NI	NI	NI	NI	NI
Cyperus lupulinus ssp. lupulinus	NI	NI	NI	NI	NI
Elatine brachysperma	NI	NI	NI	NI	NI
Eleocharis bolanderi	NI	MIIH	MIIH	MIIH	MIIH
Eremothera pygmaea	NI	NI	NI	NI	NI
Eriogonum cusickii	NI	MIIH	MIIH	MIIH	MIIH

Species or Habitat	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Erythranthe inflatula	NI	NI	NI	NI	NI
Heliotropium curassavicum	NI	NI	NI	NI	NI
Lipocarpha aristulata	NI	NI	NI	NI	NI
Lomatium ochocense	NI	MIIH	MIIH	MIIH	MIIH
Muhlenbergia minutissima	NI	NI	NI	NI	NI
Penstemon peckii	NI	NI	NI	NI	NI
Phemeranthus spinescens (Talinum spinescens)	NI	NI	NI	NI	NI
Potamogeton diversifolius	NI	NI	NI	NI	NI
Pyrola dentata	NI	MIIH	MIIH	MIIH	MIIH
Rorippa columbiae	NI	NI	NI	NI	NI
Rotala ramosior	NI	NI	NI	NI	NI
Salix wolfii	NI	NI	NI	NI	NI
Thelypodium eucosmum	NI	NI	NI	NI	NI
Utricularia minor	NI	NI	NI	NI	NI
Encalypta brevipes	NI	NI	NI	NI	NI
Entosthodon fasicularis	NI	NI	NI	NI	NI
Schistidium cinclidodonteum	NI	NI	NI	NI	NI
Tortula mucronifolia	NI	MIIH	MIIH	MIIH	MIIH
Texosporium santi-jacobi	NI	NI	NI	NI	NI
Other Wildlife					
Miles of system within 660' of hawk/owl nest	0	0.25	0	0	0
Miles of system within1/4 mi of osprey nest	0	0.6	0.46	0.46	0.46
Miles of system within ¼ mi of goshawk nest	0	2.95	1.46	2.78	1.96
Miles of system within goshawk post-fledging area	0	5.98	4.13	7.6	3.5
Miles of system within mapped pileated woodpecker feeding habitat	0	2.8	0.7	2.5	2.2
Old Growth and Special Habitat Areas					
Miles of system within Old Growth Management Areas	0	2.59	1.44	2.54	1.47
Acres and miles of designated trail system in special habitat (Hardwood)	0 ac 0 mi	0.6 ac 0.5 mi	0.6 ac 0.5 mi	0.6 ac 0.5 mi	0.4 ac 0.3 mi
Acres and miles of designated trail system in special habitat (Meadow)	0 ac 0 mi	2.4 ac 2.02 mi	2.5 ac 2.1 mi	4.1 ac 3.35 mi	1.4 ac 1.17 mi
Acres and miles of designated trail system in special habitat (Rock)	0 ac 0 mi	1.3 ac 1.1 mi	0.7 ac 0.6 mi	1.6 ac 1.3 mi	0.8 ac 0.68 mi
Acres and miles of designated trail system in special habitat (Shrub-scabland)	0 ac 0 mi	29.1 ac 24.0 mi	10.8 ac 8.9 mi	33.2 ac 27.4 mi	16.18 ac 13.35 mi

Analysis disclosed in Chapter 3 of the EIS indicates that no action alternative would affect any Inventoried Roadless Area or potential wilderness area. No Wilderness areas would be affected, except possibly by increased noise in a very limited area. The Wild Horse Herd Management Area on Lookout Mountain Ranger District would not be affected. Opportunities for quiet recreation would continue to be available throughout the majority of the project area, as well as across the remainder of the Ochoco National Forest.

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CHAPTER 1. PURPOSE OF AND NEED FOR ACTION

Background

Motor vehicles are an appropriate way for people to enjoy the National Forests, in the right places, in the right manner and with proper management. It is Forest Service policy to provide a diversity of road and trail opportunities for experiencing a variety of environments and modes of travel that are consistent with the National Forest recreation role and land capability (Forest Service Manual 2353.03(2)).

As the availability and capability of OHVs have grown, more Americans are enjoying access and recreation opportunities on National Forests and Grasslands. However, a substantial increase in OHV use is exceeding the ability of the Forest Service to manage National Forest System lands for multiple uses. Unmanaged recreation, including impacts from off-highway vehicles, was identified by former Forest Service Chief Dale Bosworth as one of four key threats to sustaining the nation's forests and grasslands. The proliferation of unplanned, unauthorized and non-sustainable roads and trails created by cross-country travel adversely impacts the environment, justifying the need for regulating unmanaged motor vehicle travel. The Travel Management Rule provides policy for ending this trend of unauthorized route proliferation and managing the Forest transportation system in a sustainable manner through designation of motorized National Forest System (NFS) roads, trails, and areas, and the subsequent prohibition of cross country travel by regulation (36 CFR 261.13).

Locally, as well as regionally and nationally, unmanaged OHV use on federal lands has resulted in unplanned roads and trails, soil erosion, watershed and wildlife habitat damage, impacts to cultural sites, safety concerns, trespass and vandalism on adjacent private land and increased conflict between motorized and non-motorized recreational experiences. Perceptions of crowding and user conflict are occurring in some areas of the Forest. Current regulations prohibit trail construction and operation of vehicles in a manner that damages the land, wildlife or vegetation. These regulations have not proven sufficient to control the proliferation of unauthorized routes or environmental damage. According to the OHV IRIS (Internet Research Report Series)[1] report, regional and national OHV use days have increased 42 percent from 2001-2007 (Cordell, 2008). Parallel trends in local OHV use have been noted locally with the population growth of Central Oregon. Increased OHV use and related impacts have been observed by Forest Service personnel as well as by other agencies, non-governmental organizations (NGOs) and the general public. Similar situations have occurred throughout the nation, leading to the Travel Management Rule that governs OHVs and other motor vehicle use on National Forests and Grasslands.

The 2005 Travel Management Rule directed each National Forest to designate roads, trails and areas that are open to motor vehicle use on a motor vehicle use map. Motor vehicle use off of designated roads and trails and outside designated areas was prohibited by regulation (36 CFR 261.13). A series of public meetings were held across the Deschutes and Ochoco National Forests between 2006 and 2009 to explain the Travel Management Rule, gather input on the National Forest System (NFS) roads and trails, and discuss changes to the NFS roads and trails. The two-forest-level Travel Management EIS (2011) was informed by that process. The 2011 Deschutes and Ochoco Travel Management Record of Decision (ROD) designated routes and areas that are available for motorized use. Of the roads that remain open for travel, some are restricted to highway-legal vehicles while others provide opportunities for mixed or shared use by highway-legal and nonhighway-legal

[1] Off-Highway Vehicle Recreation in the United States and its Regions and States: A National Report from the National Survey on Recreation and the Environment (NSRE) February, 2008 by: H. Ken Cordell, Carter J. Betz, Gary T. Green, and Becky Stephens.

motorized vehicles. Generally, cross-country travel is no longer available to off-road motorized vehicles. During the travel management planning process, the Deschutes and Ochoco National Forest supervisors expressed intent to conduct site specific projects to evaluate development of designated routes and/or areas for Off Highway Vehicle (OHV) use. The Ochoco Summit Trail System project is one site-specific effort.

Purpose and Need for Action

There is a need to provide a designated trail system for motorized recreation on the Ochoco National Forest in a suitable and sustainable location[2] while considering other forest uses.

The 2011Deschutes and Ochoco Travel Management ROD changed the opportunity for OHV use on the Ochoco National Forest. Prior to the decision, OHVs could legally be operated anywhere on the Forest except where specifically prohibited. The 2011 decision reduced the recreation opportunity previously available to OHV recreationists; in order to offset this reduction in OHV opportunity, the Ochoco National Forest Supervisor decided to pursue creating and designating a trail system intended for OHV operation.

There is currently only one motorized trail in a forested setting on the Ochoco National Forest, the Green Mountain Trail. At just over eight miles, it is not of sufficient length to provide a day of riding to an experienced rider, let alone a weekend of opportunity. In addition, the Deschutes and Ochoco Travel Management ROD identified specific roads as open for motorized mixed use. Motorized mixed use allows concurrent use of a road by highway-legal vehicles (such as a standard passenger vehicle) and vehicles that are not highway-legal (such as off-highway motorcycles or ATVs). Refer to Crimmins (2006)[3] for more detailed descriptions of vehicle types. However, mixed-use roads are not equivalent to trails; National Forest System (NFS) roads are designed primarily for highway-legal vehicles such as passenger cars or log trucks, and are often too wide and too smooth to provide a course with sufficient technical difficulty to keep OHV riders interested and challenged.

Public comment on the Travel Management project, as well as conversations with Forest users during several public meetings indicated that many Forest visitors were interested in maintaining opportunities for OHV recreation on the Ochoco National Forest. Information from these same sources indicated concerns about conflicts between motorized recreation and other types of recreation, and effects of unmanaged OHV operation on Forest resources. Considering the reduction of OHV opportunity following the 2011 Travel Management decision and recognizing that it is Forest Service policy to provide a diversity of road and trail opportunities for experiencing a variety of environments and modes of travel, the following Needs for Change were identified, which led to the development of the statement of Purpose and Need.

There is a need to designate a system of roads, trails and areas open to motorized recreational vehicles that will provide legal public access, protect natural resources, and minimize conflicts between motorized and non-motorized recreational use on the Ochoco National Forest.

There is a need to change the existing system of NFS motorized-use trails on the Ochoco National Forest to provide a sufficient number and length of trail to disperse recreational users and make a sustainable network of trails.

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[2] The term “sustainable location” refers to non-sensitive areas on the landscape that can tolerate motorized use over time, such as upland/drier sites.

[3] Management Guidelines for OHV Recreation. 2006 by: Tom M. Crimmins in association with the National Off-Highway Vehicle Conservation Council.

There is a need to provide a diversity of off-highway motorized recreation opportunities, including opportunities for 4x4 vehicles, ATVs and motorcycles, to offset the loss of opportunities following the 2011 Travel Management decision.

The Ochoco Summit Trail System project will not analyze nor change over-snow motorized travel. It will also not include regulation of non-motorized travel including hiking, skiing, horseback riding or bicycling.

Forest Plan Direction and Other Guidance

The Ochoco National Forest Land and Resource Management Plan (Forest Plan) was approved in 1989, and has since been amended by several decisions. The Forest Plan, as amended, provides guidance for management activities on the Ochoco National Forest. The Forest Plan establishes goals, objectives, and desired future conditions, identifies management areas within the Forest, and provides standards and guidelines for each management area as well as Forest-wide standards and guidelines. In 1995, the Inland Native Fish Strategy (INFISH) Decision Notice amended the Forest Plan. INFISH added goals and objectives for inland native fish habitat condition and function, and identified Riparian Habitat Conservation Areas (RHCAs) where management activities will meet interim standards and guidelines. This analysis is tiered to the Final Environmental Impact Statement (FEIS) for the Forest Plan, as amended.

Forest Plan Management Areas

The major Ochoco National Forest management areas in the project area include (see Map 2):

MA-F22, General Forest (195,735 ac) - The emphasis for this area is to produce timber and forage while meeting the Forest-wide standards and guidelines for all resources (Forest Plan, p. 4-86). Motorized use on designated routes is encouraged (Forest Plan, p. 4-190).

MA-F21, General Forest Winter Range (25,183 ac) - The emphasis for this area is to manage for timber production with management activities designed and implemented to recognize big game habitat needs (Forest Plan, p. 4-84). Motorized use on designated trails and routes is allowed, but such use is restricted to designated open roads between December 1 and May 1 (Forest Plan, p. 4-189).

MA-F20, Winter Range (17,827 ac) – Winter range is to be managed for big game habitat. Road and trail use is to be limited to one mile of open access per section between December 1 and May 1 (Forest Plan, p. 4-83). Motorized use on designated routes is allowed (Forest Plan, p. 4-189).

MA-F11, Lookout Mountain Recreation Area (14,365 ac) - The emphasis for this area is to maintain a natural setting, provide continued opportunities for high quality semiprimitive recreational activities and wildlife habitat, and maintain healthy forests (Forest Plan, p. 4-68). Year-round trails to facilitate the use of the area by horseback riders, mountain bikers, hikers, snowmobilers and cross-country skiers will be developed (Forest Plan, p. 4-188).

MA-F26, Visual Management Corridor (11,478 ac) – The emphasis for this area is to maintain the natural appearing character of the Forest major travel routes, where management activities are usually not evident or are visually subordinate to the surrounding landscape (Forest Plan, p. 4-95).

MA-F6, Old Growth Management Area (7,693 ac) - Habitat will be provided for wildlife species dependent upon old-growth stands with pileated woodpecker as the management indicator species. The desired conditions for these areas are stands of mixed conifer and ponderosa pine with multi-layered canopy with shaded conditions and a large number of snags. Prescribed fire may be evident if natural fuels accumulate to dangerous levels, threatening the existence of the old-growth stand, or where vegetation manipulation is needed to maintain stand structure and species composition (Forest

Plan, p. 4-58). No motorized or mechanized use is allowed in Old Growth Management Areas (Forest Plan, p. 4-188 – 4-189).

MA-F7, Summit Trail (5,901 ac) - Acres of the project area that are along the Summit Historic Trail include 221 acres of Partial Visual Retention Corridor and 25 acres of Visual Retention Corridor. The Summit Trail is a historic resource, and was found eligible for nomination to the National Register of Historic Places in January 1987. The emphasis of this management area is to protect the existing integrity of the Summit Trail and enhance and interpret significant segments for public enjoyment and education. Pristine segments of the trail will be managed to protect, interpret and preserve their historic qualities (Forest Plan, p. 4-60-61).

MA-F2, Bridge Creek Wilderness (5,355 ac) – Emphasis in the Bridge Creek Wilderness Area is to protect the wilderness ecosystems and manage use to maintain a natural setting and preserve solitude. Bridge Creek Wilderness is to be managed as a nontrailed wilderness (Forest Plan, p. 4-51). No motorized or mechanized use is allowed on trails (Forest Plan, p. 4-188).

MA-F8, Rock/Cottonwood Roadless Area (5,098 ac) - The emphasis for this area is to allow timber harvest while protecting the anadromous fishery, sensitive soils on steep slopes and big game habitat (Forest Plan, p. 4-64).

MA-F25, US Highway 26 Visual Corridor (3,801 ac) - The emphasis for this area is to maintain and enhance scenery for travelers along U.S. Highway 26 (Forest Plan, p. 4-93).

MA-F24, North Fork Crooked River (NFCR) Scenic Corridor (1,948 ac) - The emphasis for this area is to maintain and enhance the natural appearing landscape and protect the scenic river designation, or where in MA-F6 apply old growth prescriptions where they are more restrictive (Forest Plan, p. 4-91). This is segment 3 and 4 of the NFCR Wild and Scenic River Plan (1993) with the objective of managing for semiprimitive nonmotorized recreation opportunities (NFCR, p. 10).

MA-F5, Research Natural Area (1,923 ac) - The emphasis for this area is to allow natural processes to occur for research purposes and education; to provide baselines against which other activities may be measured, sites for study of natural processes in undisturbed ecosystems; and gene pool preserves for both plant and animal species (Forest Plan, p. 4-56).

MA-F23, NFCR Recreation Corridor (1,225 ac) - The emphasis for this area is to maintain the appearance of a natural landscape in the foreground view from Forest Road 42 to enhance recreational and scenic values; and to protect and enhance public use and enjoyment of the river segment (Forest Plan, p. 4-89). This is segment 1 of the NFCR Wild and Scenic River Plan (1993) with the objective of riparian improvement, maintaining meadow ecosystems and Roaded Natural recreation opportunities (NFCR, p. 10).

NFCR Recreation Area (1,144 ac) - The emphasis for this area is to maintain the appearance of a natural landscape in the foreground view from Forest Road 42 to enhance recreational and scenic values; and to protect and enhance public use and enjoyment of the river segment (Forest Plan, p. 4-89). This is segment 2 of the NFCR Wild and Scenic River Plan (1993) with the objective of maintaining a Roaded Natural setting using viewpoints and the developed campground (Deep Creek) to inform visitors about the Wild and Scenic River (NFCR, p. 10)

MA-F4, NFCR Wilderness Study Area – The emphasis for this area is to maintain the existing conditions of the area for potential wilderness designation pending a decision by Congress, or until the area is released from further consideration.

MA-F27, Round Mountain National Recreation Trail (1,018 ac) - The emphasis in this area is to protect and manage for scenic qualities that make the trail corridor an attractive recreational setting. Rehabilitate trail sites where management activities conflict with National Recreation Trail objectives. Visitors to this management area will note a natural appearing forest along the majority of

the trail route. The outer boundary of the management area will generally not exceed 600 feet on either side of the Round Mountain National Recreation Trail (Forest Plan, p. 4-96).

MA-F19, Deep Creek Recreation Area (901 ac) - The emphasis in this area is to provide a near natural setting for recreational pursuits within the area where management activities are not visually evident (Forest Plan, p. 4-81).

MA-F13, Developed Recreation/Facilities (690 ac) - The emphasis in this area is to provide safe, healthful and aesthetic facilities for people to utilize while they are pursuing a variety of recreational experiences within a relatively natural outdoor setting (Forest Plan, p.4-71).

MA-F12, Eagle Roosting Area (264 ac) - The emphasis in this area is to provide winter roosting habitat for migrating bald eagles annually during the period December through April (Forest Plan, p. 4-70). The annual emphasis period has been changed to November 1 through April 30 based on best available science (Isaacs 2003).

MA-15, Riparian – The Riparian management area overlays the entire project wherever it is adjacent to water. Management emphasis in riparian areas is to maintain or improve water quality through management of streamside vegetation and habitat, and to meet temperature and turbidity levels as required by state standards under the Clean Water Act.

INFISH

The Inland Native Fish Strategy (INFISH) was intended to be interim direction to protect habitat and populations of resident native fish and to provide for options for management. The INFISH delineated RHCAs where riparian-dependent resources receive primary emphasis. These RHCAs include traditional riparian corridors, wetlands, intermittent streams, and other areas that help maintain the integrity of aquatic ecosystems. These areas will be managed to maintain or restore water quality, stream channel integrity, channel processes, sediment regimes, instream flows, diversity and productivity of plant communities in riparian zones, and riparian and aquatic habitats to foster unique genetic fish stocks that evolved within the specific region. RHCAs run through and overlay other allocations.

Recreation Management is addressed in INFISH (1995 p. A-9). It states:

RM-1. Design, construct, and operate recreation facilities, including trails and dispersed sites, in a manner that does not retard or prevent attainment of the Riparian Management Objectives and avoids adverse effects on inland native fish. Complete watershed analysis prior to construction of new recreation facilities in Riparian Habitat conservation Areas within priority watershed. For existing recreation facilities inside Riparian Habitat Conservation Areas, assure that the facilities or use of the facilities would not prevent attainment of Riparian Management Objectives or adversely affect inland native fish. Relocate or close recreation facilities where Riparian Management Objectives cannot be met or adverse effects on inland native fish cannot be avoided.

RM-2. Adjust dispersed and developed recreation practices that retard or prevent attainment of Riparian Management Objectives or adversely affect inland native fish. Where adjustment measures such as education, use limitations, traffic control devices, increased maintenance, relocation of facilities, and/or specific site closures are not effective in meeting riparian Management Objectives and avoiding adverse effects on inland native fish, eliminate the practice or occupancy.

Implementing INFISH is to achieve a high level of habitat diversity and complexity through a combination of habitat features, to meet the life-history requirements of the fish community inhabiting a watershed. Project proposals are to not retard the attainment of RMOs. To “retard” would mean to slow the rate of recovery below the near natural rate of recovery if no additional human caused disturbance was placed on the system (INFISH 1995 p. A-3).

Proposed Action

The action proposed by the Forest Service to meet the purpose and need is to create a trail network that would include approximately 124 miles of proposed OHV trail and 45 miles of open National Forest System (NFS) roads that connect trail segments or contribute to the network by providing alternate "get-back" routes or other recreational experiences. The trail system would include about 69 miles of trail for Class I vehicles, 48 miles for Class II vehicles, and 52 miles for Class III vehicles. Trail systems for each vehicle class would also include staging areas and trailheads. Staging areas would each have at least one vault toilet, a picnic table, and a kiosk or sign board to provide information and maps. Other amenities, including supervised youth riding areas, defined camp sites, and warm-up loops are proposed at some staging area locations. Picnic tables and/or benches and interpretive signing are proposed at points along some trails. Please refer to Chapter 2, Alternatives Considered in Detail, for a detailed description of the proposed action.

Decision Framework

The Responsible Official for this proposal is the Forest Supervisor of the Ochoco National Forest. The Responsible Official will decide whether to:

- Select the proposed action;
- Select an action alternative that has been considered in detail;
- Modify an action alternative;
- Select the no action alternative;
- Identify what mitigation measures and monitoring will apply.

In making this decision, the Responsible Official will consider how well the alternatives lead to providing a quality motorized recreation experience, minimizing disturbance to big game and big game habitat, minimizing effects to water quality and fish habitat, and managing conflicts between motorized and nonmotorized recreationists. The Responsible Official will also consider comments submitted by other governments, other agencies, individuals, organizations, and adjacent landowners.

Public and Intergovernmental Involvement

Pre-Scoping

The Ochoco National Forest maintains working relationships with a broad spectrum of stakeholders including Deschutes Basin Provincial Advisory Committee (PAC), the PAC Travel Management Working Group, Crook County Natural Resources Planning Committee (CCNRPC), non-governmental organizations (NGOs), and other resource management agencies (County, State, Federal and interagency). Between February and November of 2009, the Ochoco National Forest encouraged early involvement by posting information on the web, by making presentations and by interacting with a variety of recreational groups, sportsmen and women, permit holders, adjacent land owners, special interest groups and the general public. Communications on the project also occurred during meetings and field tours with collaborative groups including the PAC and their Travel Management Working Group, and the CCNRPC. Information on this project was also provided at other Central Oregon Travel Management public meetings, and postcards were sent to the Forest-level Travel Management mailing list encouraging recipients to check the box to be put on the Ochoco Summit project mailing list. Throughout this time, early involvement was encouraged, and many comments were received. These pre-NEPA contacts helped to define areas of concern and options for providing opportunities, which in turn helped shape the strategy that was used during

development of the Proposed Action. Some recreation groups offered to partner in the construction, monitoring and maintenance of proposed trails and facilities, while others offered to help with rehabilitation and restoration of existing unauthorized routes. The project Interdisciplinary Team learned about some issues and concerns, as well as opportunities; the Ochoco National Forest looks forward to continuing partnerships and fostering new and diverse alliances as a by-product of this planning effort.

It was during the pre-scoping process that the boundaries of the project area were determined. Initially, the area identified for development of a designated OHV trail system was in the McKay Creek subwatershed near Prineville, Oregon. Communication with stakeholder groups, however, determined that there was a distinct lack of common support for such an undertaking in that location. Further stakeholder meetings indicated that there was common support for development of a proposed action within the area that became the Ochoco Summit project area (please see Map 1).

While many individuals and organizations recognize that both motorized and non-motorized recreation are legitimate uses of NFS lands, input received during the pre-scoping process fell primarily into two categories. In the first category, comments advocated for off-road (trail) opportunities for motorized use (ATVs, 4x4s and motorcycles). Users were interested in having trails available to them that provide more interesting and challenging experiences than those provided by open roads maintained for standard vehicle types (eg. passenger cars and pick-up trucks). Conversely, others advocated for reducing existing motorized use, with no adoption of any new systems of OHV routes. This category of respondents would prefer to see motorized recreation confined to open roads or existing OHV areas (outside of the Ochoco Summit project area). Other respondents believe that both motorized and non-motorized use can be accommodated if strategically planned, well-mapped and signed, maintained and enforced.

Some of the concerns expressed during our discussions with the public and other agencies were:

- Resource concerns including effects to wildlife, fish, streams, sensitive habitats, forage and weeds.
- Inadequate quality of experience for off-highway vehicle use on open roads; in particular there should be provision of varied motorized use types, loop opportunities, learner opportunities, and difficulty levels of sufficient variety and scale to make a successful network of trails.
- Retention of non-motorized use experience, potential noise levels.
- Retention of traditional motorized recreational experience, noise/traffic levels.
- Concern for increasing off-highway vehicle use on the Forest: shifting from low profile, local and low density use to high profile, destination or high density use.
- User conflicts associated with motorized/non-motorized recreation.
- Economic sustainability of road and trail system.
- Monitoring, maintenance and enforcement of appropriate use.
- Potential economic benefits to communities that rely on recreation-tourism.
- Potential impacts to adjacent land owners.
- Potential impacts to livestock and range improvements on permitted allotments.

The project Interdisciplinary Team relied heavily on information received during these pre-scoping efforts to design a proposed action to meet the Purpose and Need while considering all the concerns listed above.

Public and Intergovernmental Scoping

The Ochoco National Forest circulated its Proposed Action for the Ochoco Summit project in November of 2009; a letter was mailed and/or emailed to individuals and organizations on the

project's mailing list. National outreach took place when the Notice of Intent to prepare an Environmental Impact Statement (NOI) was published in the *Federal Register* on November 20, 2009. The NOI asked for public comment on the proposal to be submitted on or before December 21, 2009. Letters were written to local Tribal Governments to advise them of the Proposed Action and to invite their involvement in the planning process.

The Forest Service received 70 comment letters and emails from the public and from other agencies. The Interdisciplinary Team used the issues raised in these letters and emails to develop alternatives to the Proposed Action. The issues are described in the section titled "Issues" in this EIS.

The Ochoco National Forest released the draft EIS for the Ochoco Summit Trail System project in January of 2012 and the final EIS and draft Record of Decision in March of 2014. The Responsible Official withdrew the final EIS and draft Record of Decision in 2014 due to her desire to have further dialog with public stakeholders and other agencies prior to making a decision and also due to the Bailey Butte Fire of 2014, which burned into the project area and created a condition sufficiently different from the condition initially analyzed that some changes to project design were required. The Ochoco National Forest then initiated this supplemental draft EIS.

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 may be found at the Lookout Mountain Ranger District, Prineville, Oregon, in the project record.

As for significant issues, the Forest Service identified the following issues during scoping:

Issue 1: The proposed action trail system is too small and lacks quality (complexity, range of difficulty levels, dispersion of users, etc).

Class I (ATV) users would prefer:

- More miles to disperse users
- More loops, especially near staging areas
- More options, decision points
- Better range of difficulty, especially more difficult
- Separate ATV riding area from 4x4 routes
- Include destinations and viewpoints
- Include north/south connection other than on jeep routes

Class II (jeep and 4x4) users would prefer:

- More trail, less or no open mixed use roads
- Remove all gravel surfaces, bladed roads
- Need array of challenging routes, range from easy to difficult
- Separate jeep trails from ATV routes

Class III (motorcycle) users would prefer:

- More miles for more saddle time and more interesting experience
- Multiple trails from staging areas and/or loops
- Move trails off of open roads
- Move trails off of jeep trail
- Include long loops and destinations

Measures to compare the alternatives include:

- Class I opportunities:
  - Miles of "new construction" trails (class I)
  - Miles of road-to-trail conversion (class I)
  - Miles of connecting road necessary to link class I trail segments
  - Number of staging areas (class I)
  - Number of decision points (trail-to-trail intersections)
  - Number of decision points (trail-to-mixed use road intersections)
  - Miles of trail within 5 mile radius of center of staging areas
  - Number of distinct class I trail loops within 5 mile radius of center of staging areas
  - Percent of total class I legal trail miles available that are shared with jeeps.
  - Number of selected destinations and viewpoints accessed (Slide Mtn, Pisgah, Peterson Point).
- Class II opportunities:
  - Miles of "new construction" trails (class II)
  - Miles of road to trail conversion (class II)
  - Miles of connecting road necessary to link class II trail segments
  - Number of decision points (trail-to-trail intersections).
  - Number of decision points (trail-to-mixed use road intersections).
  - Number of selected destinations and viewpoints accessed (Peterson Lava, Jones Lava, Jones South Lava)
- Class III opportunities:
  - Miles of "new construction" trails (class III)
  - Miles of road-to-trail conversion (class III)
  - Miles of connecting road necessary to link class III trail segments
  - Number of staging areas (class I and III)
  - Miles of trail within 5 mile radius of center of class III staging areas
  - Number of distinct class III trail loops within 5 mile radius of center of Class III staging areas
  - Miles of ski trail included in class I and III networks
  - % of total class III trail miles available that are shared with ATV only
  - % of total class III trail miles available that are shared with jeeps and ATV
  - Number of decision points (trail-to-trail class III only intersections)
  - Number of decision points (trail-to-trail all classes intersections)
  - Number of decision points (class III trail-to-mixed use road intersections)

Issue 2: The trail system could impact big game habitat.

- Human/motorized use can disturb or displace big game from preferred habitat or from public to private land.
- Road density and increased motorized route density can impact big game behavior, reproduction and survival.
- The effectiveness of security areas for elk can be reduced or eliminated by human use (especially motorized).

Measures to compare the alternatives include:

- Open road density by Forest Plan management allocation and by 5th field watershed
- Open road plus motorized trail density by Forest Plan allocation and by 5th field watershed
- Acres of elk security habitat by 5th field watershed, as defined by patches > or = 250 acres and > ½ mile from any open road or motorized trail (Hillis)
- Acres of elk security habitat by 5th field watershed, as defined by acres >1/2 mile from open road regardless of patch size (Rowland, Naylor, Preisler, Johnson, Thomas)
- miles of trail > ½ mile from open road and within 2 miles of private land
- Miles of trail > ½ mile from open road and within elk calving areas or RMEF summer range
- Miles of trail within winter range and general forest winter range, or ODFW winter range, or RMEF winter range/crucial winter range
- Acres by 5th field watershed within ¼ mile of any motorized route (high disturbance zone)
- Acres by 5th field watershed >1 mile from any motorized route (low or no disturbance zone)

Issue 3: The trail system could impact water quality or cause degradation of fish habitat.

- Trail could directly impact fish habitat at and below stream crossings.
- Trail could reduce effectiveness of recent and ongoing restoration efforts (Deep Cr, Crazy Cr, Little Summit Cr, Allen Cr).
- Potential impact to drainage patterns (concentration of flow, change in release rates, sediment mobilization and delivery).
- Potential impacts to streambanks.
- Potential changes to upland soil movement and delivery to riparian areas.

Measures to compare the alternatives include:

- Number total trail-over-stream crossings by stream class by 6th field watershed
- Number of new construction trail-over-stream crossings, on 303d within each 6th field watershed
- Number of total trail-over-stream crossings on 303d, by stream class within each 6th field watershed
- Hydraulic net: density of open and closed roads plus trails by 5th field watershed
- Miles of trail on unstable slope based on slope/erosion hazard map

Issue 4: The trail system could create or exacerbate conflict between motorized and non-motorized recreationists.

- Noise impacts vs. “natural quiet” experience
- Impacts to Recreation Opportunity Spectrum (ROS):
- Semiprimitive nonmotorized (RNA, Old Growth)
- Semiprimitive nonmotorized, snowmobiles allowed Dec 1-May 1 (Rock Crk/Cottonwood Crk, North Fork Crooked River Scenic Corridor)
- Roaded Natural (Deep Creek Rec. Area, Summit National Historic Trail, riparian, Bandit Springs, North Fork Crooked River Rec. Corridor)
- Roaded Natural, Roaded Modified or Rural (visual management corridors)
- Impacts to Wilderness Recreation Spectrum
- Primitive and semiprimitive nonmotorized (Wilderness, Wilderness Study Area)
- Impacts to developed recreation sites
- Impacts to dispersed recreation camp sites
- Opportunity to achieve and balance S&Gs on LRMP pg 4-183, 4-189 and 4-190
- Impact of trails on angler and hunter satisfaction and success
- Impact of trails on non-consumptive recreational use (bird watching, wild flower viewing, wildlife photography, sight-seeing, etc)

- Impact to non-motorized trails (hiking, horseback, mtn biking, Nordic skiing)

Measures to compare the alternatives include:

- Estimated user days
- Acres of potential noise disturbance by trail type based on decibel levels and average distance heard
- Acres of Semiprimitive Non-motorized ROS (RNA, Old Growth, Rock Crk/Cottonwood Crk, North Fork Crooked River Scenic Corridor) from which sounds of OHVs might be audible at > 45 db.
- Acres of Roaded Natural ROS (Deep Creek Recreation Area, Summit National Historic Trail, Riparian Area, Bandit Springs Recreation Area, North Fork Crooked River Recreation Corridor, Round Mountain National Recreation Trail) from which sounds of OHVs might be audible at > 45 db.
- Acres of Roaded Natural, Roaded Modified or Rural (Eagle Roosting Areas, Developed Recreation, Dispersed Recreation, Winter Range, General Forest Winter Range, General Forest, Highway 26 Visual Corridor, Visual Management Corridors, Facilities) from which sounds of OHVs might be audible at > 45 db.)
- Acres of Wilderness Recreation Spectrum, Primitive and Semiprimitive (Bridge Creek Wilderness, North Fork Crooked River Wilderness Study Area) from which sounds of OHVs might be audible at > 45 db.
- Number of developed recreation sites (campgrounds, cabins, etc) from which sounds of OHVs might be audible at > 45 db.
- Number of dispersed sites (dispersed recreation camp sites in LRMP) from which sounds of OHVs might be audible at > 45 db.
- Miles of dispersed camping roads (MVUM) from which sounds of OHVs might be audible at > 45 db.
- Miles of non-motorized trails, trailhead or trail shelters (LRMP) from which sounds of OHVs might be audible at > 45 db.
- Miles of non-motorized non-system horse trails, endurance ride staging areas and horse trail group camp sites from which sounds of OHVs might be audible at > 45 db.

CHAPTER 2. ALTERNATIVES, INCLUDING THE PROPOSED ACTION

Introduction

This chapter describes and compares the alternatives considered for the Ochoco Summit Trail System. It includes a description and map of each alternative considered. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternative and some of the information is based upon the environmental, social and economic effects of implementing each alternative.

Alternatives Considered in Detail

The Forest Service developed 4 alternatives, including the No Action and Proposed Action alternatives, in response to issues raised by the public.

Alternative 1 (No Action)

Alternative 1 is the No Action Alternative is included as a baseline comparison of continuing the existing conditions without implementing the proposed actions as required by the CEQ Regulations (40 CFR 1502.14). Alternative 1 would not implement any changes in the current management direction regarding motorized access. Enforcement of existing restrictions found in the Ochoco National Forest Plan and site-specific decisions would continue. This includes past decisions to close or decommission National Forest system roads that may not have been implemented through physical barriers or signing, or where the closure method was limited to not conducting routine maintenance activities. The current management direction for travel would be directed by the management plan that is in place. A decision has been made on the forest-level Travel Management Plan (which implements the 2005 Travel Management Rule). The direction included in that decision is the current management direction.

Alternative 2 (Proposed Action)

Alternative 2 focuses on designating motorized trails and supporting areas, in conjunction with opportunities that would remain on mixed use roads identified in the forest-level Travel Management EIS. Table 1 provides a summary of actions proposed in Alternative 2.

The Proposed Action would:

- Designate a system of trails and areas (including staging areas, play areas, riding areas where young riders may be supervised by adults, learner/warm-up loops, and picnic and camping areas) by class of vehicle and season of use.
- Utilize designated open motorized mixed use roads as connecters between trail segments.
- Designate areas for developed and dispersed camping activities with legal trail access.
- Implement rehabilitation or restoration activities in previously damaged areas, as well as at locations where the proposed routes connect with unauthorized or user-created routes. This would consist of actions to promote vegetative recovery, to prevent further damage, and to prevent confusion about which routes are open to motor vehicles and which are not.
- Establish directional, informational and interpretive signing to facilitate proper trail use, safety and enforcement; to provide public information and education; to define trail, riding

area, staging area and camp sites locations; to promote recovery of rehabilitation and restoration sites; and to encourage reporting of violations, restoration or maintenance needs.

Motorized trails would be open for use by specified vehicle type, seasonally between May 1 and November 1 of each year, except on Paulina Ranger District, where trails would close at the beginning of the restriction period specified for the Rager Cooperative Travel Management Area, and would remain closed until May 1 of each year.

Non-motorized use would not be prohibited on proposed motorized trails.

Camping would be allowed at staging areas within designated camp sites, as well as in dispersed camp sites at trailheads or as allowed in the current Travel Management Plan.

Maps 3 and 4 show the network of proposed roads, trails and areas included in the proposed action, the project area boundary and a background of existing open roads. The Proposed Action maps show where the proposed routes and supporting areas are located and how the routes overlay existing soil disturbance as identified by the presence of existing NFS roads. Refer to the legend for route color codes: existing disturbance is shown by the two colors used to display roads (orange, green). The Proposed Action maps also display quality of user experience as determined by whether the proposed route provides potential for trail features (narrow, winding, challenging) or whether it falls on an open road (easy travel, easy access, mixed traffic). Refer to the legend for route color codes: road-to-trail conversions are proposed on closed/decommissioned roads (green), while new trail construction is proposed on route segments that are not on NFS roads (blue). Routes on open mixed use roads are shown in orange.

Trails would be designed with width and difficulty appropriate for each intended vehicle type, while roads designated as open in the forest-level Travel Management EIS would not be narrowed to trail standards (ie. designated open roads would remain designated open roads). Trail widths would be based on intended vehicle types, which are also displayed on Maps 3 and 4. Refer to the legend for vehicle types I, II and III. Motorcycle-only trails (single track) would be designed for 24” wide clearance and are displayed on the maps as a dashed line. Only single track vehicles would be allowed on single track trails (ie. no ATVs or 4x4s). All-terrain vehicle (ATV) trails would be designed for 50” wide clearance and are displayed as a dotted line on the maps. ATV trails would be available for use by ATVs and motorcycles but not 4x4s or side-by-side buggies. Class II trails would be designed for 80” wide clearance and are displayed on the maps as a line with cross bars. Class II trails would be available for use by any vehicle with an outside maximum width of less than 80” (jeeps, ¼ ton trucks and SUVs, side-by-side buggies, rock crawlers, etc.)

This project does not propose to change roads that would be open or closed to motorized access under the forest-level Travel Management EIS. The routes shown on these maps include proposed trails as well as about 45 miles of interconnected roads that are designated for mixed use by highway legal and non-highway legal vehicles (OHVs and passenger cars/trucks). The open roads are not changed from the forest-level EIS, but are shown on the Proposed Action map as they serve as connectors between trail segments, or they enhance loop opportunities/options for trail users.

***The Proposed Action trail network includes*:**

Overall, the OHV network displayed on the Proposed Action map includes approximately 124 miles of proposed OHV trail and 45 miles of open National Forest System (NFS) roads that connect trail segments or contribute to the network by providing alternate “get-back” routes or other recreational experiences (also see Table 1).

Of the total 69 miles in the Class I vehicle (ATV) network, 14 miles are on open roads, 25 miles are on closed or decommissioned road beds and 30 miles are not on NFS roads. This would allow for up to 55 miles of 50” wide trail through conversion of old road beds and new trail construction

combined. In addition all Class II trails would be available for use by ATVs. Mixed use roads identified under the forest-wide Travel Management EIS would also remain available for use by ATVs.

Of the total 48 miles in the Class II vehicle (jeep, small truck and buggy) network, 28 miles are on open roads, 8 miles are on closed or decommissioned road beds and 12 miles are not on NFS roads. This would allow for up to 20 miles of 80" wide trail through conversion of old road beds and new trail construction combined. Mixed use roads identified under the forest-wide Travel Management EIS would remain available for use by non-highway-legal jeeps and buggies and highway-legal vehicles would have access to all roads identified as open in the forest-wide EIS.

Of the total 52 miles of Class III vehicle (motorcycle) network, 4 miles are on open roads, 23 miles are on closed or decommissioned road beds and 26 miles are not on NFS roads. This would allow for up to 49 miles of 24" wide trail through conversion of old road beds and new trail construction combined. In addition all Class I and II trails would be available for use by motorcycles. Mixed use roads identified under the forest-wide Travel Management EIS would remain available for use by non-highway-legal motorcycles and highway-legal vehicles would have access to all roads identified as open in the forest-wide EIS.

***The Proposed Action motorized use areas include*:**

In support of the proposed Class I network, four staging areas and two trailheads are proposed along the west half of the ATV route (west of the class II network), while two staging areas and one trailhead are proposed along the east half of the ATV route (east of the class II network). Proposed staging area locations include: Ochoco Divide Snopark, Ahalt Mineral Source, Walton Snopark, Scott's Mineral Source, Aspen Mineral Source and Road 600. Proposed trailhead access points include: Road 350 south of Indian Butte, road 550 at Allen Creek and Road 500 north of Jones Lava. Class I staging areas and trailheads would also be available for use by motorcycles (Class I and III).

In support of the proposed Class II network, two staging areas and three trailheads are proposed along the designated route. Class II staging areas and trailheads are distributed in order to provide access to a variety of terrain features and camp sites. Staging area locations include: Peterson Lava and Ross/Peterson ridge. Proposed trailhead access points include: East Porter Creek, Looney/Porter lava and Scott's Camp Mineral Source. Class II staging areas would also be available for use by ATVs and motorcycles (Class I, II and III).

In support of the proposed Class III network, two staging areas are proposed along the motorcycle-only route. Staging area locations include: Cottonwood Pit Mineral Source and Six Corners Mineral Source. Trails out of these staging areas would only be available for use by motorcycles (Class III only).

***Amenities*:**

Under the Proposed Action staging areas would provide amenities to support the intended use for each specific area. All staging areas would include at least one vault toilet, a picnic table and a kiosk or sign board with informational/directional signs and maps. Site specific amenities for each staging area are as follows:

Ochoco Divide Snopark would retain existing level of facilities (paved parking area, one vault toilet and a sign board). The objective for this staging area would be to provide access for trail users who travel/camp in recreational vehicles that are generally self-contained and require little additional amenities. This staging area would include a simple warm-up or learner loop, and would generally be an entry point for visitors planning to travel eastward on the trail.

Ahalt Mineral Source would be improved to support ATV and motorcycle staging. The objective for this area would be to provide for use by trail riders with a range of experience levels, for day or

overnight use, for play area and/or for trail access. Amenities that would be needed include at least two vault toilets, defined and hardened camp sites, play area boundary markers, supervised youth rider area (markers or fence), picnic tables and sign boards.

Walton Snopark would be improved to support ATV and motorcycle staging. The objective for this area would be to provide a trail access point for day or overnight use. Amenities that would be added include one more vault toilet, picnic tables and sign boards (near the existing toilet) and directional signing to keep users headed north from the staging area.

Scott's Mineral Source would be improved to support ATV and motorcycle staging. The objective for this area would be to provide a trail access point for day or overnight use. This staging area would include a simple warm-up or learner loop, but would generally be intended to be an entry point for visitors planning to travel the east/west trail corridor. Amenities that would be added include at least one vault toilet, defined camp sites, picnic tables, sign boards and directional signing to lead riders onto the trail out of the staging area.

Aspen Mineral Source would be improved to support ATV and motorcycle staging. The objective for this area would be to provide for use by trail riders with a range of experience levels, for day or overnight use, for play area and/or for trail access. Amenities that would be needed include at least one vault toilet, defined camp sites, play area boundary and hazard markers, supervised youth rider area (markers or fence), picnic tables and sign boards.

Road 600 Staging Area would be improved to support ATV and motorcycle staging. The objective for this area would be to provide a trail access point for day or overnight use. This staging area would include a simple warm-up or learner loop, but would generally be intended to be an entry point for visitors planning to travel north. Amenities that would be added include at least one vault toilet, defined camp sites, picnic tables, sign boards and directional signing to lead riders onto the trail out of the staging area.

Peterson Lava would be improved to support class II vehicle (jeep, etc) staging. The objective for this area would be to provide a trail access point for day or overnight use. This staging area would include a short rock crawl loop (easy to moderate), but would generally be intended to be an entry point for visitors planning to travel throughout the class II area, or south on the jeep trail. Amenities that would be added include at least one vault toilet, defined camp sites, picnic tables, sign boards, haz-mat supply, and directional signing.

Ross/Peterson ridge would be improved to support class II staging. The objective for this area would be to provide a trail access point for day or overnight use. This staging area would provide an entry point for visitors planning to travel throughout the class II area, or quick access to the south end of the jeep trail. Amenities that would be added include a hardened parking area, at least one vault toilet, defined camp sites, picnic tables, sign boards, haz-mat supply, and directional signing.

Cottonwood Pit Mineral Source would retain existing level of facilities but would serve as a motorcycle staging area. The objective for this area would be to provide a trail access point for day or overnight use. This staging area would include a warm-up or learner loop and supervised youth riding area, but would generally be intended to be an entry point for visitors planning to travel east or west on the single-track trail loop. Amenities that would be added include a hardened parking area, picnic tables and sign boards (near the existing toilet) and directional signing to lead users to the trails out of the staging area.

Six Corners Mineral Source would be improved to support motorcycle staging. The objective for this area would be to provide a trail access point for day or overnight use. This staging area would include a warm-up or learner loop and a supervised youth riding area, but would generally be intended to be an entry point for visitors planning to travel the single-track trail loop. Amenities that would be added

include at least one vault toilet, defined camp sites, picnic tables, supervised youth rider area markers or fence, sign boards and directional signing to lead riders onto the trail out of the staging area.

Throughout the area, trailheads would remain as dispersed camp sites without developed recreation amenities such as toilets and picnic tables. Trailhead markers with informational signboards would be installed at mapped trailhead locations. At these locations hardening of surfaces for camp sites, turn-arounds and parking areas, and defining of campsites, would occur as needed. Other dispersed camp sites do occur along the trail that will not be mapped, these camp sites will generally not be modified, but trail routes passing by these sites would have directional signs and entrance filters (entrance devices to control vehicle size) installed, and camp sites defined as needed.

Selected locations along proposed trails would be improved to provide opportunities for sight- seeing, interpretive signing, rest/regroup areas and trail-side picnics. These locations would be at scenic viewpoints, points of interest, shady spots, etc. Improvements would be limited to picnic tables and/or benches and interpretive signing.

Table 1. Summary of proposed motorized trails and areas, Alternative 2, Ochoco Summit Trail System project.

Trail Type	Proposed Action – trail miles	Staging Areas	Mapped Trail Heads
Motorcycle (<24”) Trail	49	2	0
ATV (vehicles <50”) Trail	55	6	3
4x4 (vehicles <80”) Trail	20	2	3
Total	**124**	**10**	**6**

Non-Significant Amendments to Forest Plan

Alternative 2 includes five site-specific amendments to the Ochoco Land and Resource Management Plan. Each of these is related to designation of motorized crossings in Old Growth Management Areas (MA-F6) allocated in the 1989 LRMP other than on constant service roads (4-232, 4-234). One additional project-specific amendment would allow designation/construction of motorized trail on scabland.

- Amend Old Growth Management Area (OG-D1-08) at Indian Butte to include motorized recreation only on designated routes including one new crossing to connect between roads 2200-306 and 2200-309.
- Amend Old Growth Management Area (OG-D1-12) at East Porter to include motorized recreation only on designated routes including one new crossing at Looney Creek to connect between roads 4200-430 and 4200-440.
- Amend Old Growth Management Area (OG-D2-11) near Chamberlin Spring to include motorized recreation only on designated routes including one crossing on closed road 4250-700 to connect between roads 4250-610 and 1200-440.
- Amend Old Growth Management Area (OG-D2-02) near Deep Creek to include motorized recreation only on designated routes including one new crossing.
- Amend the Forest-wide Standard and Guideline for Recreation (LRMP 4-177) that states: “ORV use on scablands will be limited to snowmobiles operating on an adequate snow base.” The Standard and Guideline would be amended to allow crossing over of scablands on designated routes primarily on existing disturbance (old road beds).

Alternative 3

Alternative 3 was developed in response to Key Issues 2, 3 and 4, and is intended to provide motorized trails and areas at a lesser scale to reduce potential for impacts to water quality, fish and

wildlife, and to reduce conflict between motorized and non-motorized recreational use. Table 2 provides a summary of actions proposed under Alternative 3.

Alternative 3 would:

Alternative 3 offers many of the features described for Alternative 2 with the following exceptions:

Motorized trails would be open for use by specified vehicle type, seasonally between June 1 and September 30 of each year, except on Paulina Ranger District, where trails would close at the earlier date of September 30 or the beginning of the restriction period specified for the Rager Cooperative Travel Management Area, and would remain closed until June 1 of each year.

The motorcycle (Class III) loop trail does not include the side loop in the Derr and upper Jackson Creek area that was in the Proposed Action. It also does not include the staging area or associated trails at Forest Road 4200-600, or the staging and play areas and associated trails at and around Aspen Pit compared to Alternative 2. It also does not include the staging area at Peterson Lava or any of the trailheads from Alternative 2.

Compared to the Alternative 2, the class I staging and parking areas at Ahalt Pit are not included; the singular (there-and-back) ATV (class II) route between Indian Butte (at Forest Road 2200-350) and Scott's camp is not included; and none of the trailheads are included in this alternative.

Alternative 3 does not include designated trails or staging areas for class II vehicles (jeeps and buggies).

Maps 5 and 6 show the network of proposed roads, trails and areas included in Alternative 3, the project area boundary and a background of existing open roads. The alternative maps show where the proposed routes and supporting areas are located and how the routes overlay existing soil disturbance as identified by the presence of existing NFS roads. Refer to the legend for route color codes: existing disturbance is shown by the two colors used to display roads (orange, green). The alternative maps also display quality of user experience as determined by whether the proposed route provides potential for trail features (narrow, winding, challenging) or whether it falls on an open road (easy travel, easy access, mixed traffic). Refer to the legend for route color codes: road-to-trail conversions are proposed on closed/decommissioned roads (green), while new trail construction is proposed on route segments that are not on NFS roads (blue). Routes on open mixed use roads are shown in orange.

Trails would be designed with width and difficulty appropriate for each intended vehicle type, while roads designated as open in the forest-level Travel Management EIS would not be narrowed to trail standards (i.e. designated open roads would remain designated open roads). Trail widths would be based on intended vehicle types, which are also displayed on Maps 5 and 6. Refer to the legend for vehicle types I and III. Motorcycle-only trails (single track) would be designed for 24" wide clearance and are displayed on the maps as a dashed line. Only single track vehicles would be allowed on single track trails (ie. no ATVs or 4x4s). All-terrain vehicle (ATV) trails would be designed for 50" wide clearance and are displayed as a dotted line on the maps. ATV trails would be available for use by ATVs and motorcycles but not 4x4s or side-by-side buggies. Alternative 3 does not include designated trails for class II vehicles (jeeps and buggies).

This project does not propose to change roads that would be open or closed to motorized access under the forest-level Travel Management EIS. The routes shown on these maps include proposed trails (approximately 88 miles) as well as about 13 miles of interconnected roads that are designated for mixed use by highway legal and non-highway legal vehicles (OHVs and passenger cars/trucks). The open roads are not changed from the forest-level EIS, but are shown on the Alternative 3 map as they serve as connectors between trail segments, or they enhance loop opportunities/options for trail users.

***Alternative 3 trail network includes*:**

In contrast to Alternative 2, this alternative includes two discrete riding areas for class I and III (ATVs and motorcycles) that are separated by an area without designated trails:

A single track (class III) loop between Peterson Lava and Six Corners is included that incorporates some of the proposed jeep trail route locations from the Proposed Action alternative. This alternative does include one of the central tie-through trails between Paulina Butte and Jackson Creek. This alternative does retain staging areas at both Cottonwood Pit and Six Corners Mineral Source and their associated amenities. The Class III loop would include 9 miles of open mixed-use road, 25 miles of trail on closed or decommissioned road beds, and 28 miles of trail that are not on NFS roads.

A series of interconnected 50" trails (class I and III) and loops between Ochoco Divide Snopark, Walton Snopark and road 2200-350 are included. Additional loops on the west end are included compared to the Proposed Action in order to provide adequate trail miles within a more compact area, multiple decision points and alternate loop options. Staging areas at Ochoco Divide Snopark and Walton Snopark are included in this alternative. This section of trail system would include 4 miles on open, mixed-use roads, 12 miles of trail on closed or decommissioned road beds, and 22 miles of trail that are not on NFS roads.

***The Alternative 3 motorized use areas include*:**

In support of the proposed Class I network, two staging areas are proposed along the ATV route (in the west end of the project area). Proposed staging area locations include: Ochoco Divide Snopark and Walton Snopark. Class I staging areas would also be available for use by motorcycles (Class III).

In support of the proposed Class III network, two staging areas are proposed along the motorcycle-only route. Staging area locations include: Cottonwood Pit Mineral Source and Six Corners Mineral Source. Trails out of these staging areas would only be available for use by motorcycles (Class III only).

***Amenities*:**

Under Alternative 3 staging areas would provide amenities to support the intended use for each specific area. All staging areas would include at least one vault toilet, a picnic table and a kiosk or sign board with informational/directional signs and maps. Site specific amenities for each staging area are as follows:

Ochoco Divide Snopark would retain existing level of facilities (paved parking area, one vault toilet and a sign board). The objective for this staging area would be to provide access for trail users who travel/camp in recreational vehicles that are generally self-contained and require little additional amenities. This staging area would include a simple warm-up or learner loop, and would generally be an entry point for visitors planning to travel eastward on the trail.

Walton Snopark would be improved to support ATV and motorcycle staging. The objective for this area would be to provide a trail access point for day or overnight use. Amenities that would be added include one more vault toilet, picnic tables and sign boards (near the existing toilet) and directional signing to keep users headed north from the staging area.

Cottonwood Pit Mineral Source would retain existing level of facilities but would serve as a motorcycle staging area. The objective for this area would be to provide a trail access point for day or overnight use. This staging area would include a warm-up or learner loop and supervised youth riding area, but would generally be intended to be an entry point for visitors planning to travel east or west on the single-track trail loop. Amenities that would be added include a hardened parking area, picnic tables and sign boards (near the existing toilet) and directional signing to lead users to the trails out of the staging area.

Six Corners Mineral Source would be improved to support motorcycle staging. The objective for this area would be to provide a trail access point for day or overnight use. This staging area would include

a warm-up or learner loop and a supervised youth riding area, but would generally be intended to be an entry point for visitors planning to travel the single-track trail loop. Amenities that would be added include at least one vault toilet, defined camp sites, picnic tables, supervised youth rider area markers or fence, sign boards and directional signing to lead riders onto the trail out of the staging area.

Dispersed camp sites do occur along the trail that will not be mapped, these camp sites will generally not be modified, but trail routes passing by these sites would have directional signs and entrance filters (entrance devices to control vehicle size) installed, and camp sites defined as needed. Camping would be allowed as in dispersed camp sites as allowed in the current Travel Management Plan. Selected locations along proposed trails would be improved to provide opportunities for sight- seeing, interpretive signing, rest/regroup areas and trail-side picnics. These locations would be at scenic viewpoints, points of interest, shady spots, etc. Improvements would be limited to picnic tables and/or benches and interpretive signing.

Table 2. Summary of proposed Ochoco Summit Trail System, Alternative 3, motorized trails and areas.

Trail Type	Proposed Action – trail miles	Staging Areas	Mapped Trail Heads
Motorcycle (<24”) Trail	53	2	0
ATV (vehicles <50”) Trail	35	2	0
4x4 (vehicles <80”) Trail	0	0	0
Total	**88**	**4**	**0**

Non-Significant Amendments to Forest Plan

Alternative 3 includes four site-specific amendments to the Ochoco Land and Resource Management Plan. Each of these is related to designation of motorized crossings in Old Growth Management Areas (MA-F6) allocated in the 1989 LRMP other than on constant service roads (4-232, 4-234). One additional project-specific amendment would allow designation/construction of motorized trail on scabland.

- Old Growth Management Area (OG-D1-08) at Indian Butte to include motorized recreation only on designated routes including one new crossing to connect between roads 2200-306 and 2200-309.
- Old Growth Management Area (OG-D1-12) at East Porter to include motorized recreation only on designated routes including one new crossing at Looney Creek to connect between roads 4200-430 and 4200-440.
- Old Growth Management Area (OG-D2-02) near Deep Creek to include motorized recreation only on designated routes including one new crossing.
- Amend the Forest-wide Standard and Guideline for Recreation (LRMP 4-177) that states: “ORV use on scablands will be limited to snowmobiles operating on an adequate snow base.” The Standard and Guideline would be amended to allow crossing over of scablands on designated routes primarily on existing disturbance (old road beds).

Alternative 4

Alternative 4 was developed in response to Issue 1; it includes trails for class I, II and III vehicles over more area and with more miles than the Proposed Action. The associated staging areas, trailheads and play areas are similar to the Proposed Action, except: 1) moving ATV staging areas from Scott’s Mineral Source to Allen Creek and moving Aspen Pit Staging Area to the ridge east of Happy Camp Creek; 2) dropping of ATV trailheads on rds 2200-350 and 550, 3) dropping of two trailheads at Porter Creek. We anticipate a larger number of trail miles for all three vehicle types, and

a higher percentage of class II trails not on roads compared to Proposed Action, but likely less total miles for class II due to exclusion of open roads from the class II network. Table 5 provides a summary of actions proposed under Alternative 4.

Alternative 4 would:

Alternative 4 offers the same features described for Alternative 2, but over a slightly larger area, with more trail miles and fewer supporting facilities such as trailheads. Motorized trails would be open for use by specified vehicle type, seasonally between May 1 and November 1 of each year. The exception is on Paulina Ranger District, where trails would close at the beginning of the restriction period specified for the Rager Cooperative Travel Management Area and would remain closed until May 1 of each year.

Maps 7 and 8 show the network of proposed roads, trails and areas included in Alternative 4, the project area boundary and a background of existing open roads. The Alternative 4 maps show where the proposed routes and supporting areas are located and how the routes overlay existing soil disturbance as identified by the presence of existing NFS roads. Refer to the legend for route color codes: existing disturbance is shown by the two colors used to display roads (orange, green). The Alternative maps also display quality of user experience as determined by whether the proposed route provides potential for trail features (narrow, winding, challenging) or whether it falls on an open road (easy travel, easy access, mixed traffic). Refer to the legend for route color codes: road-to-trail conversions are proposed on closed/decommissioned roads (green), while new trail construction is proposed on route segments that are not on NFS roads (blue). Routes on open mixed use roads are shown in orange.

Trails would be designed with width and difficulty appropriate for each intended vehicle type, while roads designated as open in the forest-level Travel Management EIS would not be narrowed to trail standards (i.e. designated open roads would remain designated open roads). Trail widths would be based on intended vehicle types, which are also displayed on Maps 7 and 8. Refer to the legend for vehicle types I, II and III. Motorcycle-only trails (single track) would be designed for 24” wide clearance and are displayed on the maps as a dashed line. Only single track vehicles would be allowed on single track trails (i.e. no ATVs or 4x4s). ATV trails would be designed for 50” wide clearance and are displayed as a dotted line on the maps. ATV trails would be available for use by ATVs and motorcycles but not 4x4s or side-by-side buggies. Class II trails would be designed for 80” wide clearance and are displayed on the maps as a line with cross bars. Class II trails would be available for use by any vehicle with an outside maximum width of less than 80” (jeeps, ¼ ton trucks and SUVs, side-by-side buggies, rock crawlers, etc.).

This project does not propose to change roads that would be open or closed to motorized access under the forest-level Travel Management EIS. The routes shown on these maps include proposed trails (approximately 158 miles) as well as about 53 miles of interconnected roads that are designated for mixed use by highway legal and non-highway legal vehicles (OHVs and passenger cars/trucks). The open roads are not changed from the forest-level EIS, but are shown on the Proposed Action map as they serve as connectors between trail segments, or they enhance loop opportunities/options for trail users.

***The Alternative 4 trail network includes*:**

Similar to the Proposed Action this alternative features several interconnected trail systems:

Class I network includes a series of shorter interconnecting loops, offering numerous decision points, on the west end. This portion of the ATV network would be served by 4 staging areas (Ochoco Divide, Ahalt, Walton and Scotts Mineral Source). In the east central part of the project area there would be a moderate size loop generally east of the Jeep area and west of the motorcycle loops, served by two staging areas (Happy Camp/Double Corral ridge, and 4200-600 mineral source. This

central loop could be ridden entirely without entering the jeep area, but ATV and motorcycle riders could choose to use the jeep trails being provided three legal points of access. The Class I network would include 34 miles of open mixed-use roads, 47 miles of trail on closed or decommissioned road beds, and 48 miles of trail that are not on NFS roads.

Class II network would include a series of 80" trails created by a combination of new construction and road-to-trail conversion, served by two staging areas and one trailhead. These trail segments would be connected with the minimal amount of open mixed use road necessary to get from one staging area to the other, and to connect from one discrete trail segment to the next. Though other alternate loop options would remain available on mixed use roads, extra opportunities would not be included in the system of designated routes and would not be managed as designated trail routes. Camp areas would be within 300' of open roads and would not have exclusive use by class II vehicles. All 80" trails would be available to any rubber tired vehicle with a maximum width of 80", though some routes would be posted as not recommended for certain vehicle types. The Class II network would include 11 miles on open mixed-use roads, 7 miles of trail on closed or decommissioned road beds, and 11 miles of trail that are not on NFS roads.

Class III network would include a series of interconnected loops ranging from short to long, offering numerous decision points. The motorcycle only network would be served by two staging areas (Six Corners and Cottonwood Pit). The motorcycle only network would interconnects with the central ATV system, providing more options for class III riders without having to enter the jeep area. Class III vehicles could use the entire system of trails if they choose to do so, however they could also travel from the west end to the east end without having to travel on a class II trail. However, to do so they would have to make connections between the west end network and the central /eastern networks on mixed used road 2630 and 2630-750 or 2630-800. The Class III network would include 8 miles of open mixed use roads, 22 miles of trail on closed or decommissioned road beds, and 22 miles of trail that are not on open roads.

***The Alternative 4 motorized use areas include*:**

In support of the proposed Class I network, four staging areas are proposed along the west half of the ATV route (west of the class II network), while two staging areas are proposed along the east half of the ATV route (east of the class II network). Proposed staging area locations include: Ochoco Divide Snopark, Ahalt Mineral Source, Walton Snopark, Scott's Mineral Source, Happy Camp/Double Corral Ridge and Road 600. Class I staging areas would also be available for use by motorcycles (Class I and III).

In support of the proposed Class II network, two staging areas are proposed along the designated route. Class II staging areas are distributed in order to provide access to a variety of terrain features and camp sites. Staging area locations include: Peterson Lava and Ross/Peterson ridge. Class II staging areas would also be available for use by ATVs and motorcycles (Class I, II and III).

In support of the proposed Class III network, two staging areas are proposed along the motorcycle-only route. Staging area locations include: Cottonwood Pit Mineral Source and Six Corners Mineral Source. Trails out of these staging areas would only be available for use by motorcycles (Class III only).

***Amenities*:**

Under the Proposed Action staging areas would provide amenities to support the intended use for each specific area. All staging areas would include at least one vault toilet, a picnic table and a kiosk or sign board with informational/directional signs and maps. Site specific amenities for each staging area are as follows:

Ochoco Divide Snopark would retain existing level of facilities (paved parking area, one vault toilet and a sign board). The objective for this staging area would be to provide access for trail users who travel/camp in recreational vehicles that are generally self-contained and require little additional amenities. This staging area would include a simple warm-up or learner loop, and would generally be an entry point for visitors planning to travel eastward on the trail. Amenities that would be needed include sign boards and directional signing.

Ahalt Mineral Source would be improved to support ATV and motorcycle staging. The objective for this area would be to provide for use by trail riders with a range of experience levels, for day or overnight use, for play area and/or for trail access. Amenities that would be needed include at least two vault toilets, defined and hardened camp sites, play area boundary markers, riding area where youth could be supervised (markers or fence), picnic tables, sign boards and directional signing.

Walton Snopark would be improved to support ATV and motorcycle staging. The objective for this area would be to provide a trail access point for day or overnight use. Amenities that would be added include one more vault toilet, picnic tables and sign boards (near the existing toilet) and directional signing to keep users headed north from the staging area.

Scott's Mineral Source would be improved to support ATV and motorcycle staging. The objective for this area would be to provide a trail access point for day or overnight use. This staging area would include a simple warm-up or learner loop, but would generally be intended to be an entry point for visitors planning to travel the east/west trail corridor. Amenities that would be added include at least one vault toilet, defined camp sites, picnic tables, sign boards and directional signing to lead riders onto the trail out of the staging area.

Happy Camp/Double Corral Ridge staging area, approximately 1 mile east of Aspen Mineral Source (near FS Road 30/850, would be improved to support ATV and motorcycle staging. The objective for this area would be to provide for use by trail riders with a range of experience levels, for day or overnight use, for trail access. Amenities that would be needed include at least one vault toilet, defined camp sites, a simple warm-up or learner loop, picnic tables, sign boards and directional signing.

Road 600 Staging Area would be improved to support ATV and motorcycle staging. The objective for this area would be to provide a trail access point for day or overnight use. This staging area would include a simple warm-up or learner loop, but would generally be intended to be an entry point for visitors planning to travel north. Amenities that would be added include at least one vault toilet, defined camp sites, picnic tables, sign boards and directional signing to lead riders onto the trail out of the staging area.

Peterson Lava would be improved to support class II vehicle (jeep, etc) staging. The objective for this area would be to provide a trail access point for day or overnight use. This staging area would include a short rock crawl loop (easy to moderate), but would generally be intended to be an entry point for visitors planning to travel throughout the class II area, or south on the jeep trail. Amenities that would be added include at least one vault toilet, defined camp sites, picnic tables, sign boards, haz-mat supply, and directional signing.

Ross/Peterson ridge would be improved to support class II staging. The objective for this area would be to provide a trail access point for day or overnight use. This staging area would provide an entry point for visitors planning to travel throughout the class II area, or quick access to the south end of the jeep trail. Amenities that would be added include a hardened parking area, at least one vault toilet, defined camp sites, picnic tables, sign boards, haz-mat supply, and directional signing.

Cottonwood Pit Mineral Source would retain existing level of facilities but would serve as a motorcycle staging area. The objective for this area would be to provide a trail access point for day or overnight use. This staging area would include a warm-up or learner loop and riding area where youth

could be supervised, but would generally be intended to be an entry point for visitors planning to travel east or west on the single-track trail loop. Amenities that would be added include a hardened parking area, picnic tables and sign boards (near the existing toilet) and directional signing to lead users to the trails out of the staging area.

Six Corners Mineral Source would be improved to support motorcycle staging. The objective for this area would be to provide a trail access point for day or overnight use. This staging area would include a warm-up or learner loop and a riding area where youth could be supervised, but would generally be intended to be an entry point for visitors planning to travel the single-track trail loop. Amenities that would be added include at least one vault toilet, defined camp sites, picnic tables, supervised youth rider area markers or fence, sign boards and directional signing to lead riders onto the trail out of the staging area.

Dispersed camp sites that occur along the trail will not be mapped; these camp sites generally will not be modified, but trail routes passing by these sites would have directional signs and entrance filters (entrance devices to control vehicle size) installed, and camp sites defined as needed. Camping would be allowed as in dispersed camp sites as allowed in the current Travel Management Plan. Selected locations along proposed trails would be improved to provide opportunities for sight- seeing, interpretive signing, rest/regroup areas and trail-side picnics. These locations would be at scenic viewpoints, points of interest, shady spots, etc. Improvements would be limited to picnic tables and/or benches and interpretive signing.

Table 3. Summary of proposed Ochoco Summit Trail System, Alternative 4, motorized trails and areas.

Trail Type	Proposed Action – trail miles	Staging Areas	Mapped Trail Heads
Motorcycle (<24”) Trail	45	2	0
ATV (vehicles <50”) Trail	95	6	0
4x4 (vehicles <80”) Trail	18	2	0
Total	**158**	**10**	**0**

Non-Significant Amendments to Forest Plan

Alternative 2 includes five site-specific amendments to the Ochoco Land and Resource Management Plan. Each of these is related to designation of motorized crossings in Old Growth Management Areas (MA-F6) allocated in the 1989 LRMP other than on constant service roads (4-232, 4-234). One additional project-specific amendment would allow designation/construction of motorized trail on scabland.

- Amend Old Growth Management Area (OG-D1-08) at Indian Butte to include motorized recreation only on designated routes including one new crossing to connect between roads 2200-306 and 2200-309.
- Amend Old Growth Management Area (OG-D1-12) at East Porter to include motorized recreation only on designated routes including one new crossing at Looney Creek to connect between roads 4200-430 and 4200-440.
- Amend Old Growth Management Area (OG-D2-11) near Chamberlin Spring to include motorized recreation only on designated routes including one crossing on closed road 4250-700 to connect between roads 4250-610 and 1200-440.
- Amend Old Growth Management Area (OG-D2-02) near Deep Creek to include motorized recreation only on designated routes including one new crossing.

- Amend the Forest-wide Standard and Guideline for Recreation (LRMP 4-177) that states: "ORV use on scablands will be limited to snowmobiles operating on an adequate snow base." The Standard and Guideline would be amended to allow crossing over of scablands on designated routes primarily on existing disturbance (old road beds).

Alternative 5

Alternative 5 was developed primarily in response to Key Issues 2, 3 and 4, but has features intended to respond to Key Issue 1(specifically related to opportunities for operators of a broader range of vehicle types and quality of motorized recreational experience based on interconnection of loops and number of decision points). This alternative also responds to changed conditions that resulted from the Bailey Butte Fire of 2014 and to a variety of suggestions provided during the Objection Period following the release of the FEIS. This alternative is intended to provide a range of motorized trail opportunities and areas at a moderate scale while limiting potential for impacts to water quality, fish and wildlife habitat, and to be responsive to potential conflict between motorized and non-motorized recreational use. Table 4 provides a summary of actions proposed under Alternative 5.

Alternative5 would:

Alternative 5 offers many of the features described for Alternative 2 with the following exceptions:

Motorized trails would be open for use by specified vehicle type, seasonally between June 1 and September 30 of each year. The exception is on Paulina Ranger District, where trails would close at the earlier date of September 30 or the beginning of the restriction period specified for the Rager Cooperative Travel Management Area, and would remain closed until June 1 of each year.

The motorcycle (Class III) loop trail does not include the side loop in the Derr and upper Jackson Creek area that was in the Proposed Action. This alternative proposes single track (class III) trails instead of ATV (class I) trails in the portion of the designated system east of Porter Creek and Broadway Lava. Alternative 5 also does not include the staging area or associated trails at Forest Road 4200-600, or the staging and play areas and associated trails at and around Aspen Pit (Happy Camp area) compared to Alternative 2. It also does not include one of the routes between roads 4254 and 4250 that was included in Alternative 2. It does include a trailhead at Six Corners Mineral Material Source rather than a staging area, as proposed in Alternative 2. In addition, routes were adjusted to reduce stream crossings and to maximize placement on existing road beds.

Regarding the ATV (class I) network, the portion east of Porter Creek and Broadway Lava proposed under Alternative 2 is instead proposed to be single track (Class III) in Alternative 5, as described above. On the west end of the proposed class I trail network the extent and the number of interconnected loops and overall distance in the ATV (class I) trail system is higher than in Alternative 2. However, Alternative 5 does not include the staging and parking areas at Ahalt Pit; or the singular (there-and-back) route between Indian Butte (at Forest Road 2200-350) and Scott's camp. Instead of the connector trail across the south flank of Mount Pisgah that was proposed in Alternative 2, Alternative 5 provides a trail to road connection between the west end ATV trail system and viewpoints accessed via existing mixed use roads (Mount Pisgah, Slide Mountain and Peterson Point). This proposed trail network is designed to utilize an existing network of old road beds and skid trails, while limiting potential conflict with equestrian and other non-motorized recreational use in and around Corral Flat, Crystal Creek, and Crystal Springs.

Many of the connector roads that were included as loops in the jeep and buggy (class II) designated system in Alternative 2 are included as Class I routes instead in Alternative 5 based on comments expressed by the class II driver community. They did not want open mixed use roads to be shown as class II trail system routes. These existing open mixed use roads will continue to be open mixed use roads available to all OHV vehicle types. However, open roads that are necessary to link class II trail segments in order to create loop opportunities are displayed as part of the class II network under

Alternative 5. Thus, Alternative 5 does include designated trails and staging areas for class II vehicles, but at a reduced extent compared to Alternative 2. Alternative 5 also does not include any of the trailheads from the Alternative 2 class II trail network. This is because the class II riders who commented on the project indicated that they did not want developed trailheads. They would rather have trail miles and legal access off of mixed use roads without an excess of development. The class II network in Alternative 5 incorporates one trail route that was included as an ATV (class I) route in Alternative 2 and drops the class II routes from Alternative 2 that required new stream crossings. In addition, route alignments were adjusted to reduce potential for impacts to riparian areas, swales and ephemeral draws.

Alternative 5 does include a designated trail loop for side-by-sides (class IV) vehicles. The loop proposed for Class IV vehicles utilizes an existing network of closed roads and provides a loop with technical difficulty at an easy level for the casual rider in a forested setting with scattered vistas, and easy access from Highway 26 and with camping opportunities along an existing open mixed use road. For riders seeking a more challenging experience on their Class IV vehicle, they would have an opportunity to use the class II trail system, as well as the 659 miles of open mixed use road within the project area.

Maps 9 and 10 show the network of proposed roads, trails and areas included in Alternative 5, the project area boundary and a background of existing open roads. The alternative maps show where the proposed routes and supporting areas are located and how the routes overlay existing soil disturbance as identified by the presence of existing NFS roads. Refer to the legend for route color codes: existing disturbance is shown by the two colors used to display roads (orange, green). The alternative maps also display quality of user experience as determined by whether the proposed route provides potential for trail features (narrow, winding, challenging) or whether it falls on an open road (easy travel, easy access, mixed traffic). Refer to the legend for route color codes: road-to-trail conversions are proposed on closed/decommissioned roads (green), while new trail construction is proposed on route segments that are not on NFS roads (blue). Routes on open mixed use roads are shown in orange and they would remain open roads.

Trails would be designed with width and difficulty appropriate for each intended vehicle type, while roads designated as open in the forest-level Travel Management EIS would not be narrowed to trail standards (i.e. designated open roads would remain designated open roads). Trail widths would be based on intended vehicle types, which are also displayed on Maps 9 and 10. Refer to the legend for vehicle types I, II, III and IV. Motorcycle-only trails (single track) would be designed for 24” wide clearance and are displayed on the maps as a dashed line. Only single track vehicles would be allowed on single track trails (ie. no ATVs, side-by-sides or 4x4s). All-terrain vehicle (ATV) trails would be designed for 50” wide clearance and are displayed as a dotted line on the maps. ATV trails would be available for use by ATVs and motorcycles but not 4x4s or side-by-side buggies. Alternative 5 does include designated trails for class II vehicles (jeeps and buggies) up to 80” wide and are displayed on the maps as a solid line with cross bars. Unlike the other three action alternatives, Alternative 5 includes a trail system loop for side-by-sides up to 65” wide which is displayed on the maps as a string of triangles. Side-by-side trails would be available to ATVs and motorcycles, but not 4x4s.

This project does not propose to change roads that would be open or closed to motorized access under the forest-level Travel Management. One segment of FS 2630 would be open to mixed use rather than being restricted to highway-legal vehicles. The routes shown on the maps include proposed trails (approximately 105 miles) as well as about 30 miles of interconnected roads that are designated for mixed use by highway legal and non-highway legal vehicles (OHVs and passenger cars/trucks). The open roads are not changed from the forest-level EIS, but are shown on the Alternative 5 map as they serve as connectors between trail segments, or they enhance loop opportunities/options for trail users.

***Alternative 5 trail network includes*:**

Like Alternative 3, this alternative includes two discrete riding areas that are separated by an area without designated trails. However, in contrast to Alternative 3, this alternative provides opportunity for class II (jeep and buggies) and class IV (side-b-sides) as well as for class I and III (ATVs and motorcycles).

In the eastern Implementation Area, two loops of 24" single track trails (class III) and connecting roads between Peterson Lava and Six Corners are included. The loops connect to the eastern edge of a class II (jeep) system of routes, which include a portion of the jeep trail route locations from the Proposed Action. Alternative 5 does include a central tie-through trail between Paulina Butte and Jackson Creek. This alternative does retain the staging area at Cottonwood Pit and associated amenities. The staging area at Six Corners Mineral Source proposed in Alternative 2 would be a trailhead, rather than a developed staging area. The Class III system would include 11.6 miles of open mixed-use road, 25.5 miles of trail on closed or decommissioned road beds, and 24.7 miles of trail that are not on NFS roads.

A series of interconnected 50" trails (class I and III) and roads offer loops between Shamrock Creek, Ochoco Divide Snopark, Walton Snopark and road 2200-350. Additional loops on the west end are included compared to the Proposed Action in order to provide adequate trail miles within a more compact area, multiple decision points and alternate loop options. Staging areas at Ochoco Divide Snopark and Walton Snopark are included in this alternative. This section of trail system would include 9.3 miles on open, mixed-use roads, 20 miles of trail on closed or decommissioned road beds, and 18 miles of trail that are not on NFS roads.

A series of 80" trails (class I, II, III and IV) and interconnected open mixed use roads provide loops between Peterson Lava and Jones Lava. Less mileage is included compared to the Proposed Action primarily due to the exclusion of most of the mixed use open roads that were included in the Proposed Action class II network. The staging area at Peterson Lava is retained while all other developed areas from the Proposed Action class II system are omitted based on comments received from class II riders. This section of trail system would include 8.3 miles on open, mixed-use roads, 4 miles of trail on closed or decommissioned road beds, and 8 miles of trail that are not on NFS roads. Existing interconnected mixed use roads would continue to be available for use by class II riders as well as other OHV riders, but they would not be displayed on the maps or posted as part of the designated system of routes for this trail project. Use of routes outside of the designated trail system would be guided by the existing travel management plan as displayed on Motor Vehicle Use Maps (MVUM).

A single loop trail of primarily on existing road beds would be designated for use by vehicles 65" wide or less (class I, III and IV). This loop would offer easy access to a leisurely loop in a forested setting with multiple scenic vistas and legal access to a mixed use road with dispersed camping opportunities. This six-mile loop would have a difficulty rating of easy, making it less appealing to riders seeking technical challenge or longer saddle time. However the class IV loop would connect to the class I trail system giving class I and III riders the option of connecting to a larger system with more challenging routes. The class IV system would include 1.2 miles of open mixed use road, 4.8 miles on closed roads and 0.2 miles not on NFS roads. Supporting facilities would be limited to trailhead access and unloading ramp. There would not be a developed staging area and camping would be dispersed along the open mixed use road.

***The Alternative 5 motorized use areas include*:**

In support of the proposed Class I network, two staging areas are proposed along the ATV route (in the west end of the project area). Proposed staging area locations include: Ochoco Divide Snopark and Walton Snopark. Class I staging areas would also be available for use by motorcycles (Class III).

In support of the proposed Class II network, one staging area is proposed at Peterson Lava. Trail system connections with other mixed use roads would not be developed other than signage for trail access points and strategically placed informational kiosks or sign boards. Trails out of these areas would be available for use by OHVs up to 80" in width.

In support of the proposed Class III network, one staging area and one trail head are proposed along the motorcycle-only route. Staging area location is Cottonwood Pit Mineral Source; trailhead location is Six Corners Mineral Source. Trails out of these areas would only be available for use by motorcycles (Class III only).

In support of the proposed Class IV network, one mixed use road would provide access at to each end of the loop as well as access for dispersed camping. There would be no developed staging area.–Trail access points would have trail signs and there would be an informational kiosk near the entry point for the area. Trails out of this area would be available for use by OHVs up to 65" in width.

***Amenities*:**

Under Alternative 5 staging areas would provide amenities to support the intended use for each specific area. All staging areas would include at least one vault toilet, a picnic table and a kiosk or sign board with informational and directional signs and maps. Site specific amenities for each staging area are as follows:

Ochoco Divide Snopark would retain existing level of facilities (paved parking area, one vault toilet and a sign board). The objective for this staging area would be to provide access for trail users who travel/camp in recreational vehicles that are generally self-contained and require little additional amenities. This staging area would include a simple warm-up or learner loop, and would generally be an entry point for visitors planning to travel eastward on the trail.

Walton Snopark would be improved to support ATV and motorcycle staging. The objective for this area would be to provide a trail access point for day or overnight use. Amenities that would be added include one more vault toilet, picnic tables and sign boards (near the existing toilet) and directional signing to keep users headed north from the staging area.

Cottonwood Pit Mineral Source would retain existing level of facilities but would serve as a motorcycle staging area. The objective for this area would be to provide a trail access point for day or overnight use. This staging area would include a warm-up or learner loop and supervised youth riding area, but would generally be intended to be an entry point for visitors planning to travel east or west on the single-track trail loop. Amenities that would be added include a hardened parking area, picnic tables and sign boards (near the existing toilet) and directional signing to lead users to the trails out of the staging area.

Peterson Lava would be improved to support class II vehicle staging. The objective for this area would be to provide a trail access point for day or overnight use. Amenities that would be added include at least one vault toilet, defined camp sites, picnic tables and sign boards and directional signing to lead riders onto the trail out of the staging area.

Six Corners would provide trail access, but would not be developed as a staging area under this alternative. Dispersed camping would be allowed as guided by MVUM. An informational sign board or kiosk would be installed at the trail crossing.

Dispersed camp sites do occur along the trail that will not be mapped, these camp sites will generally not be modified, but trail routes passing by these sites would have directional signs and entrance filters (entrance devices to control vehicle size) installed, and camp sites defined as needed. Camping would be allowed as in dispersed camp sites as allowed in the current Travel Management Plan and displayed on MVUM. Selected locations along proposed trails would be improved to provide opportunities for sight- seeing, interpretive signing, rest/regroup areas and trail-side picnics. These

locations would be at scenic viewpoints, points of interest, shady spots, etc. Improvements would be limited to picnic tables and/or benches and interpretive signing.

Table 4. Summary of proposed Ochoco Summit Trail System, Alternative 5, motorized trails and areas.

Trail Type	Trail system miles	Staging Areas	Mapped Trail Heads
Motorcycle (<24") Trail	62	1	1
ATV (vehicles <50") Trail	47	2	0
4x4 (vehicles <80") Trail	20	1	0
Side-by-side (<65")	6	0	0
Total	**88**	**4**	**1**

Non-Significant Amendments to Forest Plan

Alternative 5 includes four site-specific amendments to the Ochoco Land and Resource Management Plan. Each of these is related to designation of motorized crossings in Old Growth Management Areas (MA-F6) allocated in the 1989 LRMP other than on constant service roads (4-232, 4-234). One additional project-specific amendment would allow designation/construction of motorized trail on scabland.

- Amend Old Growth Management Area (OG-D1-08) at Indian Butte to include motorized recreation only on designated routes including one new crossing to connect between roads 2200-306 and 2200-309.
- Amend Old Growth Management Area (OG-D1-12) at East Porter to include motorized recreation only on designated routes including one new crossing at Looney Creek to connect between roads 4200-430 and 4200-440.
- Amend Old Growth Management Area (OG-D2-02) near Deep Creek to include motorized recreation only on designated routes including one new crossing.
- Amend the Forest-wide Standard and Guideline for Recreation (LRMP 4-177) that states: "ORV use on scablands will be limited to snowmobiles operating on an adequate snow base." The Standard and Guideline would be amended to allow crossing over of scablands on designated routes primarily on existing disturbance (old road beds).

Other Information for all Action Alternatives

Each action alternative would be implemented under a phased implementation approach as partnerships are developed and as funds are obtained. In addition, the Implementation Plan would delay development in selected areas (such as within the Bailey Butte Fire Area) in order to provide time for vegetative recovery, weed treatment, and the natural fall-down of hazard trees. The Implementation Plan would also utilize a construction strategy by which phases of construction would establish functional loops or connections prior to that segment being opened for use by motorized vehicles.

Each action alternative would be implemented within Implementation Area(s) which serves as an area of focus for trail design and construction, signage, education, enforcement, monitoring and maintenance.

Each action alternative would include a mapped OHV Management Area which would serve as the area within which management of motorized travel would be emphasized including closure, concealment, rehabilitation or restoration of unauthorized and unwanted routes; as well as measures to discourage unauthorized motorized use on routes not intended for motorized travel.

None of the action alternatives propose any changes to the current management of motorized winter over-snow recreation.

- Aircraft;
- Watercraft;
- Over-snow vehicles;
- Limited administrative use by the Forest Service;
- Use of any fire, military, emergency, or law enforcement vehicle for emergency purposes;
- Authorized use of any combat or combat support vehicle for national defense purposes;
- Law enforcement response to violations of law, including pursuit; and
- Motor vehicle use that is specifically authorized under a written authorization under federal law or regulations, or approved permit.

The use of motor vehicles off the designated system for purpose of big game retrieval would not be allowed. Proposed timing restrictions to mitigate the potential for disturbance during construction and maintenance of trails, or during restoration activities, for various wildlife, fisheries and other resource conditions would be displayed in the Design Criteria section of this EIS.

Resource Protection Measures

The following features are incorporated into the design of alternatives. Project Design Features are sideboards and assumptions that were used in development of specific alternatives. Mitigation measures are those that are site specific, usually have a specific unit(s) assigned to them, and are used to avoid, minimize, rectify, reduce, or compensate an impact (40 CFR 1508.20). For example, a Project Design Feature may include a seasonal closure for an unknown nest site (if discovered); a mitigation measure would place a seasonal closure on a known nest site specific to a trail system. Project Design Features and mitigation measures are used as a basis for determining and disclosing effects in the Environmental Consequences discussions.

Project Design Criteria Common to All Action Alternatives

The Forest Service developed the following design criteria to be used as part of each action alternative.

OHV Trail Design

- The design, construction and management parameters in the following documents will be used as guidelines when designing the OHV trails for this project.
- *Forest Service Handbook* 2309.18_20
- *Off-Highway Motorcycle & ATV Trails Guidelines for Design, Construction, Maintenance and User Satisfaction* (Wernex 1994)
- *Trail Construction and Maintenance Notebook – 2007 Edition* (Forest Service Technology and Development Program 2007)
- *Trail Planning, Design & Development Guidelines* (Minnesota Department of Natural Resources 2006)
- *Management Guidelines for OHV Recreation* (Crimmins 2006)
- *Sustainable OHV Trails: Layout and Design Clinic* (Recconnect 2009)
- Forest Service Handbook identifies trail construction standards as “trail classes.” These trail classes are not the same as OHV vehicle classes which coincide with proposed trails described throughout this DEIS as Class I, Class II and Class III trails. Other than in this project design element, in this DEIS Class I trails refer to trails for ATVs with a maximum width of 50”; Class II trails refer to trails for 4x4’s (jeeps and buggies) with a maximum width of 80”; and Class III trails refer to trails for motorcycles with a maximum width of 24”.

Design Element: Trail Management objectives will be developed for each new route designated as part of the Ochoco Summit Trail System. FSH 2309.18_20 design parameters would be used as follows: Trail Class 2 will be used for motorcycle trails; ATV trails will be a mix of Trail Class 2 and Trail Class 3 standards; and Four-wheel drive trails (> 50") will be designed using the Trail Class 2 standard.

- Trails will be designed and managed to offer a variety of rider experiences. This will be accomplished by using a blend of tight and open trails (curvilinear features with a variety of sinuosity) that provide a diversity of settings, speeds and challenges.
- Designated routes utilizing existing road beds or routes will be enhanced (narrowed, roughened, etc.) as needed to increase safety and improve rider experience.
- Trail locations and design will provide views, as well as changes in setting, vegetation, soils and topography to the extent possible.
- Curves may be super-elevated (banked) where practical, using natural terrain, to improve flow of the trail and reduce widening. Native or natural appearing materials will be used where necessary to discourage off trail excursion and to narrow and roughen the trails.
- All trails, except learner loops, will be designated for two-way traffic (single trail width with turnouts).
- Trails will be designed to cross cattle guards on a tangent (perpendicular crossing on a straight segment of trail).
- Trails will be designed to minimize sediment transfer to watercourses by using rolling dips, rolling the grade, and reversing grade to facilitate distribution of water off the trail and to prevent run-off from concentrating and running down the trail. Erosion controlling and water diverting structures will be installed when trail tread modifications are not feasible.
- Water crossings and approaches to water crossings will utilize design elements described for water quality and aquatic organisms (see below).
- Trails will be maintained using hand tools, trail groomers (drag pulled by ATV) and when needed a Sweco trail dozer. Other mechanized equipment, appropriately sized to maintain trail width, may be used if available and/or needed.
- Trail, staging area and kiosk signing will generally conform to the COHVOPS sign plan. To the extent possible, sign colors, shapes and messages will be consistent with other COHVOPS trail systems. Information describing appropriate user behavior and ethics will be provided at all designated Staging Areas and Trailheads. Emphasis will be on using TREAD LIGHTLY! and LEAVE NO TRACE programs to educate the public. Information on hunting seasons, State of Oregon Hunting and ATV laws, livestock and other safety concerns will be provided at staging areas.
- A designated trail system will incorporate trail rangers, information kiosks, trail maps, and signs. In addition, federal law enforcement officers will enforce the travel management regulations within the project area.
- Compliance and education patrols will be conducted on a regular basis throughout the season of use and intermittently during closed periods.

Transportation

- Where the proposed trail crosses the highway legal only routes, driving safety is a concern for both the OHV rider and the driving public. These intersections will require additional signing for the trail user.
- OHV trail approaches to highway legal only routes will be designed to allow trail users to stop and look both ways prior to crossing the road.
- Warning signs will be installed in both directions of travel prior to OHV route crossings on highway legal only roads.

- Supplemental Engineering Analysis will be performed on portions of Roads 1250, 2630, 38, 3810, 4250, 4254, 4270 and 4276 to determine what requirements are necessary to allow for safe use by a mix of highway-legal and non-highway-legal vehicles. As needed, actions (such as brushing or signing) will be taken to meet safe use requirements for mixed use traffic on segments of these roads included in the selected alternative.
- OHV routes crossing over or sharing mixed use roads will have signs installed to clarify the designated route location and all points of intersection.

Recreation

- Routes intended for motorized travel on the designated trail system will be posted with directional signs to clarify the open route location.
- Areas intended for motorized travel in "play areas" will have signs posted on boundaries of the designated area to distinguish areas that are open from areas that are not open for motorized travel.
- Routes not intended for OHV travel that cross designated OHV routes will be identified at crossings with the appropriate trail marker (ie. Nordic ski trail, horse trail, snowmobile trail, or hiking trail markers), so that they are easily identified as not being part of the designated OHV trail system.
- Unwanted unauthorized or user created roads and trails that cross designated OHV routes will be physically closed or concealed to discourage/prohibit motorized use. Examples of closure methods include, but are not limited to, gates or fences, ripping and seeding, recontouring, placement of felled trees, roots and/or rocks, or planting with native trees or shrubs. Physical closures will be implemented over time, in a prioritized order, where resource damage is occurring and/or where sensitive fish, wildlife or rare plant habitats are being affected.
- Any new route designated as part of the trail system will be given a system number.
- A Sign Plan will be developed and on-the-ground signing will be used to clearly identify travel routes and the allowed modes of travel.
- Trails and supporting facilities within visual corridors will be designed to meet Forest Plan Visual Quality Objectives.
- Trail segments shared with routes used under recreational special use permits may be temporarily closed during events that are authorized under valid Special Use Permit at the discretion of the Responsible Official. Proposed routes with crossings over such event routes would remain open. Event in progress notices would be placed at staging areas, trailheads or other kiosks in the vicinity of such events. These measures would be coordinated by a Recreation Specialist and/or Special Use Permit administrator.

Minerals and Geology

- Avoid or minimize disturbance within or adjacent to existing noxious weed infestations. Develop a control plan to prevent weed spread in mineral material sources. This could include fencing and gates to control traffic into active portions of rock pits.
- Access for mining activities will be coordinated with mining claimants as needed. Mining Reference – 36 CFR 228A and 228C, Ochoco NF 1989 Forest Plan S&G Pg. 4-171.

Water Quality and Aquatic Organisms

- Stream approaches must be in an area that has the least grade or steepness perpendicular to the stream. This reduces the length of the crossings and amount of sediment that could enter streams from trails in RHCAs and allows for proper water drainage to prevent rutting, rilling and/or gullying.
- Where possible utilize reverse grades (low point of trail coinciding with naturally occurring dips or swales to facilitate drainage) when approaching streams in order to minimize runoff

down the trail and movement of sediment toward the stream. When reverse grades are used, there must be adequate filtering (distance, vegetation, or geology) between the dip and any active stream channel to prevent movement of sediment into active stream channels.

- Out slope and harden approaches to streams using materials such as concrete blocks or similar materials that strengthen unstable surfaces. These treatments prevent movement of soil, gravels, and other surface materials. Hardening will occur where the trail enters and exits the stream crossing to a gradient break for no more than 100 feet. At this point, construct rolling dips or other cross drainage structures of such size that they would disperse water from the trail and be durable enough to hold up to the expected type and level of traffic. If the trail continues up hill, continue constructing the rolling dips or other cross drainage structures approximately every 50 feet, or where there is a break in grade, to prevent channelizing sediment into streams especially during snow melt, rain events, or rain-on-snow events. This will prevent rutting and movement of surface materials into streams during the wet season, (mid-October to mid-June) (USDA Forest Service 2006), or during rain events throughout the summer season provided there is sufficient vegetation on the margins of the trail (Welsh 2008).
- Seeps and springs will be managed using Class III and IV RHCAs as specified in INFISH and PACFISH. This includes springs and seeps within dormant landslide terrain. Ochoco NF S&G Mass Wasting (Pg 4-196-197). Reroute trails to avoid meadows, seeps, and springs. If not possible, puncheon stringers need to be elevated above the meadow. This will allow for continuance of vegetation and prevent cutting off flow of water during wet periods, allowing continued access for frogs and other organisms that inhabit the area.
- New construction of Class I, II, and III stream trail crossings or culvert replacement at existing culverts will be bridges or culverts and will meet the Regional (PNW) Aquatic Organism Passage Guidelines (sized for the 100-year flood and pass all aquatic organisms).
- Trail maintenance will not occur during the wet season (mid-October to mid-June) when the potential for soil erosion and water quality degradation exists. Under coordination with the Hydrologist or Fishery Biologist, this restriction could be waived by the Responsible Official under dry conditions and with a specific erosion control plan (e.g. rocking, waterbarring, seeding, mulching, barricading).
- In water work will occur in accordance with the *Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources*, Oregon Dept. of Fish and Wildlife[4].
- Water drainage facilities and trail treads on trails in RHCAs will be maintained as needed to avoid trail gullying and erosion that would increase sedimentation into Class I, II and III streams. If rutting, rilling, and gullying do occur, the affected trails (or areas) will be shut down until rehabilitated or until reconstructed to alleviate erosion at affected sites.
- Trail construction including crossings, staging areas or any other construction to occur in the Upper North Fork Crooked River Watershed that are identified in the BAER 2006 (Maxwell Fire) report will be field reviewed for having completed vegetation restoration from the fire before any activity proposed in the OHV EIS is implemented.
- Road Conversion to Trail Forest Service National Best Management Practices Program:
- 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 a desired ecologic structures or functions.

[4] http://www.dfw.state.or.us/lands/inwater/Oregon_Guidelines_for_Timing_of_%20InWater_Work2008.pdf

- 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. See nos. 3 and 5 above for additional information about stream crossings.
- All fuel-powered vehicles and tools would be refueled at least 75 feet from any live stream.

Soils

- Use of sediment ponds, trenches, weed free straw bales, geotextile fabric or coconut fiber logs/bales, may be used to prevent or reduce the movement of sediment from the project site to stream channels during construction. These materials will be removed or rehabilitated once the site is stabilized in order to create a natural appearance.
- Trails with grades over 20 percent will be designed to prevent erosion. Where incline or decline exceeds 20 percent trails will be treated to harden the surface or by other techniques which meet the objective of reducing rutting and erosion. Techniques include, but are not limited to tread blocks, rock surfacing, soil amendments, rolling dips and/or reverse grades.
- Where possible, rolling grades and outsloping will be used on trails to reduce concentration of flows and minimize accumulation of water on the trail.
- Woody material will be windrowed at the soil surface on the base of trail fill slopes to catch sediment.
- Maintain large coarse woody material along trail edges, keeping rider safety in mind, to maintain the stability of the trail running surfaces.
- Where trails cross scablands treatments to prevent erosion will be implemented. Techniques may vary by trail type and may include but are not limited to rock surfacing or soil amendments.
- Inventories will occur annually to identify and schedule ongoing trail maintenance needed to ensure resource protection and rider safety.

TES Plants

- A rare plant survey and evaluation will be completed prior to trail construction or other disturbance, such as trail maintenance using mechanized equipment, closing of unauthorized roads or trails, culvert installation or removal, etc.
- Protection measures will be put in place so that impacts to rare or sensitive plants will not occur, or impacts will be mitigated to acceptable levels as determined by the District Botanist. Protection measures may include trail relocation, bridges, boardwalks, or erosion control measures listed in other design criteria.
- To protect TES plant habitat, close the trail system when conditions exist that may result in resource damage (rutting, runoff, etc). Coordinate with the District Botanist when determining conditions for trail closure.

Invasive Plants

- Do not route trails, place staging or camping areas, or other disturbance within areas containing invasive plants.
- To avoid potential spread or introduction of invasive plants, actions conducted or authorized by written permit require cleaning of all equipment (ex. trail dozers, excavators, and other construction or trail maintenance equipment) prior to entering Forest Service lands. This includes cleaning before moving to another location on FS land if equipment inadvertently enters an invasive plant site.

- Any OHV or other piece of equipment used for trail construction or maintenance (such as OHV-pulled trail groomers) should be free of mud, dirt, and plant parts prior to entering Forest Service lands.
- Use of weed-free gravel, fill, sand, or other quarry or borrow materials is required for construction and maintenance of trails, staging areas, camping areas, trailheads, etc.
- Use of weed-free straw and mulch is required for all project activities.
- Maintenance activities for the trail network that involve blading, brushing, ditch cleaning, etc. in areas with invasive plants will be done in consultation with the District or Forest-level invasive plant specialist.
- Invasive plants introduced on designated OHV routes will be treated using the early detection/rapid response strategy; and given a high priority status for treatment.
- Trails, trailheads, play areas, staging areas, etc, that become infested with invasive plants may be closed by the Responsible Official until the infestation is controlled.
- Native plant materials are the first choice in revegetation and rehabilitation projects.
- Construction of trails within the Bailey Butte Fire area should be deferred for a period of at least 3 years post-fire in order to allow vegetative recovery and associated resistance to introduction or spread of invasive plant species.

Special Habitats

- Avoid designating trails within special habitats where possible. Special habitats include aspen and cottonwood groves, wet meadows, springs and seeps, etc.
- When trail designation within special habitat is necessary, consult with the District Botanist for the best placement, and other mitigating measures. Remove as little vegetation as possible during trail construction and maintenance.

Bald Eagle and Golden Eagle

- Active nest sites will be protected from disturbing activities within timeframes and distances shown in Table 5.

Table 5. Seasonal restrictions on trail construction and maintenance for active raptor nest sites.

Species	Buffer Distance	Restriction Period
Northern Bald Eagle	½ mile line-of-sight or ¼ mile not line-of-sight	January 1 to August 31
Golden Eagle	1/2 mile	March 1 to August 15
Prairie Falcon	¼ mile	March 1 to August 1
Osprey	¼ mile	April 1 to August 1
Goshawk	¼ mile	March 1 to August 31
Other Raptors	660 feet (10 chains)	March 1 to August 1

- If an active eagle nest is discovered during implementation, efforts will be made to avoid any further disturbance. Site-specific measures will be determined by the Wildlife Biologist. These may include:
- As needed, trail alignment will be adjusted to provide appropriate buffer type and width for site specific conditions. New construction activities will not occur within 0.25 mile of bald or golden eagle nests. Exceptions will be evaluated on a case by case basis by a wildlife biologist, and may be adjusted based on current protection or management recommendations provided by USFWS and/or ODFW.
- Restrict activities within 0.5 mile of nest sites from March 1 to August 15 for golden eagles.
- Restrict activities within 0.25 mile of nest sites (0.5 mile line of sight, 1 mile for blasting) from January 1 to August 31 for bald eagles.

Goshawk

- No management activities, including new trail construction, will occur inside the mapped 30 acre nest stand. As needed, trail alignment will be adjusted to provide appropriate buffer type and width for site specific conditions. Decommissioning of existing routes may occur in nest cores outside of the seasonal restriction period.
- Seasonal restriction (March 1-August 31) on construction, reconstruction, maintenance and decommissioning activities will be used within 0.25 mile of active nests. Seasonal restriction may be waived on an annual basis if an appropriately timed nest inventory determines that breeding is not active. Exceptions will be evaluated on a case by case basis by a Wildlife Biologist.

Other Raptors

- Active nest sites will be protected from disturbing activities within timeframes and distances from active nests as shown in Table 5. No new construction activities will occur within 330 feet of a nest site (primary zone). As needed, trail alignment will be adjusted to provide appropriate buffer type and width for site specific conditions.
- Construction and decommissioning operations will be restricted for both primary and secondary zones (0.25 mile for osprey and prairie falcon, 660’ for other species) between March 1 and Aug. 1 at active nests. Exceptions will be evaluated on a case by case basis by a Wildlife Biologist.
- An evaluation of potential disturbance will be done by a wildlife biologist prior to planned construction, reconstruction, maintenance or decommissioning if a new nest is discovered. Such an evaluation will take into consideration the species involved, topography, the type, intensity and duration of the activity, and other criteria (such as proximity to open roads, visual screening, etc.).

Snags/Down Logs

- To the greatest extent possible the trail system will be designed to minimize tree and snag felling during trail construction. Retain large (>20” dbh) snags and snag patches to the extent possible during trail lay-out, construction and maintenance.
- Snags that pose a safety hazard which cannot be mitigated will be topped or felled.
- Safety hazards will be identified by a qualified person, as defined by, and using the procedures provided in the interagency Field Guide for Danger Tree Identification and Response (Toupin et. al., 2008).
- Where it can be done safely, danger trees in excess of 20” dbh should be cut with high stumps within suitable habitat for white-headed woodpeckers.
- Active nest trees (or snags) located during layout or project implementation will be designated with a wildlife tree marker and protected. If the nest tree is determined to be a safety hazard, coordination with the Wildlife Biologist will occur to determine if the hazard can be mitigated. If the hazard cannot be mitigated, felling of the tree will occur outside of the nesting season after the young have fledged. No felling of trees or snags with visible nests or cavities will occur from March 1 to August 15. Exceptions or waivers will be evaluated on a case by case basis by a Wildlife Biologist.
- To the greatest extent possible the trail system will be designed to minimize loss of large (>20” diameter, large end) down wood habitat during trail construction. To achieve this, trail location should be selected to avoid placement through squirrel middens, sites with hollow logs or old log decks to the extent possible. Where possible conceal unauthorized and unwanted user created trails by scattering woody debris in full length or with roots attached, rather than cutting into shorter pieces. The intent is to retain large wood (>20”) in the longest

pieces possible along trails.

Big Game

- Timing restrictions will be placed on project construction, re-construction, decommissioning and maintenance activities from May 15 through June 30 within elk calving areas. These areas were established based upon telemetry data from radio collared elk in the Ochoco Mountains (ODFW), district records and other sources.
- Timing restrictions will be placed on project construction, re-construction, decommissioning and maintenance activities from September 1 through October 15 within 0.25 mile of known elk wallows.
- The Rager Cooperative Travel Management Area (green dot road closure agreement) will remain in effect under all alternatives. Only routes designated as open and specified on the TMA map will be available for travel during the period listed on the brochure for each year. The timing of this restriction varies from year to year and is based on the dates of the rifle hunting seasons, which are determined by Oregon Department of Fish and Wildlife (ODFW). Information on the TMA will be provided at Staging areas and trailheads prior to hunting season each year.
- To the greatest extent possible, OHV trails will be routed away from water sources, mineral licks, wallows, wet meadows and aspen stands.

Range

- Use cattle guards at fence crossings to reduce the frequency of gates being left open and allowing livestock to disperse through pastures and other allotments.
- In range allotments, signs will be posted at staging areas and trailheads to inform all user groups that there are livestock in the area and to be aware of their presence.
- Trail distance from water developments should be at least 100 feet to reduce the potential of collisions between livestock and off-road vehicles.
- Trails will not cross an allotment's fenceline more than two times in order to reduce the amount of fence crossings and necessary cattle guards and to reduce the potential for an increase in the need for fence maintenance by permittees. Exceptions would be coordinated with the Range Conservationist.
- Minimize the length of trail running parallel to and within 20' of pasture fences, in order to prevent impacts to fence stability and condition from use of the trail, and to improve safety.

Cultural

- The need for cultural resource survey will be determined along each of the proposed routes, at each proposed staging area and trailhead, and at each proposed restoration site. This need will be determined based on extent of previous survey, location of known sites and high probability areas.
- For known and discovered sites, a list of site-specific design elements will be developed and included in a FOIA-exempt file in the project analysis file, and will be made available to the implementation team for this project.
- Cultural resource surveys will be conducted in advance of all ground disturbing actions. Surveys of potentially impacted areas will be done in accordance with the Ochoco Inventory Strategy.
- To the greatest extent possible the trail system will be designed to minimize potential direct and indirect effects to known cultural sites and historic properties.
- During implementation of proposed activities for this project, if cultural materials are discovered, the activity will stop until the District Archeologist or their representative can review the site. If possible, trail alignment will be re-located in order to avoid newly

discovered sites. In the event that a site cannot be avoided, then mitigation will be required and will be coordinated by the District Archeologist, or the route will be dropped from consideration and not constructed.

- Where a road is converted to a trail through a site, the narrowing of the trail will be accomplished by methods that maintain the integrity of the site below the surface of the road bed. To avoid disturbance to known sites, use methods to narrow routes that do not involve ground disturbance. These include placement of barriers such as down wood or boulders, limiting the clearing of vegetation or overhanging branches, or defining the width of a trail using fallen trees.
- Decommissioning or concealment of existing unauthorized and unwanted user routes may occur on archeological sites, under coordination with the archeologist and using methods that maintain the integrity of the site below the soil surface. Rehabilitation activities on known sites would use appropriate non-ground disturbing methods such as barriers at or above the soil surface and shallow rooted vegetation.
- Trail routes that are proposed on top of, or crossing over, segments of FS road 2630 will include design features in accordance to the Historic Summit Trail Management Plan and relevant Standards and Guidelines (LRMP 4-61, 4-125, 4-180, 4-182, 4-190, 4-192 to 193).
- Unless limited by topography, trail drainage features would be placed outside of site boundaries. If drainage is required within a site boundary, then mitigation would be implemented as described in the Mitigation section of this document.

Mitigation Measures Common to All Action Alternatives

The following mitigation measures are an integral part of each of the action alternatives. These are different from Project Design Features in that they are typically tied to a specific route, trail or location and they are used to avoid, minimize, rectify, reduce, or compensate an impact (40 CFR 1508.20). They are listed here separately to avoid repeating them in each alternative description.

The effectiveness of each measure is rated at high, moderate, or low to provide a qualitative assessment of how effective the practice would be in preventing or reducing resource impacts. These mitigation measures and design elements are considered in the effects discussions of Chapter 3.

Effectiveness ratings of High, Moderate or Low are based on the following criteria: a) Literature and Research, b) Administrative Studies (local or within similar ecosystem), c) Experience (judgment of qualified personnel by education and/or experience, d) Fact (obvious by reasoned, logical, response).

High*:* Practice is highly effective (greater than 90 percent), meets one or more of the rating criteria, and documentation is available.

Moderate*:* Documentation shows that practice is 75 to 90 percent effective; or logic indicates that practice is highly effective, but there is no documentation. Implementation and effectiveness of this practice needs to be monitored and the practice would be modified if necessary to achieve the mitigation objective.

Low*:* Effectiveness is unknown or unverified, and there is little or no documentation; or applied logic is uncertain and practice is estimated to be less than 60 percent effective. This practice is speculative and needs both effectiveness and validation monitoring.

Botanical Resources

- To assure protection of a sensitive plant population adjacent to a class I staging area (Alternatives 2 and 4), a structure such as split rail fencing would be used to define the staging area in proximity to the population. *High*

- To assure protection of active material Sources from invasive plant introduction and to increase rider safety, active portions of active material sources at Scotts Camp and Six Corners will be fenced (Alternatives 2 and 4). *High*

Cultural

- Incorporate data recovery *(high)*, protection *(moderate)*, and/or avoidance *(high)* in eligible and unevaluated cultural resource sites.
- Where site recovery information is required, it would consist of a detailed site record, sketches of the site and any artifacts or features present, gathering GPS data for updates to the spatial record, and entering field data into the corporate tabular database. These data are then forwarded to State Historic Preservation Office (SHPO) to complete the consultation process. *High*

Education, Enforcement, Safety, and Operational Maintenance Plan

The Ochoco Summit Trail Project would place an emphasis on education, enforcement, safety and operational maintenance. The following is a successful model used by the Central Oregon Combined Off-Highway Vehicle Operations (COHVOPS). COHVOPS was first chartered in early 1998, to promote customer service and efficiency in the management of public land with a mission to partner available resources in efficient, cost-effective ways. Their purpose is to provide a high quality OHV program in central Oregon that is centered on consistency, customer service, and resource protection. COHVOPS has the latitude to cross agency boundaries and explore creative new ways of doing business.

Safety, Education and Law Enforcement

The Safety Education strategy and Law Enforcement plan is based on the three "E" concepts: Engineering, Education, and Enforcement. The benefit of a strong safety education program is that it provides *"Education"* as a means to prevent violations through visibility, information, maps, brochures, and signing; the intent is to use education as a means to increase compliance, agency visibility, and visitor safety on public lands. This is achieved through on-the-ground education patrols, staffing education booths at trade shows and other OHV related events and expanding youth education programs. Other methods used to increase OHV education and safety include informational kiosks, quality mapping and signs, and educational materials. Law enforcement actions would likely encourage compliance through education in the first two years of project implementation, although it is unknown what level of non-compliance may occur initially. In a worst-case scenario, if education, monitoring, and enforcement do not succeed in correcting problems, portions of the trail system can be closed using Code of Federal Regulations prohibitions for motor vehicle use (CFR 261.16).

Safety and Education

The safety/education program assists in the implementation of an effective monitoring, maintenance, and enforcement. This program places a strong emphasis on user education and encourages user-ownership of the area, creating an atmosphere of voluntary cooperation and self-policing. Currently, 65 percent of the staff time combined with Trail Rangers, user groups and other volunteers is spent on the ground conducting Education Patrols. The remaining time is used for staffing education booths, teaching the ATV Rider Course, and providing personnel for presentations and special events. Volunteerism has exceeded 360 person days in central Oregon.

The Trail Ranger program has been successfully employed in central Oregon and consists of Forest Service staff and volunteers. The group of volunteers is an important part of the safety/education program and each volunteer is asked to make a commitment of 24 hours per year to the program.

Currently, COHVOPS has a bank of volunteer labor commitments from various central Oregon user groups. Tasks that have been negotiated in the past with these groups and individuals have included trail grooming, maintenance, and annual log out of trails in designated trail systems. They also have a volunteer Sutter (machinery uniquely designed for OHV trail maintenance) operator. Many volunteers donate the use of their personal equipment, including vehicles, motorcycles, ATVs, and chainsaws, while performing services. Initial indications through public outreach on the Ochoco Summit project suggests that there are volunteers willing to help patrol staging areas and trails, provide information and maps, answer questions related to trail conditions, and talk about riding safety.

As part of a larger program, individual volunteers, Trail Rangers, and user groups assist in staffing educational booths at trade shows and other OHV events. This lends the opportunity to reach thousands of potential visitors and provide information about the trail systems, *Right Rider* ethics and education, "Tread Lightly!" principles, OHV Oregon Laws and rules, equipment requirements, and Required to Ride information. The booths at these events are designed to draw in all ages, types and classes of OHV users, individuals that are new to the sport, and the general public that has an interest in OHV use. Whenever possible, the Oregon Parks and Recreation Safety program and trailer is incorporated into the educational booths.

Trail system maps are updated and reprinted as needed for distribution at the various staging areas and trailheads, as well as local vendors and agency offices. Educational materials that are on-hand at display booths come in any number of different forms, including pamphlets, brochures, manuals, and souvenirs. Informational kiosks are located at trailheads and other key locations. These structures offer information on interpretive opportunities, fire restrictions, general area regulations, maps, invasive plant control, wildlife, and other important resource topics.

Mapping and signing are essential for updates on the status of trails/riding areas, how to get there, and how to get back. Mapping and signing makes it easier to disperse riders, increase utilization of the trail systems, increase safety, and provide a way to plan daily trips. Maps also provide another opportunity to inform users on regulations, ethics, user safety, and equipment requirements

Law Enforcement

The Forest Service has the responsibility of enforcing the laws of the United States including Titles 16, 18 and 21 United States Code (USC) as well as the Code of Federal Regulations (CFRs) promulgated under the authority granted in 16 USC §551. Those regulations can be found in CFR, Title 36, Part 261, Subpart A, B and C. Subpart A regulations apply to all National Forest System Lands. Subpart B is Special Orders that apply to specific National Forest System lands such as Regions, Forests, Grasslands, or specific Ranger Districts. Subpart C regulations apply to specific Regions and have gone through the rulemaking process. The CFRs are implemented to address violations that affect National Forest System lands. Violations that affect NFS lands include, but are not limited to, interference with Forest Officers, disorderly conduct, fire, timber, forest products, livestock, fish and wildlife, property, occupancy and use, Forest roads and trails, OHV use, wilderness, and primitive areas.

There are several methods to gain compliance of National Forest System rules and regulations. The primary method to gain voluntary visitor compliance is through proper area engineering coupled with an effective education component. Easily understandable signs, substantial public education and well-engineered barriers to prevent trail proliferation are essential components for success. With these components in place it allows law enforcement to focus on a smaller number of "willful violators."

The first line of enforcement is all Forest Service employees. All Forest Service employees are considered Forest Officers and serve as the eyes and ears for the agency. These employees are

required to document and report any incidents they observe involving the violation of the laws of the United States including the CFRs.

The second line of enforcement is Forest Protection Officers (FPOs). FPOs have authority to issue citations for CFR violations committed on National Forest System lands. These violations typically involve littering, resource damage, OHV violations, and area closures. FPOs also gain compliance through public education during field contacts. Most FPOs work seasonally, but there are also many who work under a full-time status for the Forest Service.

The third line of enforcement is Forest Service Law Enforcement Officers (LEOs). LEOs patrol for and respond to calls for service for CFR violations, state law violations, other federal crimes, and investigations that are more serious in nature. LEOs also gain compliance from offenders through warnings and education.

Forest LEOs can also assert their federal and state arrest authority for those violations that warrant it. Along with protecting the National Forest natural resources, LEOs also provide for the safety of forest visitors, Forest Service employees, Forest Service volunteers, and other government agents.

Having an enforcement presence on the ground encourages public awareness of responsible use, increases compliance with OHV rules and regulations[5], and promotes the protection of natural resources within the recreation areas of central Oregon. An increased presence of law enforcement officers at the staging areas, on the trails, in the dispersed riding areas, and with overflights, gains rider buy-in to the rules and regulations, and reduces acts of violence, violations, and other related offenses. Law enforcement officers support trail and riding ethics and promote OHV education, which relates to the safety of the trail users. A law enforcement presence allows for faster response times to accidents, emergencies, search and rescues, and violations.

The goal of a successful enforcement program is demonstrated by a very high rate of user compliance, which is presently the case within the current designated trail systems in central Oregon. To aid in monitoring effectiveness, each patrol officer records hours of patrol time, contacts made, locations of contacts, types of violations, warnings written, and citations issued. These data are entered into a nation-wide database called LEMARS (Law Enforcement Monitoring and Reporting System). The data are then used to determine areas where education patrols or enforcement patrols are most needed and most effective and also help indicate where additional signing, information kiosks, and trail maintenance may be needed or required.

Trail Rangers employed by the Forest Service have the authority to issue citations, although the main emphasis is education. Volunteers that patrol as part of the Trail Ranger program are used to enhance the routine enforcement by Forest Protection Officers, Forest Service law enforcement officers, and the County Sheriff Patrols.

Full time law enforcement officers spend approximately five percent of their time conducting OHV compliance patrols. They have the ability to patrol OHV areas on Class I and III ATVs, all other patrols are by vehicle. This includes the intermittent use of aerial patrols throughout the spring and fall. Prineville BLM makes up the overall staffing of patrol officers in central Oregon with one full time and one three quarter time BLM Law Enforcement Rangers. The Forest Service is staffed with six law enforcement officers: three located in Bend, and one each in Crescent, Sisters, and Prineville. These officers are responsible for law enforcement on the Deschutes and Ochoco National Forests and the Crooked River National Grassland, which encompass just over 2.5 million acres. These lands extend about 100 miles along the east side of the Cascade Mountains crest and eastward into the Ochoco Mountains. The officer that is stationed on the Ochoco National Forest may respond to calls from anywhere in Central Oregon. Also, there are approximately 25 Forest Protection Officers.

[5] Monitoring has shown a high level of compliance on designated trail systems in central Oregon managed by COHVOPS. The referenced monitoring data may be requested from the Ochoco National Forest.

Although the FPO and LEO presence on the Forest is limited at this time, there is a cooperative deputy from Crook County whose primary responsibility is to designated motorized trail systems. There are also funding opportunities for user education and law enforcement through Oregon Parks and Recreation's OHV funds that are not available for enforcement of non-designated areas. This source has helped the COHVOPS organization to fund four to five full-time Deputy Sheriffs with focused responsibility on designated motorized trail systems.

The action alternatives would create a limited area in which motor vehicles can legally operate by designating a trail system within the project area. The remaining area would be closed to motorized travel except on Maintenance Level 2-5 roads. Part of the strategy for Law Enforcement personnel would be to allow the public to gain knowledge of the new rules and system through information provided by law enforcement personnel, OHV volunteers during field contacts, at trailheads and staging areas, and at the Ochoco National Forest office.

Staging areas offer a centralized area for law enforcement personnel to provide compliance emphasis with regard to CFRs and state laws. They also provide a centralized area where equipment checks could be conducted.

Operations and Maintenance

In order to provide a high quality, well maintained trail system, the Ochoco Summit Trail System project would endeavor to utilize the assets in the Central Oregon Off-highway Vehicle Operations (COHVOPS) Operations and Maintenance program. Through formation of one OHV team, it provides the most efficient staffing, equipment, and materials necessary to operate and maintain the central Oregon OHV trail systems.

Through consistent operations and maintenance, the Ochoco Summit trail system would be maintained in a condition where the width, depth, drainage, and control of the OHV riders to keep within the parameter of the designed trail. The maintenance performed is dependent on moisture and weather conditions. The maintenance schedule and priorities may change during the year depending on unusual climatic events, shifts in use patterns, or updated information obtained from condition surveys. Most maintenance would be performed mid-week to avoid conflicts and safety issues with the OHV customers.

COHVOPS currently manages eleven designated trail systems with 657 miles of trails, 305 miles of shared use roads, and ten designated OHV play areas. Timely maintenance keeps the integrity of the trials in check by logging out fallen trees, keeping impinging brush from forming, and maintaining proper drainage to confine potential undesired off-site effects. It also keeps moguls from forming; moguls can potentially be a hazard to trail users. Routine activities include an annual sign maintenance program.

The following are specific details involved in the proposed trail maintenance program:

Condition Surveys – Periodic condition surveys would occur for the trails, play areas, staging areas, and facilities within each of the OHV riding areas to provide an assessment of priority maintenance. The condition of each trail, the number and condition of all trail signs, condition of fencing, road crossings, play areas, staging areas, camping areas, and access roads would be documented.

Trail Logout – Trees that fall across trails create obstacles that must be removed before user-created trails are developed around the blockage. Trail logout takes place as trails open in the spring, after major windstorms, and periodically throughout the year to make certain there are no trees blocking the trails. Much of the logout would be accomplished by volunteers supporting the program.

Trail Grooming – Trail grooming slows the development of trail moguls or whoops, fills holes and ruts, and improves the riding surface of the trails. Regular grooming has many obvious benefits for riders and keeps them confined within the trail system, but it also extends the interval of time before

reconstruction becomes necessary. Trail grooming normally occurs during the spring and the fall when there is enough moisture in the ground to solidify the trail tread. Currently, COHVOPS averages 600 miles of trail grooming during a normal year.

Trail Reconstruction – Grooming is an excellent tool to defer trail reconstruction, but when the moguls become too large, it becomes necessary. Trails are generally reconstructed every three to five years, depending on use. Trails at the core of the system may need to be reconstructed annually due to extremely high use levels. Trail reconstruction may also be used to change the design of a trail and create a higher quality riding experience. A winding trail also slows the riders down making the trail safer and decreases the development of moguls. After reconstruction, the trails remain temporarily closed until the grooming is complete and the tread has solidified. Most traill reconstruction would occur in the same timeframe as grooming. Currently, approximately 150 miles of trails are reconstructed by COHVOPS annually.

Facility Maintenance –This includes cleaning and pumping of toilets; site maintenance of staging areas and camp sites, maintenance of kiosks, map boxes and split rail fencing, garbage removal, litter cleanup; and repairs from vandalism.

Sign Maintenance – Signs and accurate maps are one of the key elements in customer service and keeping riders where they are designated to ride. Currently, COHVOPS and its partners maintain over 6,500 signs within the existing Central Oregon trail systems, staging areas, access roads, and play areas. They are frequently in need of repair or replacement due to damage from the elements, vehicles, or vandalism. Missing, damaged, or vandalized trail signs would be replaced as soon as possible. The priority would be to replace safety signing, such as yield, yield-ahead signs, warning signs on open roads prior to and at OHV trail crossings, and shared use road signs.

Equipment Maintenance –Use of specialized equipment requires a good maintenance program. Equipment expected to be used includes chain saws, Sutters, ATVs, and motorcycles as part of the education and enforcement program.

Operations and Maintenance Guidelines

- An annual trail maintenance plan would be prepared that would outline the trails/areas to be worked on and the recommended treatments. All maintenance performed would be recorded on a maintenance log to facilitate future planning and accounting of work accomplishments.
- Trail condition surveys and monitoring would be performed to identify maintenance needs. Any undue hazards that are identified would be treated as a priority.
- Once heavy maintenance is performed with the Sutter, the trail would be closed until enough moisture is received to firm up the trail tread.
- To improve the flow of the trail and reduce the potential for widening, curves would be super elevated where practical.
- Trail grooming would be performed on high use trails to slow the growth of moguls and maintain a smooth tread. If moguls develop to the point that users ride off to the side of the trail, the trail would be scheduled for reconstruction. Generally, trails that have been reconstructed most recently would receive priority for grooming.
- Any off-trail tracks would be raked out, concealed, rehabilitated or obliterated.
- Dead, inflexible limbs and stubs would be pruned during regular maintenance. To the extent possible, pruned limbs would be cut flush with the trunk. Any live limbs that would require pruning would be cut beyond the collar or branch to facilitate healing over of the cut.
- During logout, an adequate width and turning radius would be maintained; the cut material would be strategically placed to prevent shortcutting the trail, or to deter any off-trail use.

- When a trail follows a closed road, cut material from logout would be staggered randomly from one side to the other so that an "S" alignment is created. The cuts would not exceed the recommended clearing widths so the trails would not be passable by full-sized vehicles.
- Trees that are leaning over the trail or suspended over the trail may be left in place if they are more than six feet above the trail tread and there is adequate sight distance in both directions to see and react to the potential obstacle.
- Any trail signs that are vandalized would be replaced as soon as practical. Replacing safety and regulatory signs would be a priority.
- Generally, no maintenance would occur at play areas unless unsafe holes or ledges develop. Play areas would be checked regularly for signing or fencing damage and other needs.
- All trailheads, staging areas, and facilities would be maintained to clean and safe conditions, having the appearance being sanitary, well-kept and maintained.
- Trailheads, staging areas, and camps would be patrolled 1-2 times per week during the primary season. Litter would be picked up, signs replaced, fences repaired, and bollards installed as needed. Vault toilets would be checked and cleaned at least weekly during the prime season and as needed during the shoulder seasons. Toilets would be checked daily during holidays and other peak days. Vaults would be pumped as required.
- Kiosks would be checked weekly. Faded or damaged posters, signs, and maps would be replaced as needed.
- Map boxes would be stocked weekly, or more often as needed.
- Entry signs would be checked regularly for vandalism and repaired or replaced as needed.
- Gravel roads are maintained by the road crew on an lperiodic basis.
- The trail groomers are utilized to maintain the parking areas and spurs as needed. Spot rocking may be employed to harden soft areas.
- Vandalized facilities would be repaired or replaced as soon as practical.
- Boulder or other barriers would be installed to define campsites as needed.
- Potential effects to sensitive resources are mitigated by avoidance through trail location, site hardening, use of physical barriers, seasonal closures, and other effective mechanisms.
- Vegetation removal is kept to a minimum. Most maintenance requires only minor trimming of overhead vegetation or removal of fallen trees.
- If monitoring indicates that a decline in user experience or unacceptable numbers of riders are using a trail system, an assessment of the need to implement a method designed to control and/or limit the number of riders would be developed.
- Through consistent operations and maintenance, trails are maintained in a condition where the width, depth, drainage, and control of the riders is adequate to protect adjacent resources; trails are kept within the parameter of the designed trail management objectives; and in a condition that provides for user safety.
- Informational kiosks, located at trailheads and other appropriate locations, are used to provide information on general area regulations, trail etiquette, maps, invasive plant prevention, wildlife and resource protection, fire restrictions, and for interpretive opportunities.
- Trails maps are provided at all trailheads, staging areas, kiosks, and USFS offices and are made available on-line. The maps provide information on regulations, signing, ethics, safety, as well as trail locations.

Trail and/or Area Closure

The intent of the Ochoco Summit Trail System project is to provide a well-designed trail system on which people may participate in OHV recreation in a manner that is safe and consistent with resource objectives on the Ochoco National Forest. If, however, unintended effects occur that are not consistent with resource objectives and are not preventable or manageable using the methods

described above, the Ochoco National Forest Supervisor has the discretion to close trails and/or areas, as described in 36 CFR 261.50:

> (a) The Chief, each Regional Forester, each Experiment Station Director, the Administrator of the Lake Tahoe Basin Management Unit and each Forest Supervisor may issue orders which close or restrict the use of described areas within the area over which he has jurisdiction. An order may close an area to entry or may restrict the use of an area by applying any or all of the prohibitions authorized in this subpart or any portion thereof.
>
> (b) The Chief, each Regional Forester, each Experiment Station Director, the Administrator of the Lake Tahoe Basin Management Unit and each Forest Supervisor may issue orders which close or restrict the use of any National Forest System road or trail within the area over which he has jurisdiction.

Monitoring

The Forest Service believes a well-designed and monitored trail system can provide a positive riding experience for a segment of the public that desires a designated trail system while maintaining various other uses and values of the National Forest lands. The following summary of the planned monitoring within the Ochoco Summit Trail System project area includes specific monitoring items identified by resource area:

Soil and Water Quality

- Implementation monitoring and Water Quality monitoring to evaluate the effectiveness of BMPs and INFISH standards and guidelines is included for all the action alternatives.
- Drainage would be monitored prior to opening of the trails to ensure that they are functional during operating season, and after the open season to ensure that they are fully functional going into the winter when the trail is not in use.
- Areas with high erosion potential would be monitored to determine whether design treatments intended to reduce erosion potential were implemented according to plans and that they are effective in achieving desired outcomes. Possible methods include establishment of long term photo points or transects in selected sites to monitor changes in soil depth, displacement and compaction.
- The alternatives include several design elements aimed at reducing the potential for sediment delivery from trails in RHCAs and at stream approaches. Selected reaches would be monitored to evaluate changes in sediment. Baseline water quality data for normal conditions would be established at selected sites, and would be used as a basis from which to measure change. Water quality standards and the amount of acceptable change would be identified. Monitoring would occur along stream courses, springs, wet meadows, and RHCAs to determine whether project design elements were implemented as planned and whether they are effective in meeting protection needs.
- Unauthorized or unwanted user created routes that are closed or decommissioned under this project would be monitored to determine if effective ground cover has become established in order to minimize erosion and sedimentation.

Invasive Plant Species

- High priority areas such as sensitive plant populations, rare habitats, staging areas and parking areas would receive regular monitoring and prevention for invasive plant species presence. If noxious weeds are found, an early detection rapid response strategy for treatment of weeds would be implemented.

- Trail segments within the Bailey Butte Fire Area would receive regular monitoring and prevention for invasive plant species. If noxious weeds are found, an early detection rapid response strategy for treatment of weeds would be implemented.

Wildlife

- Although no trail systems have been designed to overlap existing known bald eagle nest sites or Bald Eagle Management Areas (BEMAs), periodic monitoring of selected bald eagle nest sites would continue to occur within the project area as part of the wildlife monitoring program.
- Although no trail systems have been designed to overlap existing known goshawk core areas or primary zones for other raptors, periodic monitoring of selected raptor nest sites would continue to occur within the project's area of influence as part of the wildlife monitoring program.
- Monitoring and enforcement of system route closures within the Rager Cooperative Travel Management Area would occur. The focus would be during hunting season and would emphasize patrols within the TMA.
- Periodic monitoring of designated routes through special wildlife habitats such as elk calving areas, old growth management areas, pileated woodpecker foraging habitat and goshawk post fledging areas would be conducted to determine if unauthorized or user created routes are developing in a fashion that connects with the designated route. If such unwanted, unauthorized or user created routes are detected then steps would be taken to close, rehabilitate and/or conceal such routes at their intersection with the designated route and at their point of origin.

Range

- As part of a routine maintenance program, monitoring of all fences that are crossed by a designated route would occur during and after trail construction and route designation and periodically after implementation to determine effectiveness and needs for maintenance or repair.
- Monitoring of all water developments that are within ¼ mile of a designated route, trailhead or staging area would occur during and after trail construction and route designation and periodically after implementation to determine if unauthorized routes have developed which need to be closed.
- Monitoring of range designated monitoring areas (DMAs) that are within ¼ mile of a designated route, trailhead or staging area would occur during and after trail construction and route designation and periodically after implementation to determine if unauthorized routes have developed that need to be closed.

Cultural Resources and Site Monitoring Plan

- Monitoring of all sites that are crossed by, or adjacent to, a designated route would occur during and after trail construction and route designation. Following implementation, site visits would occur periodically to ensure that integrity of these sites is being maintained. This would be coordinated by the District or Forest Archaeologist.

Road Management and Public Safety

- The Road Manager(s) would be responsible for monitoring the condition of designated mixed use routes and crossings of open roads, addressing items that may need corrective action associated with timing of maintenance and public safety. Visibility related to adequate sight distance on curves and at intersections and adequate signing would be the focus.

Recreation

- Monitoring would be conducted by Central Oregon Off-Highway Vehicle Operations (COHVOPS) which incorporates agency personnel and volunteers into an integrated education and enforcement program that monitors elements such as sound testing at staging areas and key locations, and rules related to camping and use of the trail system.
- Trail management would include implementation monitoring of trail construction (including all design elements), type(s) of vehicle accessing each trail area and season of use.
- For conversion of road beds to trails, monitoring would be conducted to determine if widths in excess of trail width specifications were adequately rehabilitated with effective ground cover or width controlling devices such as logs or boulders.
- Trails would be monitored annually to determine if improvements need to be made to support intended use and compliance with trail rules.
- Trail Condition Surveys would be conducted annually to determine if repair or restoration needs have arisen. Monitoring would be done both before the trails open for public use in the spring and throughout the open season. These surveys also include checking to determine if unauthorized or user created trails have developed that need to be addressed.
- Stationary sound testing (Society of Automotive Engineers (SAE Standard J1287) of vehicle dB levels would be conducted periodically at all staging areas.
- Ambient sound testing would be conducted periodically in selected areas (such as Walton Lake Basin) during the operating season to determine the effectiveness of the Sound Model and application of the 45 dB level for establishing sound impacts above ambient level.
- Monitoring of campsites at staging areas and trailheads would be conducted to determine if the camp areas are accommodating user needs, and to determine if camp sites need to be defined (placement of physical limits).
- Trail use would be monitored in selected locations via a combination of visual visitor counts at staging areas, traffic counters and trail counters.
- Implementation monitoring results would be available through the Forest Plan Monitoring Report. At the programmatic level, minimum trail plan monitoring would include an annual report of the following:
    - Miles of new trail constructed by user type
    - Miles of trail reconstruction by user type
    - Miles of trail maintained by user type
    - Miles of total trail that meet meaningful measure standards

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 may have been outside the scope of the purpose and need (to designate a sustainable system of roads, trails and areas open to motor vehicles that will provide legal public access, enhance regulation of unmanaged wheeled motor vehicle travel, protect resources, and decrease conflicts between motorized and non-motorized use on the Ochoco National Forest), 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.

A concept utilizing one long all-user trail system (80” wide) with short side loops for individual user groups (50” and 24”wide) was explored early in this planning effort. When presented to the Provincial Advisory Committee (PAC) the planning team was told that a long all-user trail would not satisfy the needs or desires of the OHV community. It was suggested that the all-user concept be dropped and separate trail systems developed that would emphasize opportunities and quality for individual user groups. Based on that feedback the all-user central network concept was abandoned and the Proposed Action was developed.

Numerous potential routes were provided by COMAC (Central Oregon Motorcycle and ATV Club). To the extent these routes fit within the sideboards established for this project (refer to Purpose and Need, Chapter 1) the COMAC routes were incorporated into project alternatives. However many of the suggested routes were not included in a fully developed alternative due to conflicts with sensitive resources (sensitive plant habitat, weed populations, fish bearing streams, etc), established uses or recreation emphasis (horse camp, semi-primitive recreation, etc), riparian management objectives or other established land management objectives. For example: a motorized route from the staging area at Ahalt Pit into the Walton Lake Basin and connecting with highway legal roads at Ochoco Creek was found to be inconsistent with objectives for recreational uses at Walton Lake and did not connect with any other trail or mixed use road. Establishing a loop trail between mixed use roads at Walton Sno-Park and Round Mountain was found to be inconsistent with objectives for Round Mountain National Recreational Trail. For these reasons the suggested routes northwest of Walton Lake and south of Walton Sno-Park were not included in a fully developed alternative.

Several options were considered for changing the designation of highway-legal roads under the Forest- level Travel Management Plan, in order to provide mixed use opportunities potentially connecting with trail systems that were being evaluated. The road segments considered included: FS 2630 between the junction with 2200-150 and 2630-400 to connect between the mixed use portions of 2630; FS 2200-150 to connect the staging area at Walton Sno-Park with mixed use portions of the 2630; FS 2200 to connect between trails at Howard Creek and the staging area at Walton Lake; FS 4250 south of the junction with 4256 to a COMAC route coming in from the west; FS 3810 or 4200 to connect between Wolf Creek Campground and the proposed trail network via mixed use roads; a short segment of FS 30 to connect mixed use roads 3000-800 and 4256 and a short segment of FS30 to connect mixed use roads 3000-500 and 4200-450. Due to declining road maintenance budgets and concern for public safety on these high use, high speed roads it was believed that generally the cost of making the changes necessary to make them safe for shared use by traditional and OHV traffic would not be a priority for road and OHV trail maintenance funds. Therefore conversion of highway legal roads to mixed use roads was an alternative that was not fully developed. In some areas parallel trails are included in action alternatives that provide the connections on a constructed trail rather than by putting the OHV onto high traffic roadways. Examples of this are parallel trail on segments along FS 12, 42 and 38 near the Six Corners and Cottonwood Pit Staging Areas, and also along the FS 30 between 3000-500 and 4200-450. In other cases an alternate connection was provided requiring only direct crossing of highway legal roads. Examples of this are connecting loops just east of the FS 30 connection between 4256 and 3000-800 under Alternatives 2 and 4.

Some suggested alternatives were outside of the project area and were considered to be outside of the scope of this analysis. One of these areas, the McKay Creek watershed, could connect to the existing Green Mountain Trail, but it is outside of this project area and therefore outside of the scope of this project. Another area that was suggested was FS 5810, which starts in the project area but travels outside of the project area prior to reaching Spanish Peak. This option was considered by the team, but it is outside of this project area; therefore, converting this highway legal road to a mixed use road in this area would be outside the scope of this project.

A commenter suggested that instead of using Ochoco Divide Snopark as a staging area, a staging area should be constructed further to the south along Highway 26 (closer to Prineville). The

recommended location was examined by the project ID team and visited by the Forest Service and some members of the public. Due to concerns about safety (related to sight distance on Highway 26), cost, and commitment of natural resources associated with converting a forested site to a staging area, this alternative was abandoned in favor of keeping the staging area at Ochoco Divide Snopark. The Snopark is an existing, paved facility with safe access from Highway 26.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative (see Table 6). Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

Table 6. Comparison of alternatives.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Total miles in Designated System Routes (including mixed-use roads)	0	170	101	212	135
Total miles of OHV trail	0	124	88	158	105
Miles of Class I Trail	0	55	35	95	38
Miles of Class II Trail	0	20	0	18	12
Miles of Class III Trail	0	49	53	45	50
Miles of Class IV Trail	0	0	0	0	5
Miles of trail not on GIS roads (“new construction”)	0	69	50	84	51
Number of Dispersed Campsites within which OHV noise from the developed trail system might be greater than 45 db	0	35	18	37	38
Miles of Dispersed Camping Roads within the >45 db noiseband	0	65	26	73	62
Miles of Equestrian Endurance Event Route within the >45 db noiseband	0	1.89	1.46	2.12	4.75
Miles of Keeton Trail within the >45 db noiseband	0	0.03	0.02	0.02	0.1
Number of Developed Recreation Sites within which OHV noise from the developed trail system might be greater than 45 db	0	4	4	5	3
Acres of Roaded Modified Recreation Opportunity Spectrum within the >45 db noiseband	0	10,837	5,818	12,771	12,541
Acres of Roaded Natural Recreation Opportunity Spectrum within the >45 db noiseband	0	1,668	1,059	2,220	2,476
Acres of Semiprimitive Non-Motorized Recreation Opportunity Spectrum within the >45 db noiseband	0	276	117	292	359
Miles of trail system in RHCA	0	17.2	7.3	22.0	12.4

Table 6. Comparison of alternatives.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Total stream crossings (cl 1 – 4)	0	150	74	168	45
New stream crossings (cl 1 – 4)	0	62	30	69	17
Class 1 & 2 stream crossings	0	28	16	28	18
All perennial stream crossings	0	25	13	30	21
Intermittent stream crossings	0	69	34	85	34
Ephemeral draw crossings	0	53	27	52	7
Increased motorized route density – 6th Field (number of subwatersheds in the project area)	0	11 of 30	9 of 30	13 of 30	16 of 30
Acres USFS more than 1/2 mi from motorized route	50,177 (16%)	44,374 (15%)	45,148 (15%)	43,085 (15%)	44,944 (15%)
Acres USFS less than 200 m from motorized route	115,127 (38%)	125,745 (42%)	123,036 (41%)	129,390 (43%)	124,432 (41%)
Acres of elk security habitat (1/2 mi + 250 ac)	47,969 (16%)	42,460 (14%)	42,514 (14%)	41,132 (14%)	42,431 (14%)
Acres of big game hiding cover (>1/2 mi from motorized route)	11,847	11,558	11,465	11,285	11,437
Acres of big game thermal cover (>1/2 mi from motorized route)	9,197	9,089	8,978	8,915	9,035
Total big game cover (>1/2 mi from motorized route)	21,044	20,647	20,443	20,200	20,472
Miles of system within 660' of hawk/owl nest	0	0.25	0	0	0
Miles of system within1/4 mi of osprey nest	0	0.6	0.46	0.46	0.46
Miles of system within ¼ mi of goshawk nest	0	2.95	1.46	2.78	1.96
Miles of system within goshawk post-fledging area	0	5.98	4.13	7.6	3.5
Miles of system within Old Growth Management Areas	0	2.59	1.44	2.54	1.47
Miles of system within mapped pileated woodpecker feeding habitat	0	2.8	0.7	2.5	2.2
Acres and miles of designated trail system in special habitat (Hardwood)	0 acres 0 miles	0.6 acres 0.5 miles	0.6 acres 0.5 miles	0.6 acres 0.5 miles	0.4 acres 0.3 miles
Acres and miles of designated trail system in special habitat (Meadow)	0 acres 0 miles	2.4 acres 2.02 miles	2.5 acres 2.1miles	4.1 acres 3.35 miles	1.4 acres 1.17 miles
Acres and miles of designated trail system in special habitat (Rock)	0 acres 0 miles	1.3 acres 1.1 miles	0.7 acres 0.6 miles	1.6 acres 1.3 miles	0.8 acres 0.68 miles
Acres and miles of designated trail system in special habitat (Shrub-scabland)	0 acres 0 miles	29.1 acres 24.0 miles	10.8 acres 8.9 miles	33.2 acres 27.4 miles	16.18 acres 13.35 miles
Crossings with highway legal only roads	0	20	16	23	13
Rehab/Restore sites - user created routes	0	89	54	106	62
Rehab/Restore sites - decommissioned roads	0	11	7	8	8

Table 6. Comparison of alternatives.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Rehab/Restore sites – closed roads	0	109	84	163	98
Estimated Construction Cost	0	$978,500	$759,000	$1,071,000	1,221,000

CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This Chapter summarizes the physical, biological, social, and economic environments of the project area and the effects of implementing each alternative on that environment. It also presents the scientific and analytical basis for the comparison of alternatives presented in the alternatives chapter.

"Affected Environment" refers to the existing biological, physical and social conditions of an area that are subject to change directly, indirectly, or cumulatively as a result of a proposed human action. Information on the affected environment is found in each resource section under "Existing Condition."

The temporal and spatial scale of the analysis is variable depending upon the resource concern being evaluated. The landscape within the Ochoco Summit Trail System project area boundary is the focus of this EIS, but adjacent lands are considered in this analysis process.

Measures to mitigate or reduce adverse effects caused by the implementation of any of the actions proposed are addressed in Chapter 2, Resource Protection Measures. Effective mitigation avoids, minimizes, rectifies, reduces, or compensates for potential effects of actions. After mitigation is applied, any unavoidable adverse effect to each resource area is addressed in the section titled "Other Disclosures" in this chapter of the EIS.

The following discussion of effects follows CEQ guidance for scope (40 CFR 1508.25(c)) by categorizing them as direct, indirect, and cumulative. The focus is on cause and consequences. Effects exist in a chain of consequences and thus may be labeled "indirect" (occurring later in time or farther in distance, 40 CFR 1508.8(b)), rather than cumulative. For this analysis, in general, direct and indirect effects have been discussed in the context that most readers are accustomed to: those consequences which are caused by the action and either occur at the same time and place, or are later in time or farther removed in distance but are still reasonably foreseeable (40 CFR 1508.8). Cumulative effects are discussed where there is an effect to the environment which results from the incremental effect of the action when added to other past, present, or reasonably foreseeable future actions (40 CFR 1508.7).

Cumulative Effects

There are basically two methodologies the individual resource subjects use in discussing cumulative actions and consequences. The first method would be to describe each individual past, present, and reasonably foreseeable action – including mitigation (cataloging). The second would be to "lump" individual actions if the information regarding those actions would not be useful to illuminate or predict the effects of the proposed action and its alternatives. A mere "cataloging" of effects does not provide the most useful discussion. In some cases, lumping past actions and describing them in terms of "where we are today" can be the most informative. No matter which method is used, it would be formulated to provide the most relevant, useful, helpful, necessary and informative format for the public and deciding official.

The Environmental Consequences disclosures in this EIS include discussion of cumulative effects. Where there is an overlapping zone of influence, or an additive effect, this information is disclosed. 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.

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 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 can't reasonably identify each and every action over the last century that has contributed to current conditions. Additionally, by focusing on the impacts of past human actions, an analysis may risk ignoring the important residual effects of past natural events, which may contribute to cumulative effects just as much as human actions do. 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 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 EIS is also consistent with Forest Service National Environmental Policy Act (NEPA) Regulations (36 CFR 220.4(f)) (July 24, 2008), 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). Table 7 is merely a listing of past present and foreseeable actions that have potential to overlap the project area. Because the project appears in this table does not necessarily mean it has an additive effect. Each resource specialist has reviewed this table and if there is a past, present, or foreseeable effect, it is disclosed in the individual resource area in Chapter 3.

Table 7. Past, present and reasonable foreseeable future actions.

Project/Event Name	General Description of Activities	Status
Spears Vegetation and Fuels Management	Commercial and non-commercial vegetation management and fuels reduction; hardwood and upland shrub restoration and road management (4.4 miles construction, 11.0 miles reconstruction, 5.9 miles decommissioning).	Implementation
Zane Vegetation and Fuels Management	Manage stand density and fuels within the Zane Project Area (Allen Creek Watershed).	Implementation
Canyon Fuels and Vegetation Management Project	Commercial and non-commercial vegetation management and fuels reduction; hardwood and upland shrub restoration and road management (0.6 miles construction, 2.0 miles temporary road reconstruction, 4.4 miles reuse of existing temporary roads, 4.9 miles decommissioning, 2.9 miles closure),	Implementation
Ochoco Valley Fuels	Prescribed fire and associated fuels reduction activities in the Ochoco Creek Watershed	Implementation
Gray Prairie Fuels	Prescribed fire and associated fuels reduction activities in the Gray and Lytle Prairie areas of the North Fork Crooked River Watershed	Implementation
Deep Watershed Restoration	Proposed stream channel reconstruction, culvert replacements, stream cutbank stabilization, road decommissioning and riparian exclosure fencing along Deep Creek and its tributaries	Implementation
Howard Elliot Johnson Fuels and Vegetation Management Project	Commercial and non-commercial vegetation management and fuels reduction; hardwood and upland shrub restoration, headcut repair and road management (0.4 miles construction, 16.8 miles temporary road reconstruction, 4.4 miles reuse of existing temporary roads, 4.9 miles, and 22.7 miles of closure),	Implementation
Jackson Fuels and Vegetation Management Project	Manage stand density and fuels within the Jackson Project Area (Deep Creek Watershed).	Implementation
Bailey Butte Fire Suppression and Rehabilitation	Installation of fireline and burn-out operations to contain the Bailey Butte Wildfire, followed by decommissioning of firelines, closure of roads not open under MVUM, seeding, planting of riparian vegetation, protection of aspen stands, reconstruction of fences and treatment of noxius weeds.	Implementation
Bailey Butte Fire Project	Salvage of fire-killed timber and abatement of roadside hazards within the Bailey Butte (2014) fire perimeter; reforestation within severely burned stands.	Implementation
Bailey Butte Fire BAER	Road and hazard sign installation, hazard tree cutting, culvert maintenance and removal, soil stabilization,restoration of drainage patterns, road maintenance, fence repair, seeding, detection and treatment of noxious weeds, and monitoring	Completed
Invasive Plant Treatments (2007)	Deschutes and Ochoco National Forests, Crooked River National Grasslands EIS to reduce the extent of specific invasive plant infestations at identified sites and to protect areas not yet infested from future introduction and spread of invasive plants species from these sites.	Implementation
Region 6 Invasive Plant EIS (2005)	Implements Standards and Guidelines and prevention strategies to manage invasive plant species	Implementation

Table 7. Past, present and reasonable foreseeable future actions.

Project/Event Name	General Description of Activities	Status
Range Management	The following allotments overlap the project area: Burn, Marks Creek, Crystal Spring, Snowshoe, Canyon Creek, Reservoir, Lookout, Brush Creek, Pringle, Antler, Gray Prairie, Lost Horse, North Fork, Fox Canyon, Big Summit, Deep Creek, Roba, Pisgah, Elkhorn, Badger, Indian Creek, Happy, Derr, Little Summit, Wolf Creek, Rock Creek, Bearskull/Cottonwood and Buck Pasture. Twenty-five of the allotments are active allotments, one of which is a sheep allotment. Remaining active allotments are currently grazed by cattle.	Ongoing
Three Trails OHV Project	Proposal to designate approximately 200 miles of trail systems and staging areas near Boundary Springs, Two Rivers, and Crescent Lake Junction. Also would rehabilitate user-created trails. A Deschutes National Forest Plan Amendment would be needed.	Implementation
Umpqua National Forest Travel Management EA (2010)	The proposed action would eliminate cross-country travel, allow motorized use on most of the current open roads, and include approximately 721 miles of OHV trail open to class I and III. Access to dispersed camping would have special provisions to limit access to sensitive areas.	Implementation
Willamette Travel Management Rule Implementation EA (2009)	Motorized travel on the Willamette National Forest would be restricted to designated roads and trails only. Access to dispersed camping would have special provisions to limit access in sensitive areas.	Implementation
Central Oregon Travel Management Project EIS	The Travel Management EIS implements the travel management rule (prohibiting motorized travel off of existing designated routes where it is not currently prohibited) and continue to provide motorized access for dispersed camping. Motorized travel in Central Oregon would be restricted to designated roads and trails only. Access to dispersed camping would have special provisions to limit access to sensitive areas.	Implementation
Cline Buttes Recreation Area Plan EA	Proposal to create a transportation system and recreation facilities on 32,000 acres of BLM lands approximately five miles west of Redmond.	Implementation
Rim Butte OHV Jeep Trails EA (2013)	Primarily Class II route 17.6 miles, Deschutes NF, Bend Fort Rock RD on the southern end of the East Fort Rock OHV Area.	Implementation
Walton Lake Restoration Project (2015)	Commercial sanitation harvest, commercial and noncommercial thinning, slash disposal, planting of native shrubs, seeding and road management (use then closure of 0.41 miles of temporary roads).	Implementation
Wolf Vegetation and Fuels Management	Proposal for commercial and non-commercial vegetation management and fuels reduction; hardwood and upland shrub restoration and road management being developed under a collaborative process.	Implementation
Fremont-Winema Travel Management Plan	The proposed action would eliminate cross-country travel, allow motorized use on most of the current open roads, allow OHV use of all of the current miles of OHV trail (only 8.5 miles), and authorize an 80-acre play-area near Klamath Lake.	Planning

Table 7. Past, present and reasonable foreseeable future actions.

Project/Event Name	General Description of Activities	Status
Meadow Lake Restoration and Travel Management Project EA (2010)	Sisters Ranger District is proposing a project to focus on restoration of recreation-related impacts to riparian vegetation, fish and wildlife habitat, water quality, and the Santiam Wagon Road. The project would include consideration of providing managed OHV opportunities in the project area.	Planning
Gap Landscape Restoration Project (2016)	Commercial and non-commercial vegetation management and fuels reduction; hardwood and riparian restoration and protection; and road management (39.9 miles temporary construction, 20.6 miles closure, 3.3 miles decommissioning).	Planning
Lookout Mountain Bike Trail	Designation of a mountain bike trail system in the Lookout Mountain Recreation Area	Planning
Ochoco Creek Culvert Replacements	Replacement of two undersized culverts on Ochoco Creek to improve function and to allow passage of aquatic organisms	Planning
Black Mountain Vegetation Management	Commercial and non-commercial vegetation management and fuels reduction.	Planning

Deep Creek is a focus watershed as defined by the Forest Service Region 6 Aquatic Restoration Strategy. Proposed restoration projects were identified in the Deep Creek Restoration Plan, some of which have already been implemented. The purpose of the Deep Creek Restoration Plan was to improve overall stream and riparian health and integrity within the watershed and improve water quality and associated habitat suitable for use by redband trout and other aquatic life. The needs for the proposed action are derived from the differences between current conditions and desired conditions, as described in Forest Plan direction and management objectives. A need was identified to:

- Stabilize stream headcutting and streambanks to improve and maintain channel stability
- Remove and/or replace culverts to allow adequate access for fish
- Allow identified riparian areas to recover natural vegetation
- Provide better distribution of livestock
- Improve in-stream fish habitat
- Decrease stream sedimentation

The decision was made to: 1) Replace 35 culverts and 3 culverts with rock fords to allow passage of flood flows and improve upstream access for redband trout; 2) create 7 water developments, 227 acres of grazing exclosures, 342 acres of riparian pasture, and place large wood along 3.6 miles of stream to better distribute livestock, 3) repair 37 headcut complexes and 18 exposed cutbanks, close, decommission, and reconstruct 47 miles of roads, reconstruct 0.25 miles of channel reaches to reduce in-stream sedimentation, and construct 6 in-stream structures to promote pool habitat for fisheries. Most proposed activities are located within RHCAs and were designed to move the watershed towards meeting interim Riparian Management Objectives (RMOs).

Of these activities, the following restoration projects have been implemented thus far:

- In 2006, 2 gates were installed on FR4272-100 and FR4272-400 in Little Summit Prairie Creek Subwatershed;
- In 2006, 2.8 miles of road were decommissioned in the Lower Deep Creek Subwatershed (FR4200-510, FR4200-600, FR4200-603, FR4200608, FR4200630, FR4260-014).

- In 2011, 1.2 miles of road were decommissioned in Little Summit Prairie Creek Subwatershed (FR4270-503, FR4270-504, FR4270-570, FR4276-030, and FR4276-070);
- In 2011, 0.7 miles of road was closed (FR3000-656), 1.6 miles or road were reconstructed (FR3000-650), and 1.5 miles of road were decommissioned in the Lower Deep Subwatershed (FR3000-610, FR3000-653, FR3000-668, FR3000-669, and FR3000-705).

Transportation

This section contains the entire transportation analysis.

Existing Condition

Location and Distribution

Within the Ochoco Summit Trail System project area there are 1,820 miles of road under various private and public jurisdictions that include federal, state, county, and private entities. The existing road system is, in general, evenly distributed throughout the project area, with a somewhat greater abundance of roads being found in the western portion of the project area, in the vicinity the Marks Creek subdivision and Highway 26.

The majority of roads in the project area are located on moderate to gentle terrain, with ground slopes ranging between 15 and 30%. A few roads can be found in mid-slope positions on slopes ranging between 30 and 80%; these roads are scattered across the project area from Shadow Creek to Deep Creek.

Within the project area, there are two Cooperative Road Management Areas established by agreement between the Oregon Department of Fish and Wildlife and USDA-Forest Service and adjacent industrial forest land owners. The Rager Green Dot closure, established by the ODFW, identifies a network of open and closed roads during the fall deer rifle-hunting season in the eastern portion of the project area, on the east end of the Ochoco Mountains, from Sept. 30 to November 29. The South Boundary Closure Area, also within the project area, has a year round closure on roads, established by ODFW. The action alternatives were developed outside of the South Boundary Closure Area. There are portions of all three alternatives within the Rager Green Dot closure area, requiring seasonal restrictions on portions of the routes.

Age and Development History of the Transportation System

The majority of roads within the project area have been in existence for more than 40 years, with few additions having been constructed in the recent past. Some portions of the system date back to the Summit Trail, which evolved from a pack trail developed with the creation of the Blue Mountain Forest Reserves in 1906.

With limited exceptions (and excluding State and County highways), roads in the Ochoco Summit project area have been constructed for access to timber harvest areas. Some roads were constructed specifically in support of mining and access to private land, primarily around Big Summit and Little Summit Prairies.

Road Use Patterns over Time, Now, and in the Future

The majority of roads within the project area, and in particular those roads under Forest Service jurisdiction, have a general pattern of use common to low-standard forest roads, in the absence of residential enclaves or developed recreation. Of the arterial roads and major collector through routes such as Forest Roads 22, 30, 42, 2610, 2630, most roads see little use other than administrative traffic and range permittees through the course of the spring and summer. Timber sale activity can

contribute substantially to daily traffic numbers, but the pattern of such activity is usually isolated in one particular area at any given time.

Active sheep and cattle grazing allotments are located within the project area, requiring a small usage component provided by permittee vehicles. The Round Mountain electronic site has frequent visits by the special use permittees and USFS radio maintenance crews. The Crystal Springs church camp, located on the west side of the project area, is in use during the summer months. Vehicle traffic may increase associated with the spring firewood season; the bulk of use for the majority of roads comes in the late summer and fall, with the commencement of deer and elk hunting seasons.

Related to recreation, road use is steady with visitors to the cabin rentals at Cold Springs and Ochoco Ranger Station, wild horse/spring flowers/wildlife viewing, and trail head use. Traffic is steady to the developed campgrounds at Walton Lake, Deep Creek and Cottonwood. Fishing at Walton Lake and along the North Fork Crooked River is steady. The project area also has a large visitor interest in endurance ride events and horse camping at Allen Creek Horse Camp and Corral Flats.

The anticipated future use patterns would be somewhat reflective of current trends of primarily administrative and timber sale-related use during the summer, firewood permit use in the spring and increased traffic by hunters in the fall. It would also be anticipated, however, that the selection and implementation of an action alternative in this analysis would result in an increase in recreational traffic during the summer months, as a result of increased OHV use.

Primary Destinations of Road System Users

The bulk of the roads within the project area do not generally serve any particular destinations, but instead provide access to areas of interest for various users. For land managers and contractors, these roads serve as access to areas where vegetative management or other land management activities are ongoing or planned. These roads also provide access to popular hunting areas such as Pisgah, Barnhouse Springs, and the Deep Creek area.

Existing Maintenance Levels and Road Surface Types

An extensive system of National Forest System Roads exists within the project area. Subsequent to the establishment of the 2005 Travel Management Rule, the Regional Forester of the Pacific Northwest Region issued direction that an Engineering Analysis would be required for any National Forest System Road designated for mixed use (allowing use by both highway-legal and non-highway-legal vehicles). As part of implementation of the Travel Management Rule on the Ochoco National Forest, a mixed use analysis has been performed to establish the suitability of allowing mixed use on roads in the context of their current setting in terms of alignment, width, typical user speed, and presence or absence of traffic control devices. Mixed use roads are available for travel by Off Highway Vehicles (OHV) as displayed on the current Motor Vehicle Use Maps (MVUM). Within the project area, the MVUM allows for mixed use on 659 miles of ML2 roads.

Operational Maintenance Levels define the degree of maintenance required for a specific road and the level of service which that road provides, consistent with road management objectives and maintenance criteria (FSH 7709.58, Transportation System Maintenance Handbook). The five maintenance levels are defined as:

Maintenance Level 1 (M/L 1): Assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period must exceed 1 year. Basic custodial maintenance is performed to keep damage to adjacent resource to an acceptable level 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 level 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 level 1, they are physically closed to vehicular traffic, but may be open and suitable for non-motorized uses.

Maintenance Level 2 (M/L 2): Assigned to roads open for use by high clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Log haul may occur at this level. Appropriate traffic management strategies are either (1) discourage or prohibit passenger cars or (2) accept or discourage high clearance vehicles.

Maintenance Level 3 (M/L 3): Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. 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 either "encourage" or "accept" passenger cars. "Discourage" or "prohibit" strategies may be employed for certain classes of vehicles or users; unless otherwise specifically authorized, non-street-legal OHV use is prohibited.

Maintenance Level 4 (M/L 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" passenger cars. However, the "prohibit" strategy may apply to specific classes of vehicles or users at certain times; unless otherwise specifically authorized, non-street-legal OHV use is prohibited.

Maintenance Level 5 (M/L 5): Assigned to roads that provide a high degree of user comfort and convenience. Normally, roads are double-lane, paved facilities. Some may be aggregate surfaced and dust abated. The appropriate traffic management strategy is “encourage,” except that, unless otherwise specifically authorized, non-street-legal OHV use is prohibited.

Within the project area there are 252 miles of native-surface Maintenance Level 2 roads, or about 34% of open roads. Most native surface roads under Forest Service jurisdiction are managed as either being open for high-clearance vehicle traffic (Maintenance Level 2) or as being physically closed so that traffic is eliminated and the roads are in a basic custodial status (Maintenance Level 1) but not prohibited (by Forest Order). The native-surface roads in Maintenance Level 2 status are not maintained on a recurring basis but are instead periodically reviewed to determine whether there are maintenance needs necessary to protect adjacent resource values. Some of the native-surface roads in the project area are on private land and are variably open to public access, depending on the wishes of those individual landowners or the existence of public rights of way (as in the case of subdivisions with the project area).

An additional 27% of the open roads are categorized as improved, native -surface. 31% of open roads have some level of aggregate surfacing; some of these roads are Maintenance Level 2 and aren’t specifically maintained for passenger car use.

The remaining 7% of roads are asphalt or bituminous-surfaced facilities, including USFS Roads 22 (Walton Lake) and Road 42 (Big Summit Prairie). These asphalt-surfaced routes are under the jurisdiction of the USDA-Forest Service and are maintained to standards that are represented by Maintenance Levels 4 and 5. Under these maintenance levels, passenger car use is encouraged, and the primary emphasis is on traveler comfort, convenience, and safety.

Table 8. Miles of road by maintenance level.

Operational Maintenance Level	Miles
Unclassified Other Jurisdiction	270
M/L 1 (Closed)	669
M/L 2 (High Clearance Vehicles Allowed)	674
M/L 3 (Passenger Car Allowed; Low Speed)	75
M/L 4 (Passenger Car Accepted; Moderate Speed)	13
M/L 5 (Passenger Car Encouraged; High Speed)	37

Within the project area, operation of non-highway legal vehicles is prohibited on those roads classified as Maintenance Level 3, 4 or 5; operation of such vehicles is allowed on those roads not maintained for passenger car use (M/L 1 and 2) in accordance with Oregon Revised Statue 821.055. There are also Maintenance Level 2 roads that, for safety reasons, have been identified as prohibiting use of non-highway legal vehicles: Rd 2200-150, Rd 2630 (to Indian Prairie), Rd 2630 (Scott's Camp for 2 miles west), Rd 2630450, Rd 4250, Rd 4270, Rd 4200-740, Rd 38, Rd 3810 and Rd 4276.

Existing Road Management Objectives

The existing management objectives for roads within the project area generally call for roads to be managed primarily for land management and administrative purposes; public access is generally allowed but is a secondary consideration except in areas where subdivisions are located or where there is a specific recreation emphasis. The majority of roads that are managed for land management and/or administrative purposes do see a great deal of public usage during hunting season and the open season for firewood cutting. Arterial and collector routes (two- and four- digit roads) are generally managed to facilitate a mix of commercial, administrative, and public use.

With the exception of those roads providing access to recreational facilities or recreational/permanent residences, the seven-digit local road component is managed, when open, to be primarily used by high-clearance vehicles, including OHVs. Passenger car operation is possible on many of these routes, but no special consideration is given to allowing such use. During timber sale activity, these roads are intended to be single-user facilities, given that their narrow travel ways and lack of frequent, intervisible turnouts preclude opportunities to safely provide for mixed commercial/public traffic.

Route Densities

The Ochoco Summit Trail System Project Area lies within portions of 33 separate sixth-field subwatersheds. The total road density for each subwatershed in Table 9 reflects all the open roads, including all jurisdictions, over 861 miles.

Table 9. Road density for 5th and 6th order watersheds, all open roads, mi/mi^2.

Watershed (5th Order)	Subwatershed Name	Operational Open Road (all jurisdictions) Density mi/mi^2
Bridge Creek		1.31
	Headwaters Bridge Creek	0.62
	Middle Bridge Bear Creek	0.94
	Upper Bridge Creek	1.95
	West Branch Bridge Creek	1.78
Deep Creek		1.90
	Jackson Creek	2.15
	Little Summit Prairie	1.91
	Lower Deep Creek	1.50
Lower Beaver Creek		1.60
	North Wolf Creek	0.84
	Wolf Creek	2.06

Table 9. Road density for 5th and 6th order watersheds, all open roads, mi/mi^2.

Watershed (5th Order)	Subwatershed Name	Operational Open Road (all jurisdictions) Density mi/mi^2
Lower North Fork Crooked River		1.27
	Lower North Fork Canyon	0.49
	Upper North Fork Canyon	1.45
Mountain Creek		1.17
	Middle Mountain Creek	1.22
	Upper Mountain Creek	1.14
Paulina Creek		1.89
	Dry Paulina Creek	1.83
	Upper Paulina Creek	1.92
Rock Creek		1.52
	Middle Rock Creek	0.78
	Upper Rock Creek	1.52
Upper North Fork Crooked River		2.34
	Elliot Creek	2.55
	Gray Creek	2.70
	Headwaters North Fork Crooked River	2.07
	Howard Creek	2.28
	Johnson Creek	1.36
	Lower Big Summit Prairie	3.35
	Peterson Creek	2.28
	Porter Creek	2.28
Upper Ochoco Creek		1.66
	Duncan Creek	1.52
	Headwaters Ochoco Creek	1.83
	Lower Marks Creek	2.51
	Upper Marks Creek	1.57
	Wolf Creek	0

User-Created Trails and All Motorized Routes

Over time, a network of motorized trails has developed within the project area. The bulk of these trails can be found between Hwy 26 and the west side of Big Summit Prairie. There is also a group of user-created trails southwest of the prairie, in addition to a network that crosses from the east side of the prairie to the South Fork John Day River and north of Black Canyon Wilderness, outside of the project boundary. These trails were developed largely as the result of all-terrain vehicle (ATV) activity by the seasonal riders who frequent the Ochoco Mountains and by year-round and recreational residents living along Hwy 26. These trails serve essentially as an extension of the official transportation system, providing shortcuts and connectors between existing roads as well as longer cross-country riding opportunities.

The density of user-created motorized trails within the 33 subwatersheds was not calculated. According to the COMAC (Central Oregon Motorcycle and ATV Club) inventory, there are potential routes identified: 188 miles of ATV trail, 87 miles of motorcycle and 159 miles of shared use. Approximately 40% of the routes identified are on existing open roads. The miles are concentrated fairly heavily west of Big Summit Prairie, across the top of the prairie and south of the prairie in Gray Creek, Headwaters of the North Fork Crooked and Lower Big Summit Prairie.

Roads Analysis Results and Opportunities

Under all action alternatives, the following subwatersheds are above the 3 miles/sq. mile density in the General Forest management area: Lower Big Summit Prairie and Lower Marks Creek. Additionally for Alt. 2 and 4: Jackson Creek and Elliott Creek. For Alternative 4, Upper Marks Creek, Porter Creek and Howard Creek are also above the recommended density.

Through previous road analysis efforts, Jackson Creek, Lower Big Summit, Lower Marks Creek and Upper Marks Creek subwatersheds had been addressed under Deep Roads Analysis (1999) and Spears Roads Analysis (2001). Howard, Elliott, Johnson and Porter Creek subwatersheds were addressed in the 2010 Howard, Johnson, Elliott and Porter Roads Analysis. There were a number of roads proposed to change from open to closed and from open to decommissioned (Table 10 and Table 11). Table 12 and Table 13 reflect the Level 2 Open Roads proposed for closure, dropping to Operational Maintenance Level 1. With closing and/or decommissioning these roads, the road density would be decreased, adjusting for the increase in proposed trails.

Table 10. Roads proposed for decommissioning under Howard, Johnson, Elliot and Porter Creek Subwatershed Roads Analysis.

Subwatershed	Road No.	Seg. Length (Miles)	Current Opt. Mtnce	Reason	Recommended Operational Mtnc. Level
Elliot Crk	2200-308	0.25	2	Wildlife	Decommission
Elliot Crk	2200-511	0.14	2	Aquatic/Wildlife	Decommission
Johnson Crk	4200-170	0.29	2	Cercla – Amity Mine	Decommission
Johnson Crk	4200-203	0.24	2	Botany/Wildlife	Decommission
Porter Crk	4200-451	0.10	2	Botany/Wildlife	Decommission
Porter Crk	4200-423	0.27	2	Botany/Wildlife	Decommission
Porter Crk	4200-463	0.66	2	Botany/Wildlife	Decommission
Howard Crk	4210-079	0.10	2	Wildlife	Decommission
	TOTAL	2.05 Miles			

Table 11. Total miles proposed to decommission for each subwatershed.

Howard Creek	Porter Creek	Elliot Creek	Johnson Creek	Total
0.10	1.03	0.39	0.53	2.05

Table 12. Operational Maintenance Level 2 roads proposed to change to Operational Maintenance Level 1 – Closed under the Howard, Johnson, Elliot and Porter Subwatersheds Roads Analysis.

Subwatershed	Road No.	Seg. Length (Miles)	Current Opt. Mtnc.	Reason	Recommended Operational Mtnc. Level
Howard Crk	2200-274	.35	1	Aquatic	1
Elliot Crk	2200-306	1.2	2	Aquatic, Wildlife/Botany	1
Elliot Crk	2200-401	0.08	2	Botany	1
Elliot Crk	2200-404	0.5	2	Botany	1
Elliot Crk	2200-405	0.2	2	Botany	1
Elliot Crk	2200-410	0.68	2	Wildlife	1
Elliot Crk	2200-411	0.13	2	Wildlife	1
Elliot Crk	2200-412	0.04	2	Wildlife	1
Elliot Crk	2200-417	0.11	2	Wildlife	1
Elliot Crk	2200-418	0.10	2	Wildlife	1

Table 12. Operational Maintenance Level 2 roads proposed to change to Operational Maintenance Level 1 – Closed under the Howard, Johnson, Elliot and Porter Subwatersheds Roads Analysis.

Subwatershed	Road No.	Seg. Length (Miles)	Current Opt. Mtnc.	Reason	Recommended Operational Mtnc. Level
Elliot Crk	2200-422	0.34	2	Botany	1
Elliot Crk	2200-451	0.22	2	Aquatic	1
Elliot Crk	2200-452	0.24	2	Botany	1
Elliot Crk	2200-455	0.21	2	Aquatic	1 (2 segments)
Elliot Crk	2200-457	0.21	2	Aquatic	1
Elliot Crk	2200-458	0.70	2	Wildlife/Aquatics	1 (2 segments)
Elliot Crk	2200-459	0.10	2	Wildlife/Aquatics	1 (2 segments)
Elliot Crk	2200-460	0.54	2	Wildlife/Aquatics	1
Elliot Crk	2200-461	0.13	2	Aquatic/Botany	1
Elliot Crk	2200-462	0.66	2	Aquatic/Botany	1
Elliot Crk	2200-463	0.36	2	Wildlife/Botany	1
Elliot Crk	2200-464	0.33	2	Aquatic	1
Elliot Crk	2200-500	0.30	2	Wildlife	1
Elliot Crk	2200-501	0.63	2	Wildlife/Botany	1
Elliot Crk	2200-503	0.27	2	Botany	1
Elliot Crk	2200-504	0.42	2	Aquatic	1
Elliot Crk	2200-505	1.04	2	Aquatic	1
Elliot Crk	2200-506	0.70	2	Aquatic	1
Elliot Crk	2200-507	1.18	2	Aquatic/Wildlife	11 (2 segments)
Elliot Crk	2200-508	0.49	2	Aquatic	1
Elliot Crk	2200-509	0.32	2	Aquatic/Wildlife	1
Elliot Crk	2200-510	0.10	2	Wildlife	1
Elliot Crk	2200-512	0.48	2	Wildlife	1
Elliot Crk	2200-521	0.18	2	Wildlife	1
Elliot Crk	2230-058	0.21	2	Wildlife	1
Howard Crk	2630-358	0.52	2	Botany	1
Howard Crk	2630-368	0.25	2	Botany	1
Howard Crk	2630-369	0.56	2	Botany	1
Howard Crk	2630-403	0.24	2	Wildlife	1
Howard Crk	2630-408	0.25	2	Wildlife	1
Porter Crk	3000-550	4.78	2	Aquatic	Trail
Porter Crk	3010-095	0.05	2	Wildlife	1
Johnson Crk	4200-153	0.84	2	Aquatic	1
Johnson Crk	4200-175	0.46	2	Aquatic	1
Johnson Crk	4200-227	0.16	2	Wildlife	1
Howard Crk	4200-233	0.56	2	Aquatic	1
Total		22.46 Miles			

Table 13. Total miles for each subwatershed proposed for closure.

Howard Creek	Porter Creek	Elliott Creek	Johnson Creek	Total
2.73	4.83	13.44	1.46	22.46

Under the Deep Roads Analysis and Deep Restoration EIS, the following roads were proposed for closure or decommissioning in the Jackson subwatershed (Table 14). Their current objective maintenance level is Open Level 2. Their recommended Objective Maintenance level is identified as Closed Level 1 or Decommission.

Table 14. Roads proposed for closure or decommissioning under Deep Creek Roads Analysis and Deep Restoration Environmental Analysis.

Subwatershed	Road Number	Length (miles)	Current Oper. Mtnc.	Recommended Operational Mtnc. Level
Jackson Creek	3000-900	0.8	2	1
Jackson Creek	2630-770	0.2	2	1
Jackson Creek	3000-656	0.7	2	1
Jackson Creek	3000-754	0.7	2	Decommission
Jackson Creek	3000-756	0.1	2	Decommission
Jackson Creek	2630-770	0.17	2	1
Jackson Creek	4250-606	0.7	2	Decommission
Jackson Creek	4272-400	2.1	2	Close - gate
Jackson Creek	4250-420	0.8	2	1
Jackson Creek	4250-421	0.9	2	1
Jackson Creek	3000-858	0.3	2	Decommission
Jackson Creek	3000-669	0.2	2	Decommission
Lower Deep Creek	3000-745	0.74	2	Decommission
Little Summit Prairie	4274-065	0.1	2	Decommission
Total		8.51 Miles		

Under Spears/Bandit Roads Analysis in 2000, the following roads were proposed for closure (Table 15). They were not closed under the Spears EIS, so their closure under this project would further reduce the road density in the subwatersheds.

Table 15. Roads proposed for closure under Spears Roads Analysis.

Subwatershed	Road Number	Length (miles)	Current Op. Mtnc.	Recommended in Spears/Bandit RA - Objective Op. Mtnc.
Upper Marks Creek	2600-452	0.38	2	1
	2630-300	0.5	2	1
	2630-302	0.6	2	1
Lower Marks Creek	2610-151	0.15	2	1
	2610-152	0.1	2	1
Total		1.73 Miles		

Under Spears/Bandit Roads Analysis in 2000, the following roads were proposed for decommissioning (Table 16).

Table 16. Roads proposed for decommissioning under Spears Roads Analysis.

Subwatershed	Road Number	Length (miles)	Current Op. Mtnc.	Recommended in Spears/Bandit RA - Objective Op. Mtnc.
Upper Marks Creek	2610-012 (0.2-0.56)	0.36	1	Decommission
	2610-012 (0.56-1.0)	0.44	2	Decommission
	2610-018	0.3	2	Decommission
Total		1.10 Miles		

The miles of road proposed for closure or decommissioning from the three Road Analysis efforts would move to further reduce road densities in the watersheds. The roads identified through Deep

and Spears subwatersheds are not reflected in the density tables for the action alternatives, due to a lack of time to get the data into the system; only those roads in Howard, Johnson, Elliott and Porter Creek subwatersheds are reflected. The additional miles proposed for closure from Deep and Spears would further reduce density.

Environmental Effects

Alternative 1 (No Action)

Implementation of Alternative 1 would result in no changes from the current conditions in the project area. The mileage of open and closed roads, and the resultant road densities, would remain as they are. Most Maintenance Level 2 roads would be open for mixed use by both highway-legal and non-highway-legal vehicles, but there would be no roads incorporated as portions of any designated trail system. Non-highway-legal vehicles would be prohibited on all roads maintained for passenger car use (Maintenance Level 3, 4, and 5), plus the Maintenance Level 2 roads added to the list for safety reasons. Use of Maintenance Level 1 roads and user-created roads and trails would be subject to decisions resulting from implementation of the 2005 Travel Management Rule on the Ochoco National Forest.

Effects Common to All Action Alternatives

To varying degrees, each of the three Action Alternatives incorporates the use of National Forest System Roads to provide designated connectivity throughout the project area within and between portions of the designated trail system. Subsequent to the establishment of the 2005 Travel Management Rule, the Regional Forester of the Pacific Northwest Region issued direction that an Engineering Analysis would be required for any National Forest System Road designated for mixed use (allowing use by both highway-legal and non-highway-legal vehicles). As part of implementation of the Travel Management Rule on the Ochoco National Forest, mixed use analysis has been performed to establish the suitability of allowing mixed use on roads, in the context of their current setting in terms of alignment, width, typical user speed, and presence or absence of traffic control devices. Supplemental analysis would be performed on certain designated mixed-use roads in the project area that have been determined to be unsuitable for a mixture of OHV's and highway-legal vehicles, because of either their current setting or their designation as roads maintained for passenger car use (on which non-highway-legal vehicle use is prohibited). In particular, this supplemental Engineering Analysis would be performed on portions of Roads 1250, 2630, 38, 3810, 4250, 4254, 4270 and 4276 to determine what requirements would be necessary to allow for safe use by a mix of highway-legal and non-highway-legal vehicles.

For public safety, the roads have been evaluated for mixed use (R. Collins, 2005). A number of the roads have been designed as highway legal only, such as Rd. 42. Where the proposed alternatives cross the highway legal only routes, driving safety is a concern for both the OHV rider and the driving public. These intersections would require additional signing for both the trail user and the vehicles to encourage safe travel for all users. Table 17 compares the alternatives, with Alternative 4 having the highest number of such crossings, followed by Alternative 2 and then Alternative 3. Given public safety is a high priority, all the crossings are equally important to protect all road users. The alternatives were designed to minimize crossing the highway legal only routes for public safety.

Table 17. Intersections between the alternative routes and highway legal only routes.

Class of Vehicle	Alt 2 Number of Crossings	Alt 3 Number of Crossings	Alt 4 Number of Crossings	Alt 5 Number of Crossings
Class I and III	19	16	22	12
Class II	1	0	1	1
Total	20	16	23	13

Trail and Stream Intersections

For all alternatives, identification of the intersection of the routes and streams was accomplished by use of a GIS data, with the identification of the type of stream crossing being based on the stream class. Bridges were identified for all the Class 2 streams and some of the Class 3 streams. Culverts were identified for a good portion of the Class 3 streams. A combination of culverts and fords were proposed for the Class 4 streams. In a few locations, boardwalks were proposed where wet meadows underlie the proposed routes. There were also several areas where the GIS stream alignment, and the proposed trail routes intersected an unusually high number of times. Ground checking would most likely show only 1 or 2 intersections. Based on the rough alignment of the proposed routes, the accuracy of the GIS stream routes and the need to verify stream class; the confidence factor for the intersections is 80%. During actual design, the type of stream crossing, location and trail route may alter.

Seasonal Closure

The Ragar Green Dot closure, established by the ODFW, identifies a network of open and closed roads during the fall deer rifle-hunting season in the eastern portion of the analysis on the east end of the Ochoco Mountains, from Sept. 30 to November 29. In each of the action alternatives, the routes entering into the Ragar Green Dot closure area would have a seasonal closure from Sept. 30 to November 29. For most years, the wet season will generally start in November, so the actual closure may extend from Sept. 30 through snow melt in the spring, for the eastern half of the trails.

The western half of the routes would seasonally close when the snow pack covers the system. This generally starts in mid-November or December and continues through April, with the systems drying out in May.

Mixed Use

Identification of an OHV route system that features numerous specific mixed use roads as part of that system would result in an increase in OHV use on these roads, especially by users who come to the area specifically to ride the system. Such increase would lead to a commensurate increase in the need for maintenance blading on aggregate surfaced roads (particularly on roads that do not normally receive regular blading maintenance). Such increase would also lead to an increased need to monitor the condition of lower standard native surface roads for issues that may require corrective action to protect adjace resources or protect user safety (for example, to address visibility concerns resulting from extreme dustiness on heavily used native surface roads or adequate sight distance on curves and at intersections due to encroaching vegetation). There would be little to no maintenance for user convenience on these low standard, high clearance vehicle roads, unless passability was to become an issue.

Alternative 2 (Proposed Action)

Under Alternative 2, a combination of Class 1, Class 2 and Class 3 routes totals to 170 miles of new trail (Table 18). The distribution of the designated OHV trails for this alternative begins on Hwy 26, passing from Hwy 26 to Walton Lake, across the top of Big Summit Prairie to 6 Corners on Paulina District. This alternative crosses a number of Class I, II, III and IV stream systems. As part of the protection for the streams, a combination of bridges, culverts, boardwalks and hardened fords have been proposed. The routes are a combination of existing roads in Maintenance Level 1 (Closed) status and new routes.

Table 18. Alternative 2 trail system, miles of existing road and new route by vehicle class.

Type	Class I (ATV)	Class II (Jeep)	Class III (Motorcycle)	Grand Total
Existing Road	37.79	36.51	26.66	100.95
New Route	31.06	12.39	25.67	69.12
Total	68.85	48.90	52.33	170.07

In Alternative 2, there would be an estimated need for 16 bridges, 88 culverts, 6 boardwalks and 33 fords for a total of 142 structures (Table 19). For the purposes of this report, a rough estimate at $45,000 for each fiberglass bridge, Alternative 2 would cost $720,000, not including design costs. Class 9 streams are those systems that haven't been updated in the GIS system, to identify stream class. They are generally a mixture of Class 3 and Class 4.

Table 19. Alternative 2 (Proposed Action) crossing type for stream class and vehicle class.

Stream Class/Crossing Type	Vehicle Class I	Vehicle Class II	Vehicle Class III	Total
1/Bridges	4		1	5
1/Culverts	1	1		2
2/Bridges	7		2	9
2 /Culverts	4	2	2	8
2/Boardwalk	2		1	3
3/Ford				
3 /Bridge	1			1
3 /Culvert	2		1	3
4/Bridge	1			1
4 /Culvert	18	22	12	52
4 /Ford	9	8	5	22
4 /Boardwalk	1			1
9/ Culvert	3	19	1	23
9/Boardwalk	2			2
9/Ford	6	4		10
Totals/vehicle class	61	56	25	142

Alternative 2 proposes construction of 3 play areas, 6 trail heads, 1 parking area and a total of 10 staging areas split between the three vehicle classes: 6 Staging areas for the Class I (ATV), 2 Staging areas for the Class II (Jeeps) and 2 Staging areas for the Class III (motorcycles). The OHV areas are spread across the proposed trail route. A cost for the construction of the OHV areas was not calculated.

In Alternative 2, for the majority of the new route construction, the slopes range from 0-20%. Cost for construction of new routes would vary by the slopes they cross. Based on a conversation with Ken Kittrell (Appendix A), the rough cost for actual construction of the new segments would run around $166,500. For comparison purposes, the cost for Alternative 2 (trails and bridges) is $886,500. At the subwatershed scale, the distribution of road/trail conversions and changes in Maintenance Level would result in a general reduction in total of open road densities, although there would be five subwatersheds – Jackson, Elliott, Lower Big Summit Prairie, Porter Creek and Lower Marks Creek – where open-road density would be increased over No Action Alternative (Table 20).

Table 20. Alternative 2 road density open roads and proposed trails - subwatershed basis (miles/sq. mile).

Watershed	Subwatershed Name	Alt. 2 Operational Open RD and TR Density	Relative Change from No Action
Bridge Creek (1.29)	Headwaters Bridge Creek	0.62	NC
	Middle Bridge Bear Creek	0.94	NC
	Upper Bridge Creek	1.95	NC
	West Branch Bridge Creek	1.73	DOWN (1.78)
Deep Creek (2.19)	Jackson Creek	2.34	UP (2.15)
	Little Summit Prairie Creek	2.27	UP (1.91)
	Lower Deep Creek	1.84	UP (1.50)
Lower Beaver Creek (1.18)	North Wolf Creek	1.16	UP (0.84)
	Wolf Creek	2.20	UP (2.06)
Lower North Fk Crooked River (1.23)	Lower North Fk. Canyon	0.49	NC
	Upper North Fk. Canyon	1.39	DOWN (1.45)
Mountain Creek (1.15	Middle Mountain Creek	1.18	DOWN (1.22)
	Upper Mountain Creek	1.13	UP (1.14)
Paulina Creek (1.85)	Dry Paulina Creek	1.89	DOWN (1.83)
	Upper Paulina Creek	1.82	DOWN (1.92)
Rock Creek (0.97)	Middle Rock Creek	0.78	NC
	Upper Rock Creek	0.97	DOWN (1.52)
Upper North Fk. Crooked River (2.32)	Elliott Creek	2.43	DOWN (2.55)
	Gray Creek	2.40	DOWN (2.70)
	Headwaters North Fk. Crooked River	1.64	DOWN (2.07)
	Howard Creek	2.18	DOWN (2.28)
	Johnson Creek	1.35	DOWN (1.36)
	Lower Big Summit Prairie	3.01	DOWN (3.35)
	Peterson Creek	2.68	UP (2.28)
	Porter Creek	3.06	UP (2.28)
Upper Ochoco Creek (1.62)	Duncan Creek	1.20	DOWN (1.52)
	Headwaters Ochoco Creek	1.73	DOWN (1.83)
	Lower Marks Creek	2.40	DOWN (2.51)
	Upper Marks Creek	1.96	UP (1.57)
	Wolf Creek	0.03	UP (0)

The overall density of total open ‘motorized’ routes (comprised of open roads and designated OHV trails) would be slightly less than the No Action Alternative. The average road densities over a larger area, do not reflect the concern for specific management areas. Table 21 identifies the subwatersheds at or above the recommended 3 miles per sq. mile density for wildlife under General Forest and General Forest Winter Range.

Table 21. Alternative 2 subwatersheds with open road and trail density at or over 3 miles/sq. mile for general forest.

Watershed	Subwatershed	Management Area – miles/sq. miles
Deep Creek	Jackson Creek	2.95 GF
Upper North Fork Crooked River	Elliott Creek	3.06 GF
	Lower Big Summit Prairie	3.31 GF
	Porter Creek	3.26 GF
Upper Ochoco Creek	Lower Marks Creek	3.15 GF

Implementation of Alternative 2 would result in 6.4 miles of mixed use route components for the trail system of the total 100.65 miles proposed. The trail primarily utilizes closed roads, new routes and some mixed use routes. It crosses highway legal only routes. There would be options for users with highway legal vehicles to connect to other portions of the trails.

In general, there would be a reduced maintenance need on those native surface Maintenance Level 2 roads built to lower standards and intended for use by high clearance vehicles with no expectation of user comfort. Maintenance on these roads would primarily consist of correcting issues, like maintaining proper drainage off the road to reduce erosion.

Alternative 3

Implementation of Alternative 3 would result in 101 miles of trail system being developed, from a combination of new route and existing roads currently in Maintenance Level 1 (closed road status) (Table 22). Alternative 3 was designed to address Class 1 and Class 3 vehicles only. The Class 2 Jeeps would have access to all the Operational Maintenance Level 2 roads on the forest. Although passenger cars can easily drive some of the routes, there are a higher percentage of routes where only a high clearance vehicle can pass through. These rougher routes would not provide a challenge for the more experienced 4x4 drivers, but they would provide a challenge for the less experienced drivers.

Table 22. Alternative 3 Routes for Class I and Class III vehicles, miles.

Type	Class I	Class II	Class III	Grand Total
Existing Road	16.44	0	34.06	50.50
New Route	21.92	0	28.40	50.32
Total	38.36	0	62.46	100.82

At the subwatershed scale, the distribution of road/trail conversions and changes in Maintenance Level would result in a general reduction in total and open road densities, although there would be two subwatersheds –Lower Big Summit Prairie and Lower Marks Creek – where open-road density would be still be over 3 miles/sq. mile (Table 23 and Table 24).

Table 23. Alternative 3 road density - subwatershed (miles/square mile).

Watershed	Subwatershed Name	Operational Open Road and Trail Density	Change from Existing Condition
Bridge Creek (1.29)	Headwaters Bridge Creek	0.62	NC
	Middle Bridge Bear Creek	0.94	NC
	Upper Bridge Creek	1.95	NC
	West Branch Bridge Creek	1.73	Down (1.78)
Deep Creek (1.95)	Jackson Creek	1.92	Down (2.15)
	Little Summit Prairie Creek	2.19	Up (1.91)
	Lower Deep Creek	1.72	Up (1.50)

Lower Beaver Creek (1.18)	North Wolf Creek	1.16	Up (0.84)
	Wolf Creek	2.20	Up (2.06)
Lower North Fk Crooked River (1.23)	Lower North Fk. Canyon	0.49	NC
	Upper North Fk. Canyon	1.39	Down (1.45)
Mountain Creek (1.12)	Middle Mountain Creek	1.18	Down (1.22)
	Upper Mountain Creek	1.09	Down (1.14)
Paulina Creek (1.85)	Dry Paulina Creek	1.89	Down (1.45)
	Upper Paulina Creek	1.82	Up (1.83)
Rock Creek (0.97)	Middle Rock Creek	0.78	NC
	Upper Rock Creek	0.97	Down (1.52)
Upper North Fk. Crooked River (2.10)	Elliott Creek	2.12	Down (2.55)
	Gray Creek	2.40	Down (2.70)
	Headwaters North Fk. Crooked River	1.64	Down (2.07)
	Howard Creek	2.01	Down (2.28)
	Johnson Creek	1.35	Down (1.36)
	Lower Big Summit Prairie	3.01	Down (3.35)
	Peterson Creek	2.16	Down (2.28)
	Porter Creek	2.33	Up (2.28)
Upper Ochoco Creek (1.77)	Duncan Creek	1.21	Down (1.52)
	Headwaters Ochoco Creek	1.67	Down (1.83)
	Lower Marks Creek	2.40	Down (2.51)
	Upper Marks Creek	2.64	Up (1.57)
	Wolf Creek	0.03	Up (0)

Table 24. Alternative 3 subwatersheds with open road and trail density at or over 3 miles/sq. mile for general forest or general forest winter range.

Watershed	Subwatershed	Management Area – miles/sq. miles
Upper North Fork Crooked River	Lower Big Summit Prairie	3.01 GF
Upper Ochoco Creek	Lower Marks Creek	2.40 GF

Implementation of Alternative 3 would result in the designation of the least amount of trail, composed of closed roads, mixed use and new routes. The distribution of the designated OHV trails for this alternative splits into a west side, from Hwy 26 to Walton Lake, and an east side, from east of Big Summit Prairie to 6 Corners on Paulina District. Alternative 3 would make the least use of mixed use roads (3.28 miles) as a key component of the overall system. This would create the least risk for mixed use conflicts and the least need (due to mileage alone) for effective traffic control. There would still be a resulting focus of both highway-legal and non-highway-legal traffic onto other permitted mixed use roads.

Alternative 4

Implementation of Alternative 4 would result in 212 miles of trail being developed from a combination of new route and existing roads currently in Maintenance Level 1 (closed road status) (Table 25). The distribution of the designated OHV trails for this alternative begins on Hwy 26,

passing from Hwy 26 to Walton Lake, across the top of Big Summit Prairie to 6 Corners on Paulina District, with additional loop trails for Class 1, Class 2 and Class 3 vehicles.

Table 25. Alternative 4 Class I, Class II and Class III routes, miles.

Type	Class I (ATV)	Class II (Jeep)	Class III (Motorcycle)	Grand Total
Existing Road	79.37	18.55	29.81	127.74
New Route	51.09	11.24	22.15	84.48
Total	130.46	29.79	51.96	212.22

At the subwatershed scale, the distribution of road/trail conversions and changes in Maintenance Level would result in a general reduction in total of open road densities, although there would be three subwatersheds – Lower Big Summit Prairie, Porter Creek and Lower Marks Creek – where open-road density would be increased over No Action Alternative (Table 26 and Table 27).

Table 26. Alternative 4 road density – subwatershed basis (miles/sq. mile).

Watershed	Subwatershed	Operational Open Road and Trail Density	Relative Change from No Action
Bridge Creek (1.31)	Headwaters Bridge Creek	0.62	NC
	Middle Bridge Bear Creek	0.94	NC
	Upper Bridge Creek	1.95	NC
	West Branch Bridge Creek	1.78	NC
Deep Creek (2.35)	Jackson Creek	2.56	Up (2.15)
	Little Summit Prairie Creek	2.39	Up (1.91)
	Lower Deep Creek	1.97	Up (1.50)
Lower Beaver Creek (1.87)	North Wolf Creek	1.16	Up (0.84)
	Wolf Creek	2.29	Up (2.06)
Lower North Fk Crooked River (1.23)	Lower North Fk. Canyon	0.49	NC
	Upper North Fk. Canyon	1.39	Down (1.45)
Mountain Creek (1.18)	Middle Mountain Creek	1.18	Down (1.22)
Mountain Creek	Upper Mountain Creek	1.23	Up (1.14)
Paulina Creek (1.85)	Dry Paulina Creek	1.89	Up (1.82)
	Upper Paulina Creek	1.82	Down (1.92)
Rock Creek (0.97)	Middle Rock Creek	0.78	NC
	Upper Rock Creek	0.97	Down (1.52)
Upper North Fk. Crooked River (2.35)	Elliott Creek	2.39	Down (2.55)
	Gray Creek	2.40	Down (2.28)
	Headwaters North Fk. Crooked River	1.64	Down (2.07)
	Howard Creek	2.40	Up (2.28)
	Johnson Creek	1.35	Down (1.36)
	Lower Big Summit Prairie	3.01	Down (3.35)
	Peterson Creek	2.70	Up (2.28)
	Porter Creek	3.13	Up (3.35)
Upper Ochoco Creek (1.92)	Duncan Creek	1.21	Down (1.52)

	Headwaters Ochoco Creek	1.72	Down (1.83)
	Lower Marks Creek	2.42	Down (2.51)
	Upper Marks Creek	3.19	Up (1.57)
	Wolf Creek	0.03	Up (0)

Table 27. Alternative 4 subwatersheds with open road and trail density at or over 3 miles/sq. mile for general forest or general forest winter range.

Watershed	Subwatershed	Management Area – miles/sq. miles
Deep Creek	Jackson Creek	3.0 GF
Upper North Fork Crooked River	Elliott Creek	3.01 GF
	Howard Creek	3.0 GF
	Lower Big Summit Prairie	3.31 GF
	Porter Creek	3.27 GF
Upper Ochoco Creek	Lower Marks Creek	3.22 GF
	Upper Marks Creek	3.27 GF

Alternative 4 does increase density for open roads and trails for the 13 of the 30 subwatersheds. Implementation of Alternative 4 would result in 13.6 miles of mixed use route components for the trail system of the total 127.14 miles proposed. The trail primarily utilizes closed roads, new routes and some mixed use routes. It crosses highway legal only routes. There would be options for users with highway legal vehicles to connect to other portions of the trails.

Alternative 5

Implementation of Alternative 5 would result in approximately 135 miles of trail being developed from a combination of new routes and existing roads currently in Maintenance Level 1 (closed road status) (Table 28).

Table 28. Alternative 5 routes for class I-IV vehicles (miles).

Type	Class I (ATV)	Class II (Jeep)	Class III (Motorcycle)	Class IV (UTV)	Grand Total
Existing Road	29	12.2	37	5.8	84
New Route	18	7.8	25	0.2	51
Total	47	20	62	6	135

In Alternative 5, there would be an estimated need for 23 bridges and 73 culverts, for a total of 96

At the subwatershed scale, the distribution of road/trail conversions and changes in Maintenance Level would result in a general reduction in total and open road densities, although there would be two subwatersheds –Lower Big Summit Prairie and Lower Marks Creek – where open-road density would be still be over 3 miles/sq. mile (Table 29 and Table 30).

Table 29. Alternative 5 road density - subwatershed (miles/sq. mile).

Watershed	Subwatershed Name	Operational Open Road and Trail Density	Change from Existing Condition
Bridge Creek (1.29)	Headwaters Bridge Creek	0.62	NC
	Middle Bridge Bear Creek	0.94	NC
	Upper Bridge Creek	1.95	NC
	West Branch Bridge Creek	1.82	Up (1.78)
Deep Creek (1.95)	Jackson Creek	2.28	Up (2.15)

	Little Summit Prairie Creek	2.33	Up (1.91)
	Lower Deep Creek	2.06	Up (1.50)
Lower Beaver Creek (1.18)	North Wolf Creek	1.23	Up (0.84)
	Wolf Creek	2.26	Up (2.06)
Lower North Fk Crooked River (1.23)	Lower North Fk. Canyon	0.49	NC
	Upper North Fk. Canyon	1.45	NC
Mountain Creek (1.12)	Middle Mountain Creek	1.18	Down (1.22)
	Upper Mountain Creek	1.14	NC
Paulina Creek (1.85)	Dry Paulina Creek	1.94	Up (1.45)
	Upper Paulina Creek	1.96	Up (1.83)
Rock Creek (0.97)	Middle Rock Creek	0.78	NC
	Upper Rock Creek	1.57	Up (1.52)
Upper North Fk. Crooked River (2.10)	Elliott Creek	2.05	Down (2.55)
	Gray Creek	2.70	NC
	Headwaters North Fk. Crooked River	2.07	NC
	Howard Creek	2.67	Up (2.28)
	Johnson Creek	1.24	Down (1.36)
	Lower Big Summit Prairie	3.01	Down (3.35)
	Peterson Creek	2.39	Up (2.28)
	Porter Creek	2.72	Up (2.28)
Upper Ochoco Creek (1.77)	Duncan Creek	1.52	NC
	Headwaters Ochoco Creek	1.90	Up (1.83)
	Lower Marks Creek	2.55	Down (2.51)
	Upper Marks Creek	2.82	Up (1.57)
	Wolf Creek	0.00	NC

Table 30. Alternative 5 subwatersheds with open road and trail density at or over 3 miles/sq. mile for general forest or general forest winter range.

Watershed	Subwatershed	Management Area – miles/sq. miles
Upper North Fork Crooked River	Lower Big Summit Prairie	3.01 GF
Upper Ochoco Creek	Lower Marks Creek	2.40 GF

Comparing the Action Alternatives – Transportation System

Comparing the four action alternatives, Alternative 3 and Alternative 5, after trail construction of the trail, proposed road closures and decommissioning would decrease road density for General Forest and winter range more than Alternative 2 and Alternative 4 (Table 23). Alternative 3 and 5 have the least number of public safety concerns, having the fewest highway legal only roads intersecting with the proposed trail system and the least mixed use miles. Alternative 3 has the least number of bridge, culvert, boardwalk and fords on the proposed trail system, than the other three alternatives. It also has the least relative construction cost and the least number of mixed use miles of the four action alternatives. All the stream crossings in Alternative 5 would be by bridge or culvert; there would be no fords.

Table 31. Comparison of the action alternatives.

Comparison Item	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Increased Road Density in Subwatersheds	11/30	9/30	13/30	9/30
Number of Highway Legal Only Road Crossings by the trail system	20	16	23	13
Creek/Wetland Crossings	142	62	170	96
New Route (miles)	69.12	50.32	84.48	51
Open Road –Mixed Use (miles)	46.40	13.77	53.22	30.09
Total Route (new route and existing/closed roads for all Classes) (Miles)	170.07	100.91	212.22	135
Estimated Construction Cost	$978,500	$759,000	$1,071,000	$1,221,000

Cumulative Effects

The combination of past access management decisions to close roads and proposed road closures and road/trail conversions in the action alternatives would result in reduction in the number of road miles open to those highway-legal vehicles that are unsuited for operation on designated trails or whose operators are uninterested or unwilling to operate on those trails. During certain time periods, in particular wood cutting or the various hunting seasons, this may result in an increase in traffic on the remaining tertiary portions of the road system outside of the designated shared use routes, which may result in the need for increased maintenance on those roads. With implementation of the Forest-level Travel Management Rule and any particular action alternative, those remaining open roads would be the sole means of vehicular access to the further reaches of the National Forest Land within and adjacent to the project area.

In particular, Ochoco Creek Roads Analysis, Deep Creek Roads Analysis and Marks Creek Roads Analysis proposed altering a number of miles of Maintenance Level 2 roads to Operational Maintenance Level 1 (close) roads. Also within the planning boundary, the Howard/ Elliott/Johnson Roads Analysis and the Gap Roads Analysis identified additional miles of road for closure and for decommissioning. The Bailey Butte Fire Rehabilitation and Burned Area Emergency Response reinforced existing road closures following fire suppression. The changes implemented or proposed in these projects, in combination with reinforcement of existing closures under this project would combine to reduce access to unauthorized routes. As a result there may be an increased level of use on roads that are open under MVUM. The combined effect would be an increase in effectiveness of management of motorized travel under guidance by the Travel Management Plan, and potentially increased needs for maintenance on the remaining system of open roads.

Recreation

This section includes the entire recreation analysis.

Introduction

The recreation niche is a description, or characterization, of the distinct role each Forest plays in providing outdoor recreation opportunities, experiences, and benefits. The niche is determined by public expectations (demand) and by the ecological capabilities of the land. The niche allows managers to focus management efforts on what is unique and valuable about the Forest. In 2006, the Ochoco National Forest developed a recreation niche statement, mapped where the public recreates, and translated the map into a narrative about the relative importance of the Forest for various recreation opportunities, experiences, and benefits. The wide variety of visitor preferences and uses were grouped into two spatial categories (settings):

- The Backyard – Located closest to the more populated communities, it provides nearby neighbors and families easy access to the Forest and Grassland, giving them the opportunity to spend an hour or spend the day.
- The Back 40 - Adjacent to working ranches and located further from larger population centers, it offers a remote experience and allows for self-discovery and finding one's own special place on a variety of roads and trails from highway to hiking.

The recreation niche indicates that each of these settings could provide opportunities for appropriately designed, maintained and managed routes designated for OHV use, and this setting is appropriate for OHV use and associated access points, including trailheads.

OHV recreation is allowed on National Forest System lands in appropriate places and under proper management (Forest Service Manual 2355.03). The Ochoco Forest Plan, as amended, permits motorized travel only on designated routes and within designated areas.

In a response to concerns around growing popularity of recreational OHV use in general, and increasing demand for OHV trail opportunities on the Ochoco NF and Crooked River National Grassland, the Ochoco NF completed a Trail System & Off-Highway Vehicle Management and Development Environmental Impact Statement. This analysis estimated that use on the ONF's only designated OHV trail, the Green Mountain Trail, was increasing 5-10% annually over the previous five year period. The document indicated that more OHV trail opportunities were needed near the communities of Prineville, Madras and Burns to provide high quality OHV experiences and to reduce the amount of motorized cross-country travel that was occurring (USDA Forest Service, 1996).

Prior to the implementation of the Travel Management Rule, approximately 88% of the Ochoco NF was open to cross-country travel by motor vehicles. Following the decision made under the Travel Management Rule, the Forest is now closed to all cross-country travel, with the exception of roughly 140 acres designated as open, as shown on the Motor Vehicle Use Map (MVUM). This open area represents less than 1% of Ochoco NF lands.

The MVUM indicates where motorized use is allowed on the Ochoco NF, by class of vehicle and time of year. User compliance to these existing restrictions varies by area and season. Opportunities for OHVs, particularly recreational use and motorized access on designated trails, are limited to 26 miles of existing motorized trail on the Ochoco NF and the Crooked River National Grassland.

Use of ATVs for recreation in Oregon is increasing. The Oregon Parks and Recreation Department (OPRD) indicates that sales of Class I and Class III vehicles have increased over 400 percent since 1990 (Oregon Parks and Recreation Department 2014).

After two years of consultation and collaboration, the State of Oregon published The Oregon Trails 2005-2014: A Statewide Action Plan. For the North Central Trails Planning Region, which includes the Ochoco Summit Trail System project area, the report lists that the top regional motorized trails plan issues are:

- Use of Snopark areas for OHV recreation during summer months (this currently occurs at Walton Sno-Park on the Ochoco NF);
- Closure or elimination of OHV trails within the region as a result of resource damage;
- Need for more Class II (4-wheel drive jeeps, SUVs) riding opportunities in the region, including a wide variety of Class II riding opportunities, and particularly technical riding areas.

In addition to the statewide action plan, a study conducted by the State of Oregon (2005) found a trend for closing existing riding opportunities within the region (Bergerson et al. 2005).

General National and Local Recreation Use and Trends

The National Visitor Use Monitoring (NVUM) survey, which is conducted, collects information on National Forests and Grasslands about visitor use and satisfaction (USDA Forest Service 2009). Three rounds of NVUM surveys for the ONF were conducted in 2001, 2008 and 2013. Data collected through the NVUM process in 2013 was incomplete and did not provide useful information regarding visitor use on the Ochoco National Forest; for the purpose of this analysis 2008 data will be used.

The National Survey on Recreation and the Environment (NSRE) data reflect information gathered in a 1999-2007 survey (Cordell et al. 2008). NSRE provides national data, as opposed to local use data, from a larger and more frequent sample.

The 2008 NVUM for the Ochoco NF estimated that there were approximately 247,000 recreation visits to the forest each year (USDA Forest Service 2009). The top five recreation activities of visitors to the Ochoco NF in 2008 were day hiking/walking, viewing wildlife, viewing natural features, relaxing, and driving for pleasure. Each visitor also indicated his or her primary activity for the current recreation visit to the forest. The top primary activities were, hunting, day hiking/walking, snowmobiling, viewing natural features, wildlife/nature viewing and developed camping.

According to the NSRE, national participation in OHV use increased approximately 18% from 2001 to 2008, with the OHV users at 19% total of all recreation activities. 2008 NVUM data for the ONF indicated as estimated 12,844 people participated in motorized trail activities.

Primary OHV users also participate in a variety of other recreation activities during their forest visit (USDA Forest Service 2006). In Washington and Oregon, the most popular secondary activity for primary OHV users is developed camping. Relaxing and viewing natural features also had high participation rates.

Statewide Motorized Recreation Use Trends

In Oregon, ATV riding is by far the most popular type of OHV use, reported by 40 percent of OHV users as their favorite activity (Bergerson et al. 2005). Seventy percent of Oregon households that participate in OHV sports report that they rode an ATV in 2004 (Table 32). Many households participate frequently. The State survey did not ask how many individuals in the household participated in each activity, so no figure for total participation is estimated by this source.

Off-road motorcycling is reported to be the favorite activity by 44 percent of OHV users (Table 32). Forty-four percent and 29 percent of OHV users favor four-wheel driving with stock vehicles and with modified vehicles, respectively. Modified 4-wheel drive vehicles have modified tires and/or suspension upgrades.

Table 32. Frequency of Motorized Trail Participation in Oregon among Households Reporting OHV Participation.

Activity	Participated in the Last Year (percent)	Estimated Oregon Households	Of Participants in Last Year, How Often? (percent)			
			Weekly	2-3/ Month	Once/ Month	Less Often
ATV riding (3 & 4 wheel)	70	68,600	12	34	19	34
Off-road motorcycling	44	43,100	16	29	20	35
4-wheel driving (stock)	44	43,100	21	24	24	31
4-wheel driving (modified)	29	28,400	21	21	33	24
Data is from the 2004 Oregon Statewide Motorized Trail User Survey (Bergerson et al. 2005).						

Residents from the counties that visit the Ochoco Summit project area (Deschutes, Crook, Jefferson, Multnomah) most often state that ATVs (Class I) are the most popular OHV; Class III OHVs (motorcycle) ownership ranges from 17 to 27 percent for these counties (Table 33). Lane County departs from ownership patterns for Class II OHVs (jeeps, etc.) by having 22 percent of permits for these vehicles, whereas the other counties show 11 percent (Lindberg 2009).

Table 33. OHV Ownership, Permits, In-state, by County, Percent of County Ownership by Class (Lindberg 2009).

	Class I (ATV)	Class II (jeep, etc.)	Class III (motorcycles)	Total
Oregon Total	61%	18%	21%	100%
Crook	72%	11%	17%	100%
Deschutes	61%	11%	27%	100%
Klamath	72%	11%	17%	100%
Lane	59%	22%	19%	100%
Excerpted from : The Economic Impacts of Off-Highway Vehicle (OHV) Recreation in Oregon: Rider Demographics and Preferences Report, Prepared for the Oregon Parks and Recreation Department: July 8, 2009, Kreg Lindberg				

More recent data collected by Oregon State University for the Oregon Parks and Recreation Department provides the annual number of days ridden for recreational purposes on public land, by class. These data include Class IV users who were unaccounted for in previous analysis (Table 34) (Lindberg, Bertone-Riggs, 2015).

Table 34. OHV riding days by vehicle class (Lindberg, Bertone-Riggs, 2015).

Class	Permits (vehicles)	Days ridden on public land per vehicle	Days
I	84,871	19.8	1,684,520
II	24,909	21.7	541,173
III	32,799	20.5	671,323
IV	8,846	24.6	217,337
Total	151,425		3,114,353
Data is from Oregon Off-Highway Vehicle (OHV) Participation and Priorities: Report in support of the 2015-2024 Oregon Trails Plan: August 2015, Kreg Lindberg and Tyson Bertone-Riggs			

Annual permit sales for most OHV classes have fluctuated slightly in recent years. In 2012, OPRD began collecting data for permit sales for Class IV vehicles and those permit sales have increased annually since (Table 35). Between 2013 and August, 2014, 230,372 permits were sold. The average percent by Class for those three years totaled: 54.9% for Class I vehicles, 16.7% for Class II vehicles, 21.7% for Class III vehicles, and 6.7% for Class IV vehicles (Lindberg, Bertone-Riggs, 2015).

Table 35. Oregon Parks and Recreation Department Historical ATV permit sales by class (Hughes, 2015).

ATV Class	FY 2015	FY 2014	FY 2013	FY 2012	FY 2011	FY 2010	FY 2009	FY 2008	FY 2007	FY 2006
Class I	37,565	46,563	42,378	45,482	44,544	53,878	53,109	46,882	56,613	39,001
Class II	12,375	13,800	12,277	14,398	14,869	17,581	16,103	15,058	15,924	11,518
Class III	15,405	18,718	15,948	16,466	15,837	20,128	18,067	15,606	19,053	13,872
Class IV	5,950	5,624	3,769	1,247	NA	NA	NA	NA	NA	NA
Total Permits	71,295	84,705	74,372	77,593	75,250	91,586	87,279	77,546	91,590	64,391
From Oregon Parks and Recreation Department: Tom Hughes, August 2015.										

Predicted OHV use in the Ochoco Summit Project Area

Most OHV use in the project area occurs seasonally as the higher elevations become inaccessible due to snow. Based on observational data from Forest Service staff, the heaviest use within the Ochoco Summit project area occurs on summer weekends and holidays from approximately May 1 – September 30, with less recreational use occurring weekdays and during the shoulder seasons of October and November. An exception to this is OHV use during hunting season. Starting with bow hunting in August and continuing through November, there are hunting camps scattered across the area. During this time, there is increased use of OHVs primarily associated with hunting activities.

Oregon has recently recovered from an economic recession and as a result gas prices are currently the lowest they have been since 2008. If this trend continues, the Ochoco NF would expect to see an increase in OHV use do to regional visitors having more disposable income to spend on fuel, travel, and recreational activities. As the economy continues to fluctuate, it is expected that use levels would also fluctuate accordingly. However, local population growth patterns show continued growth, this indicates that OHV use from local riders would continue to increase as long as OHV riding continues to be a popular recreational activity.

Oregon Statewide Comprehensive Outdoor Recreation Plan (SCORP) data indicated a 38 percent increase for ATVs between 1987-2002 (2.5 percent annual increase) and Cordell's 2008 data indicated a 56.1 percent increase over the past decade (5.6 percent annual increase); based on this data, the rate of increase of ATV use on the Ochoco NF, if the economy supports continued use, is predicted to be between 2.5 and 5.6 percent per year over the next decade.

Existing Condition

The Ochoco Summit project area has a variety of recreation opportunities to offer, ranging from developed campgrounds and trails to lesser developed settings for dispersed recreation. Walton Lake Campground is the largest developed recreation site in the project area. There are several streams that provide fishing opportunities. Hunting is a very popular activity with over 19 percent visitor participation (NVUM, 2009). Other recreation opportunities include hiking, mountain biking, camping, bird-watching, scenic viewing, snowmobiling and cross-country skiing.

Developed Recreation

Developed recreation sites managed by the Lookout Mountain and Paulina Ranger Districts of the Ochoco NF include 22 campgrounds, 4 picnic (day-use) sites, 23 trailheads, 2 rental cabins, 4 horse camps, 3 Snoparks, and other minor sites. Developed sites that are located within ½-mile of the proposed trail systems are Ochoco Divide Campground, Ochoco Divide Sno-park, Wildwood Campground, Walton Lake Campground, Scotts Camp, Allen Creek Horse Camp, Big Springs Campground, Cottonwood Pit, and Keeton Trailhead.

Dispersed Recreation

Many Forest visitors prefer a more secluded experience than what developed campgrounds and picnic areas offer. Popular dispersed recreation activities on the ONF include camping, fishing, hiking, viewing wildlife, hunting, picnicking, non-commercial gathering of forest products such as antlers, mushrooms, and cones, and driving Forest roads for recreation or for viewing natural scenery. As described above, a network of roads and trails provides a variety of access options across the Forest. The network of open roads and trails is part of the existing condition; Forest roads and trails provide users with a variety of options to access and enjoy the Forest.

Within the Lookout Mountain and Paulina Ranger Districts, there are over 900 identified dispersed sites (GIS data) of which many are accessible by high clearance roads. It is unknown how many of these sites are located within the project area; however the highest concentration of sites is around the Lookout Mountain Recreation Area, and along streams with adjacent designated roads. Many of these sites are most heavily used during big-game hunting seasons.

Trail Types and Uses

There are nearly 342 miles of designated trails on the Ochoco NF, designed for and open to a variety of trail uses.

Trails open to and managed for pack and saddle use comprises the highest percentage of designated trails, 176 miles, or 51% of the total trail system. Of these trails, 132 miles or 38% are open to mountain bikes. There are 75 miles of marked and maintained snowmobile trails and 31 miles of marked and maintained cross-country ski trails. Thirty-two miles of trail are designated as hiker-only, however 100% of trails are open to hiking. As described above, 26 miles are designated as motorized trail, or 7% of the total trail system on the Ochoco NF.

Designated Recreation Areas and Trails

The Lookout Mountain Recreation Area is a roadless area managed to provide big game habitat and semi-primitive recreational opportunities within a natural setting. There are 22.75 miles of standard/terra trails open to non-motorized uses, including mountain bikes. The 15,660 acre area provides a wide range of recreational opportunities, including motorized access on one designated road, which is 1.3 miles long and is open to all classes of motorized use (USDA, 1989). Motorized use within this management area is restricted to designated routes.

The Deep Creek Recreation Area encompasses roughly 900 acres and is popular year-round for fishing, dispersed camping, hunting, and sightseeing. The management emphasis for this area is to provide a natural setting for recreation pursuits within the area where management activities are not visually evident (USDA, 1989). Motorized use within this management area is restricted to designated routes.

The Bandit Springs Recreation Area is adjacent to the project area along the northeast side near US Highway 26. The management emphasis for this area is to provide dispersed, non-motorized recreational opportunities within a setting where most management activities are generally not evident to the casual observer.

Portions of the ***Summit National Historic Trail*** lie within the project area. The management emphasis for this area is to protect the integrity of the Summit Trail; to enhance and interpret significant segments for public enjoyment and education. Pristine segments will be managed to protect, interpret, and preserve their historic qualities (USDA, 1989). Motorized use within this management area is restricted to designated routes.

The 9.0 mile ***Round Mountain National Recreation Trail*** is located within the project area. The trail is open to non-motorized uses. The management emphasis for the trail is to protect and manage for scenic qualities that make the trail corridor an attractive recreational setting. (USDA, 1989).

Wilderness

The 5,400-acre Bridge Creek Wilderness is within the Ochoco Summit Trail System project area. Motorized and mechanized use is prohibited within designated wilderness areas.

Wild and Scenic Rivers

The North Fork Crooked Wild and Scenic River is within the project area. The 1968 Wild and Scenic Rivers Act calls for maintaining the free-flowing character of designated rivers, protecting the water quality, and protecting and enhancing their "outstandingly remarkable values." Outstandingly remarkable values (ORVs) are values or opportunities in a river corridor that are directly related to the river and that are rare, unique or exemplary from a regional or national perspective. The ORVs for the North Fork Crooked Wild and Scenic River are vegetation and scenic resources.

The North Fork Crooked Wild and Scenic River has segments classified as Recreational and Scenic (these segments are accessible by road and may have some development along their shorelines) and one segment classified as Wild (no development is allowed along the shoreline in this segment). The Ochoco Forest Plan standards and guidelines state that OHV access off of open roads within the Wild and Scenic river corridor is restricted to designated routes only; however, some OHV use is occurring within the corridors outside of designated routes.

Special Uses

All commercial events (where an entry fee is established) on National Forest lands must be authorized by a special-use permit. For the Forest Service to authorize events, organizers must ensure the use is consistent with surrounding land uses. There are several special use events annually within the project area, including the Bandit Springs Horse Endurance Race, the Oregon Star Party, and many less formal events such as poker rides.

Motorized Recreation and Access

Oregon State Law allows non-street legal vehicles to travel on one-lane gravel and native-surface roads (Oregon Parks and Recreation Department 2009).

The 2015 MVUM for the ONF indicates which roads are open to "mixed-use" which includes all classes of both street-legal and non-street legal motorized vehicles. About 1,388 miles of roads on the ONF are designated as open to "mixed-use" and are available for all classes of motor vehicles. Within the project area, approximately 659 miles road of the total 843 miles are open to all vehicles, or about 81%.

Of the 659 miles of road mixed-use road, about 252 miles are native surface. These roads offer access for all motorized vehicle users; however, native surface, high clearance roads are typically more attractive to recreational OHVs users than roads with aggregate surface. Some of these native surface roads are primitive and rough, while others are relatively smooth and offer little or no technical challenge.

Class I and III OHVs are also permitted on roughly 27 miles of designated trails for OHVs on the ONF and CRNG. None of these designated motorized trail miles occur within the project area. This limits the ability of law enforcement personnel to direct non-compliant OHV users to authorized routes. Although the extensive road system provides motorized access for many types of vehicles and associated uses such as hiking, camping, hunting and fishing, roads and existing designated trails do not necessarily provide the recreational experience many people seek or the connectivity to desired destinations such as favorite campsites, vistas, or other amenities. In many areas, vegetation and

terrain, coupled with game, cattle and user-created equestrian paths, facilitate unauthorized cross-country travel by motorized users seeking connectivity to desired destinations. Over time this use has created a system of unmanaged routes which can impact important components of the recreation experience visitors are seeking on the forest, such as quality hunting, protection of migrating, wintering and calving deer and elk, wild horses, and opportunities for quiet recreation.

Nearly 700 miles of user-created OHV routes, including open and closed roads and user created trails, have been identified in the project area. These trails are generally of low to moderate recreational value because they lack flow, connectivity, and loops. In general, there is no organization to the trails as they have been developed haphazardly as riders continue to use certain routes, or create connectivity within them. During hunting season, OHV uses increases throughout the project area. Although the Forest Service does not yet have statistically collected use data for OHVs on the district, forest personnel and the public have observed and reported an increase in the number of riders and a growing network of user-created trails in the project area. However, with implementation of the Deschutes and ONF Travel Management Plan (Travel Management Rule implementation), it is illegal to operate motorized vehicles on most user-created routes.

Existing user compliance to routes open to motorized vehicles varies across the forest. This year, the Forest has implemented motorized use monitoring, with emphasis on determining OHV user compliance to designated routes only during summer use and hunting seasons. Visitor education is being emphasized, by providing better road signage and ensuring motorized users have current MVUMs in hand.

There are a range of designated OHV trails and areas on public lands across Oregon. In order to put the Ochoco Summit project area in context with other OHV riding areas and opportunities in Central and Eastern Oregon, Travel Management Plans from Ochoco and adjacent Forests were reviewed, as well as riding area descriptions posted on the Oregon State Parks and Recreation and other Forest's web pages.

In Central Oregon ten riding areas offered some form of opportunity for operators of class II vehicles: Christmas Valley Sand Dunes (8,000 acres), Klamath Sportsman's Park (20 acres), Edison Butte (25 miles), Millican Plateau, North Millican, South Millican, Rim Butte, East Ft. Rock, Cline Buttes, and Three Trails (only on open roads). In Eastern Oregon three of eleven riding areas offered some form of opportunity for class II vehicle operators: Morrow County (20 miles), Mt. Emily (30 miles) and Virtue Flat (5,000 acres). All of the remaining riding areas posted on the State Parks web sites were limited to vehicles 50" or less in width, with the exceptions of West End ATV (Sunflower) near Spray, which allows class IV up to 65" in width, and Upper Walla Walla, which is limited to class III (single track motorcycles).

In the Central Oregon Region, the six riding areas offering opportunities for class I and III vehicles (50" and less) total approximately 662 miles of designated routes. In the Eastern Oregon Region, the six riding areas offering opportunities for class I and III vehicles (50" and less) total approximately 338 miles of designated routes. In the Eastern Oregon Region, the riding area offering opportunities for class I, III and IV vehicles (65" and less) includes 3,700 acres, while the area limited to class III (motorcycle) includes 40 miles of designated routes. Additional opportunities will be available following construction of trails planned under the Three Trails Off-Highway Vehicle Project on Deschutes National Forest; Cline Buttes on Prineville District BLM; and the Rock Creek and McCubbins Gulch areas under the Mt. Hood National Forest Off-Highway Vehicle (OHV) Management Plan. The Fremont-Winema National Forest is currently in the process of planning the South Chiloquin Motorized Trail Project.

Central Oregon OHV Operations (COHVOPS)

The Forest Service and the BLM have effectively combined forces to manage the Central Oregon Off- Highway Vehicle trail systems through a program called Central Oregon Off-Highway Vehicle Operations (COHVOPS).

The mission of COHVOPS is to provide consistent, quality off-highway vehicle recreation opportunities that are focused on customer service and resource protection. COHVOPS manages the Central Oregon OHV trail systems for the Deschutes and ONFs and the Prineville BLM. This includes operations, maintenance, monitoring, patrolling, user education, and law enforcement. The team implements existing OHV management plans, identifies future needs, recommends actions to management, and assists in future OHV planning efforts. COHVOPS is funded through a combination of direct support from the Forest Service and the BLM, and has consistently received grant funding for trail development and annual operations and maintenance of trails and associated facilities from the State of Oregon ATV Allocation Funds, which are derived from the ATV Permit program and a portion of gas tax revenue. ATV grant funds are also available and used for Law Enforcement, visitor education and resource protection.

Environmental Effects

Assumptions for the Effects Analysis

This recreation analysis is based on the following assumptions:

- OHV users base their destination decisions on a number of variables that include weather-related trail conditions, desire for variety within a given riding season, time and money they can devote to traveling to a riding area, and their choice of riding partners.
- Weather conditions preclude use in the Ochoco Summit Trail System project area much of the year, which reduces the overall opportunity.
- With the Travel Management Rule fully implemented, there are no other places to legally ride other than existing designated trail systems or mixed use roads.
- Use levels on existing roads and trails are likely to increase.
- If a new trail system is created in the project area, increased OHV is likely to occur within that trail system.
- As the economy stabilizes and continues to grow, OHV use will trend up.
- Research shows that OHV riders are willing to travel more than 100 miles to recreate in authorized areas (Bergerson et al. 2005), and local citizens indicate a preference for OHV recreation opportunities within 100 miles from home.
- As evidenced in OHV areas across the state, a well-designed, managed, enforced and maintained designated trail system with adequate facilities will attract riders who will comply with regulations.
- A designated OHV trail system using Oregon ATV Grant funding would be included in the statewide identification of riding opportunities.
- Oregon ATV Grant funding, and an associated increase in COHVOPs and law enforcement presence will increase compliance and decrease unauthorized motorized use.

Evaluation Criteria

The Experience of the OHV Recreationists

A sufficient OHV route system provides for travel distance, play areas, and scenic views, as well as a variety of “difficulty” levels to accommodate all types of users. OHV riders are much more likely to adhere to a system of designated and maintained routes when it provides the opportunities they are

looking for. A sufficient system also has adequate trailhead and staging area facilities, which include parking, restrooms, and picnic or camping opportunities (Crimmins 2006).

The effects of the alternatives on the OHV recreation experience have been evaluated using the following criteria:

Travel Distance

The alternatives were evaluated by measuring and comparing the number of miles of connected OHV trails by each vehicle class. A qualitative descriptor (high, moderate or low value) was assigned to a range of contiguous route miles to describe the adequacy of an experience based solely on the sufficiency of miles, based on Crimmins (2006). Table 36 summarizes this information by vehicle class.

Table 36. Value of OHV experience by vehicle class based on miles of trail.

Miles of Class I ATV Trail (e.g. quad, 4-wheeler)	Value
41 and more	High Value
16 to 40	Moderate Value
0 to 15	Low Value
Miles of Class II ATV Trail (e.g. Jeep, side-by-side)	**Value**
26 to 50	High Value
11 to 25	Moderate Value
0 to 10	Low Value
Miles of Class III Trail (e.g. Motorcycle)	**Value**
51 to 100	High Value
26 to 50	Moderate Value
0 to 25	Low Value

Play Areas and Scenic Views

Play areas and small, confined, open areas (such as mineral sources or pits) where use is not limited to trails, can provide OHV riders the opportunity to appropriately find challenge and warm up their equipment. New or inexperienced riders can learn and safely practice technical skills prior to a trail ride. Although not limited solely to OHV riders, scenic viewpoints such as vistas, historic sites, and geologic features are desired destinations. The presence or absence of view and play areas affects a rider's experience.

Alternatives were evaluated by comparing the number of play areas and scenic viewpoints in each alternative, and assigning the number a value: low, medium, or high (Crimmins 2006). These values are summarized in Table 37.

Table 37. Value of an OHV Area Based on Play Areas and Scenic View Points.

Play Areas		Scenic Viewpoints	
Number	Value	Number	Value
0-1	Low	0-1	Low
2-3	Moderate	2-3	Moderate
4+	High	4+	High

Staging and Camping Areas

A sufficient trail system would have at least one developed staging area in which the riders could stage and camp. The alternatives were evaluated on existence of developed staging areas. Refer to Table 38 for a description of amenities that would be provided at staging areas based on development level.

Table 38. Description of Staging and Camping Areas.

Amenities	Fully developed (3-5 acres)	Semi-developed (2-3 acres)	Semi-primitive (1-2 acres)
Campsites	X		
Parking area	X	X	X
Toilets	X	X	
Tot lot or Learner loop*	X		
Young Teen area/warm-up loop**	X		
Picnic tables	X	X	
Fire rings	X	X	

* Tot lot- small riding area for young children where they are under constant parental supervision, for class I and III vehicle staging areas only
** Area where young teens can learn to ride and for short warm-up rides

Expectations for Diversity of Motorized Uses

OHV users are a diverse group with varying desires and expectations. Not all vehicle classes perform the same on any given terrain or trail layout (Crimmins 2006). User separation can enhance specific rider experiences.

The separation of classes of vehicles was a specific interest expressed by some ATV and motorcycle riders. Some motorcyclists want only single-track trails (6 - 24 inches wide). Maintaining trails for this experience means excluding ATVs. On the other hand, it is common for a family or group of friends to visit the Forest with more than one vehicle class in tow. Such a group usually would prefer routes open to more than one vehicle class.

A comparison of the effects of each of the alternatives on providing both separated and multiple vehicle class uses is illustrated below.

Trail Complexity

Comments shared during project planning indicate OHV riders wish to feel challenged, engaged and inspired. However, what presents a challenge to one rider may be too easy for another and too challenging to a third. It's logical to assume that the longer the trail system, the better it can accommodate a variety of user demands. However, a trail system that's largely made up of user-created trails and National Forest System roads may not provide the range of experiences that OHV riders are looking for.

Forest Service personnel have heard from recreational motorized users through scoping comments and public meetings that the number a trail loop opportunities available within five miles of a staging area and the number of decision points add to the desirability of the trail system.

Analysis of user experience-based experience based on trail complexity will be largely qualitative, but will include the number of miles of Forest road converted to trail as an indicator of improved trail quality.

Rider experience will also be described based on the number of decision points at trail crossings and at junctions with mixed use roads along the trail system, and the number of trail miles and loop opportunities within five miles of a staging area.

The following data compare each alternative's trail system features including new trail construction, conversion of road to trails, and utilizing open roads as connectors, broken out by vehicle class for which the trail systems are proposed.

Alternative 1

Miles of designated motorized trails: 0
Total miles of open mixed use roads (based on draft MVUM): 674 miles

Alternative 2: Proposed Action

Length of class I system : 69 miles
Length of 50" wide trail – new route : 31 miles
Length of 50" wide trail – closed road: 21 miles
Length of 50" wide trail – decom road: 3 mile
Class I system on open road: 14 mile

Length of class II system : 49 miles
Length of 80" wide trail – new route : 12 miles
Length of 80" wide trail – closed road: 7 miles
Length of 80" wide trail – decom road: 1 mile
Class II system on open road: 28 mile

Length of class III system : 52 miles
Length of 24" wide trail – new route : 26 miles
Length of 24" wide trail – closed road: 16 miles
Length of 24" wide trail – decom road: 7 mile
Class III system on open road: 4 mile

Overall Alternative designated route mileage: 170 miles of which 46 miles are on open roads (124 miles of trail on new routes or road-to-trail conversion)

Alternative 3:

Length of class I system : 38 miles
Length of 50" wide trail – new route : 22 miles
Length of 50" wide trail – closed road: 11 miles
Length of 50" wide trail – decom road: 1 mile
Class I system on open road: 4 mile

Length of class II system : 0 miles

Length of class III system : 62 miles
Length of 24" wide trail – new route : 28 miles
Length of 24" wide trail – closed road: 19 miles
Length of 24" wide trail – decom road: 6 mile
Class III system on open road: 9 mile

Overall Alternative mileage: 101 of which 13 miles are on open roads (88 miles of trail on new routes or road-to-trail conversion)

Alternative 4:

Length of class I system : 129 miles
Length of 50" wide trail – new route : 48 miles
Length of 50" wide trail – closed road: 39 miles
Length of 50" wide trail – decom road: 8 mile
Class I system on open road: 34 mile

Class II system on open road: 30 mile

Length of 80” wide trail – new route : 11 miles
Length of 80” wide trail – closed road: 6 miles
Length of 80” wide trail – decom road: 1 mile
Class II system on open road: 11 mile

Length of class III system : 52 miles
Length of 24” wide trail – new route : 22 miles
Length of 24” wide trail – closed road: 17 miles
Length of 24” wide trail – decom road: 5 mile
Class III system on open road: 8 mile

Overall Alternative mileage: 211 of which 53 miles are on open roads (158 miles of trail on new routes or road-to-trail conversion)

Alternative 5:

Length of class I system: 47 miles
Length of 50” wide trail – new route: 18 miles
Length of 50” wide trail – closed road: 16 miles
Length of 50” wide trail – decom road: 4 mile
Class I system on open road: 9 mile

Length of class II system: 20miles

Length of 80” wide trail – new route: 8 miles
Length of 80” wide trail – closed road: 3 miles
Length of 80” wide trail – decom road: 1mile
Class II system on open road: 8 mile

Length of class III system: 62 miles
Length of 24” wide trail – new route: 25 miles
Length of 24” wide trail – closed road: 20 miles
Length of 24” wide trail – decom road: 5 mile
Class III system on open road: 12 mile

Length of class IV system: 6 miles
Length of 24” wide trail – new route : <1 miles
Length of 24” wide trail – closed road: 5 miles
Length of 24” wide trail – decom road: 0 mile
Class IV system on open road: 1 mile

Overall Alternative mileage: 135 of which 30 miles are on open roads (105 miles of trail on new routes or road-to-trail conversion)

The Experience of Non-motorized Recreationists

Non-motorized or quiet recreation is a popular activity within the planning area. “Quiet” recreationists include hikers, bicyclists, equestrians, bird watchers, hunters, anglers and others for whom the quality of their experience depends to a large degree upon their ability to escape the sights and sounds of an increasingly mechanized society. There are roughly 132 miles of forest system trails on the Ochoco NF and about 53 miles within the Ochoco Summit Trail System project area that are managed exclusively for non-motorized uses (excluding winter snowmobile, cross-country ski and snowshoe trails).

A growing body of research demonstrates that traditional and quiet recreationists are adversely affected by OHV use and often seek out landscapes free from OHVs. With respect to shared use of

trails, even though trails are designated as multiple use, heavy motorized use tends to cause other trail users to pursue opportunities at other locations in order to realize desired experiences and benefits. This displacement effect has prompted some researchers to claim that, "the displacement of…non-motorized recreation in favor of more intensive OHV use may have significant economic impacts on the local economy," (Swanson and Loomis, 1996).

Quiet recreationists may be affected by the sight of motorized recreation vehicles, associated sounds, and associated odors, as well as by direct interaction (meeting on trails). Air quality is addressed in the "Air Quality" section of Chapter 3 in this document. Effects of the action alternatives to quiet recreation were compared through an analysis of sound produced by motorized vehicles and distances at which such sounds could be heard. User conflicts are addressed in this section.

OHV Noise and Sound Analysis

The sound analysis for this project was conducted by using geographic information systems (GIS) modeling software developed by Sarah Reed for the Wilderness Society in Berkley, California. The modeling software, called SPreAD-GIS, is a GIS adaptation of a long hand analysis technique developed previously by the Forest Service and the Environmental Protection Agency. It is a series of commands that are run within Environmental Systems Research Institute (ESRI) ArcMap software. The series of SPreAD-GIS commands or scripts attempt to create concentric zones of diminishing sound around a point or along a trail or road to measure the radiating effects of motor noise in forested and other natural ecosystems. In summary, the model uses elevation, vegetation, sound source, model extent, motor type, weather conditions, predominant vegetation type (coniferous forest) and ambient sound conditions to produce a raster dataset that approximates sound diffusion through the landscape from a linear sound source.

Using the SPreAD-GIS scripts, a motorcycle was selected as the motor type and sound source as it had the potential for producing the highest dB level based on the model. The proposed OHV trail system was buffered with a 45 dB noiseband from each OHV trail and shared-use road for each alternative. This information was then overlaid over the project area to determine how many acres were within the 45 dB noiseband of a proposed OHV trail or shared-use road by alternative. The buffered layer within the 45 dB noiseband is the area determined to be the distance where OHVs would be clearly audible over expected normal ambient noise.

A designated OHV trail system would consist of both concentrations of segments of OHV trails and connecting shared-use roads. It is assumed that OHVs would spend more time on the trails (because trails are a preferable opportunity) and use the shared-used roads only to traverse to another trail area. It is acknowledged that OHVs are not the only audible sounds within the Ochoco Summit Trail System project area as there are mixed use roads that produce associated noise that would continue regardless of which alternative from this EIS is implemented.

There are many destinations where people enjoy both motorized and quiet recreation. The potential OHV trail system was buffered at the 45 dB noise level from each OHV trail and shared-use road in the designated system for each alternative. The resulting noise band was overlaid with a map of developed recreation sites, non-motorized trails, dispersed campsites, Recreation Opportunity Spectrum (ROS), and the horse endurance race event routes. Acreage of these sites within the 45 dB noiseband of an OHV trail or shared-use road was then determined. The intersection of these layers should be the area where OHVs can be heard from those specific sites and provides the measure with which alternatives were compared.

Motorized and Non-Motorized Use Conflicts

Use conflict happens when a person's expectations for his or her recreational experience are not met due to contact with another user or through disturbance from the sound or physical evidence left by another user. The potential for conflict exists among all user groups, and even within a user group,

when personal expectations of desired experience are not met. Not all user conflicts on the National Forest are entirely recreation-based; the National Forest System provides a wide array of resource-based opportunities such as timber harvest, livestock grazing and mining.

Non-motorized recreationists who use designated motor vehicle routes should expect to encounter motor vehicle use during the open motorized season of use. When a non-motorized user encounters motor vehicles (or evidence of motor vehicles, such as noise or emissions) in an area where he or she does not expect to, user conflict is more likely to occur. Equestrians may be more sensitive to encounters with other users due to their concern for animal and personal safety.

The broad categories of use for trails on the Ochoco NF are Winter/Summer and Motorized/Non-motorized. There are a few exceptions where sub categorical use separations occur such as "Hikers Only" trails within the Summer/Non-Motorized trail category. Most of the non-motorized trails on Ochoco NF have not been designed to separate user types.

Human-powered recreationists and equestrians use motorized OHV trails on the Ochoco NF. Although noise is a factor that can detract from those seeking a quiet experience, people using trails that expect motorized encounters are able to use noise to their advantage. Non-motorized users are able to hear motorized vehicles and avoid encounters. Motorized users, however, may not be able to anticipate encounters with other users unless line-of-sight is available.

Some of the designated non-motorized trails do have mixed use road crossings; however, there are no proposed OHV trail crossings between the two distinct trail uses.

Areas within the Ochoco Summit Project Area Not Affected by the Action Alternatives

Developed Recreation and Forest System Trails: There would be no effect from any of the action alternatives to the following developed recreation sites and trails because no OHV Trails will pass through, connect to or be staged at: Walton Lake CG, Biggs Spring CG, Big Spring CG, Deep Creek CG, Cottonwood CG, Wolf Creek CG, Sugar Creek CG, Barnhouse CG, Wildwood CG, Walton Lake Trail, Lookout Mountain Recreation Area Trail Systems, Round Mountain National Recreation Trail, Ochoco Mt. Trail, Barnhouse Trail, Cold Springs Rental Cabin, Marks Creek Sledding Hill.

Congressionally Designated Areas: The 5,400 acre Bridge Creek Wilderness is adjacent to the Ochoco Summit project area. Forest Road 2630 between the junction of Forest Road 150 and the open, mixed-use segment of Forest Road 2630 south of the Bridge Creek Wilderness boundary is proposed to be designated as open to mixed use travel under Alternative 5. This designation would provide a legal mixed use road connection between the West Implementation Area and the East Implementation Area of the Ochoco Summit Trail System. This connecting road segment would not be mapped as a designated trail, but would be available for mixed-use travel. The segment of Forest Road 2630 adjacent to the Wilderness boundary is already well-traveled by motor vehicles and is currently available for use by OHVs. Implementation of Alternative 5 would not add a new mixed-use route adjacent to the wilderness but could increase the level of use on this existing open road.

The North Fork Wild and Scenic River corridor is within the boundary of the Ochoco Summit project area. The closest point to any proposed motorized OHV trail is more than 2.2 miles. No portion of the Wild and Scenic River corridor is within the noiseband >45 db.

Lookout Mountain Recreation Area: There would be no effect from any of the action alternatives on any area within the Lookout Mountain Recreation Area. The closest proposed motorized trails are > 4 miles from the boundary of this area.

Non-Motorized Trails: There are 50 miles of trails managed exclusively for non-motorized use within the project area, but none of the trails are within the > 45db noiseband. A 0.03 mile segment

of trail at the Keeton Trailhead is within the >45db noiseband where trails users currently can hear sounds of motor vehicles accessing the road and trailhead.

Motorized Recreation Experience

Table 39 displays the number of miles of OHV trail by alternative. The table distinguishes between new trail construction and/or roads converted to trails (trail miles) included in the trail system (including connecting roads) in the action alternatives. Routes were mapped using information obtained by the users themselves, agency personnel with experience in motorized recreation, and Geographical Information Systems terrain and road data. Values displayed in Table 39 are based on trail system length only.

Table 39. Miles of OHV trail and assigned value by vehicle class by alternative.

Summary of Alt 2 - Proposed Action motorized trails and areas.				
Trail Type	**Total Trail System miles (including open road connections)**	**Value**	**Trail Miles (new construction or road-to-trail conversion)**	**Value**
Motorcycle (<24”) Trail	52	H	49	M
ATV (vehicles <50”) Trail	69	H	55	H
4x4 (vehicles <80”) Trail	49	H	20	M
Total	**170**		**124**	
Summary of Alt 3 - Proposed Action motorized trails and areas.				
Trail Type	**Total Trail System miles (inc. open road connections)**	**Value**	**Trail Miles (new constr. or Rd to Trail conversion)**	**Value**
Motorcycle (<24”) Trail	62	H	53	H
ATV (vehicles <50”) Trail	38	M	34	M
4x4 (vehicles <80”) Trail	0	N/A	0	N/A
Total	**100**		**87**	
Summary of Alt 4 - Proposed Action motorized trails and areas.				
Trail Type	**Total Trail System miles (inc. open road connections)**	**Value**	**Trail Miles (new constr. or Rd to Trail conversion)**	**Value**
Motorcycle (<24”) Trail	52	H	44	M

ATV (vehicles <50”) Trail	129	H	95	H
4x4 (vehicles <80”) Trail	30	M	18	M
Total	**211**		**157**	
Summary of Alt 5 - Proposed Action motorized trails and areas.				
Trail Type	**Total Trail System miles (including open road connections)**	**Value**	**Trail Miles (new construction or road-to-trail conversion)**	**Value**
Motorcycle (<24”) Trail	62	H	50	M
ATV (vehicles <50”) Trail	47	H	38	M
4x4 (vehicles <80”) Trail	20	M	12	M
Total	**135**		**105**	

Table 40 summarizes the riding areas by type, and scenic viewpoints that would be accessible to OHVs with connection to proposed trail systems in each alternative.

Table 40. Riding areas and scenic viewpoints by alternative.

	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Ochoco Divide Sno-Park	W/L	W/L	W/L	W/L
Ahalt Mineral Source	PA		PA	
Walton Snopark	TA	TA	TA	W/L
Scott's Mineral Source	W/L		W/L	
Aspen Mineral Source	PA		W/L*	
Road 600	W/L		W/L	
Peterson Lava	RC		RC	RC
Ross/Peterson Ridge	TA		TA	
Cottonwood Pit	W/L	W/L	W/L	W/L
Six Corners Mineral Source	W/L	W/L	W/L	TA
Mt. Pisgah viewpoint	yes	no	yes	yes
Peterson Pt. viewpoint	no	no	yes	yes
Slide Mtn viewpoint	no	no	yes	yes
Value based on play areas alone	mod	low	low	high
Value base on veiwpoints alone	high	low	high	high
* Changes location to Happy Camp Crk Ridge W/L – Warm-up and learner loop TA – Trail access RC – Rock crawl PA – Play area for ATV/MC				

Table 41 summarizes the staging areas and mapped trailheads by alternative; Table 42 provides site-specific information about each staging area.

Table 41. Staging areas and trailheads by alternative.

Alternative		Staging Areas	Mapped Trail Heads
2	Class I/III	6	3
	Class III only	2	0
	Class II	2	3
	TOTAL	**10**	**6**
3	Class I/III	2	0
	Class III only	2	0
	Class II	0	0
	TOTAL	**4**	**0**
4	Class I/III	6	0
	Class III only	2	0
	Class II	2	0
	TOTAL	**10**	**0**
5	Class I/III only	2	0
	Class III only	1	1
	Class II/III	1	0
	TOTAL	**4**	**1**

Table 42. Site-specific staging area information by alternative.

	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Ochoco Divide Sno-Park (SD)	X	X	X	X
Ahalt Mineral Source (FD)	X		X	
Walton Snopark (SD)	X	X	X	X
Scott's Mineral Source (SD)	X		X	
Aspen Mineral Source (FD)	X		X*	
Road 600 (SD)	X		X	
Peterson Lava (FD)	X			X
Ross/Peterson Ridge (SD)	X			
Cottonwood Pit (FD)	X	X		X
Six Corners Mineral Source (FD)	X	X		X
# Trailheads (SP)	6	0	0	1

* Changes location to Happy Camp Crk Ridge
SD-Semi-developed
SP-Semi-primitive
FD-Fully developed

Trail complexity was estimated as contributing to rider experience based on the number of decision points within the trail system and connecting mixed use roads, and the number of trail miles and loop opportunities within 5 miles of a staging area. These comparisons are displayed in Table 43. In this table trail to trail decision points are the number of locations where the trail system connects to more than one segment of the trail system. Trail to road decision points are where the trail system connects to mixed use roads that are not part of the designated trail system.

Table 43. Decision points and opportunities near staging areas by alternative.

	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Trail to Trail Decision Points, Class I	27	21	73	29
Trail to Trail Decision Points, Class II	29	0	11	12
Trail to Trail Decision Points, Class III to Class III	22	3	15	8
Trail to Trail Decision Points, Class III to Class I/II/III	78	24	99	40
Trail to Road Decision Points, Class I	64	34	94	15
Trail to Road Decision Points, Class II	36	0	33	44
Trail to Road Decision Points, Class III	28	49	28	3
System Miles w/in 5 mi. of Staging Area, Class I opportunity	69	38	133	44
System Miles w/in 5 mi. of Staging Area, Class III opportunity	69	64	85	38
Number of Loops within 5 miles of Staging Areas, Class I	5	10	27	10

Alternative 1

Alternative 1 would retain the current condition of user-created and unauthorized routes as no mechanism for closure, increased compliance and law enforcement focus or rehabilitation of these routes are proposed under this alternative. Under this alternative, OHV users would continue to have legal access to all mixed-use roads in the project area. Some users would be likely to continue to use unauthorized routes, which are not designed to be safe or sustainable. As routes become unstable or undesirable over time or users seek to create loops or connections to mixed use roads, more unauthorized user created routes would likely be developed. Visitor and access management and enforcement would become increasingly difficult. The potential for user conflicts (among motorized users and between motorized and non-motorized recreationists) would remain and could increase in areas with existing unmanaged motorized recreation.

This alternative would not provide any organized facilities designed specifically for parking, camping, and dispersal into a nearby trail system. It is assumed riders would continue to use the areas they have in the past. Areas such as Walton Lake Snopark would continue to be used for day and overnight use, and riders would continue to utilize material sources and other dispersed areas that provide for parking and access to desired riding areas.

This alternative would continue to allow access to all areas open to cross country travel associated with pits for mineral extraction and all viewpoints that can be accessed on roads open to non-highway legal vehicles as per the MVUM. Within the project area these include Crystal, Ahalt, Walton, Scott's Camp, Aspen, Six Corners, Remington, Thornton, Grasshopper, Juniper and Flow Top.

Under this alternative, there would be no opportunity to leverage grants and other funding to address and mitigate unauthorized routes, play areas and resource damage caused by OHV use. Only approved, designated trail systems are funded by state grants to actively manage OHV uses.

Alternative 2

Alternative 2 would provide a total of 170 miles of designated motorized trail for Class I, II, and III vehicles (including 46 miles of connecting open roads). See Table 44 for trail miles broken out by vehicle class.

Table 44. Summary of trail miles proposed in Alternative 2 of the Ochoco Summit Trail System project.

Vehicle Class	Miles of Open Road within	Miles of Closed Road	Miles of Decommissioned	Trail Constructed on Other Than	Total Trail Miles

	Designated Trail System	used for Trail	Road Converted to Trail	National Forest System Roads (may include user-created trail)	
I	14	21	3	31	69
II	28	7	1	12	48
III	4	16	7	26	53
TOTALS	**46**	**44**	**11**	**69**	**170**

General Effects for All Motorized Users

Because the designated Class I and Class III systems would exclude Class II vehicles, risk of conflicts between Class II vehicles and smaller vehicles would be reduced; however, risk would still be present on mixed-use roads. This separation of use would improve safety over the current condition.

Alternative 2 is rated as "Moderate" for presence of play areas and "High" for access to scenic views (see Table 40). Staging areas would provide opportunities for camping as well as day use (see descriptions in Chapter 2 of this EIS); Alternative 2 would provide ten staging areas as well as six mapped trailheads (see Table 41).

Effects to Class I Users

Alternative 2 would allow for up to 55 miles of 50"-wide trail for Class I vehicles plus 14 miles of open mixed-use road within the designated trail system. These 55 miles would be available for use by motorcycles but would be closed to Class II vehicles. This alternative would provide six staging areas and three trailheads specifically intended for use by ATVs (but available to any trail users). Staging areas would accommodate day use and overnight camping, and most would include a warm-up or learner's loop.

Effects to Class II Users

Alternative 2 would allow for up to 20 miles of 80"-wide trail for Class II vehicles plus 28 miles of open mixed-use road within the designated trail system. These 20 miles would be available for use by all classes of vehicle. This alternative would provide two staging areas and three mapped trailheads specifically intended for use by Class II vehicles (but available to any trail users). Staging areas would accommodate day use and overnight camping.

Effects to Class III Users

Alternative 2 would allow for up to 49 miles of 24"-wide trail for Class III vehicles plus 4 miles of open mixed use road within the designated trail system. These 49 miles would be available for use by motorcycles only. This alternative would provide two staging areas intended for use by motorcycles.

Alternative 3

Alternative 3 would provide a total of 100 miles of designated motorized trail for Class I and III vehicles (including 13 miles of connecting open roads). See Table 45 for trail miles broken out by vehicle class.

Table 45. Summary of trail miles proposed in Alternative 3 of the Ochoco Summit Trail System project.

Vehicle Class	Miles of Open Road within Designated Trail System	Miles of Closed Road used for Trail	Miles of Decommissioned Road used for Trail	Trail Constructed on Other Than National Forest System Roads (may include user-created trail)	Total Trail Miles
I	4	11	1	22	38

II	0	0	0	0	0
III	9	19	6	28	62
TOTALS	**13**	**30**	**7**	**50**	**100**

General Effects for All Motorized Users

Because the designated Class I and Class III systems would exclude Class II vehicles, risk of conflicts between Class II vehicles and smaller vehicles would be reduced; however, risk would still be present on mixed-use roads. This separation of use would improve safety over the current condition.

Alternative 3 is rated as "Low" for presence of play areas and "Low" for access to scenic views (see Table 40). Staging areas would provide opportunities for camping as well as day use (see descriptions in Chapter 2 of this EIS); Alternative 3 would provide four staging areas and no mapped trailheads (see Table 41).

Effects to Class I Users

Alternative 3 would allow for up to 34 miles of 50"-wide trail for Class I vehicles plus 4 miles of open mixed-use road within the designated trail system. These 34 miles would be available for use by motorcycles but would be closed to Class II vehicles. This alternative would provide two staging areas specifically intended for use by ATVs (but available to any trail users). Staging areas would accommodate day use and overnight camping, and most would include a warm-up or learner's loop.

Effects to Class II Users

Alternative 3 would not provide a designated trail system for Class II vehicles.

Effects to Class III Users

Alternative 3 would allow for up to 53 miles of 24"-wide trail for Class III vehicles plus 9 miles of open mixed use road within the designated trail system. These 53 miles would be available for use by motorcycles only. This alternative would provide two staging areas intended for use by motorcycles.

Alternative 4

Alternative 4 would provide a total of 209 miles of designated motorized trail for Class I, II, and III vehicles (including 53 miles of connecting open roads). See Table 46 for trail miles broken out by vehicle class.

Table 46. Summary of trail miles proposed in Alternative 4 of the Ochoco Summit Trail System project.

Vehicle Class	Miles of Open Road within Designated Trail System	Miles of Closed Road used for Trail	Miles of Decommissioned Road used for Trail	Trail Constructed on Other Than National Forest System Roads (may include user-created trail)	Total Trail Miles
I	34	38	5	51	128
II	11	6	1	11	29
III	8	17	5	22	52
TOTALS	**53**	**61**	**11**	**84**	**209**

General Effects for All Motorized Users

Because the designated Class I and Class III systems would exclude Class II vehicles, risk of conflicts between Class II vehicles and smaller vehicles would be reduced; however, risk would still be present on mixed-use roads. This separation of use would improve safety over the current condition.

Alternative 4 is rated as "Low" for presence of play areas and "High" for access to scenic views (see Table 40). Staging areas would provide opportunities for camping as well as day use (see descriptions

in Chapter 2 of this EIS); Alternative 4 would provide ten staging areas and no mapped trailheads (see Table 41).

Effects to Class I Users

Alternative 4 would allow for up to 94 miles of 50”-wide trail for Class I vehicles plus 34 miles of open mixed-use road within the designated trail system. These 94 miles would be available for use by motorcycles but would be closed to Class II vehicles. This alternative would provide two staging areas specifically intended for use by ATVs (but available to any trail users). Staging areas would accommodate day use and overnight camping, and most would include a warm-up or learner’s loop.

Effects to Class II Users

Alternative 4 would allow for up to 18 miles of 80”-wide trail for Class II vehicles plus 11 miles of open mixed-use road within the designated trail system. These 18 miles would be available for use by all classes of vehicle. This alternative would provide two staging areas specifically intended for use by Class II vehicles (but available to any trail users). Staging areas would accommodate day use and overnight camping.

Effects to Class III Users

Alternative 4 would allow for up to 44 miles of 24”-wide trail for Class III vehicles plus 8 miles of open mixed use road within the designated trail system. These 44 miles would be available for use by motorcycles only. This alternative would provide two staging areas intended for use by motorcycles.

Alternative 5

Alternative 5 would provide a total of 135 miles of designated motorized trail for Class I, II III and IV vehicles (including 30 miles of connecting open roads). See Table 47 for trail miles broken out by vehicle class.

Table 47. Summary of trail miles proposed in Alternative 5 of the Ochoco Summit OHV Trail System project.

Vehicle Class	Miles of Open Road within Designated Trail System	Miles of Closed Road used for Trail	Miles of Decommissioned Road used for Trail	Trail Constructed on Other Than National Forest System Roads (may include user-created trail)	Total Trail Miles
I	9	16	4	18	47
II	8	3	1	8	220
III	12	20	5	25	62
IV	1	5	0	0	6
TOTALS	300	44	10	51	135

General Effects for All Motorized Users

Because the designated Class I, III and Class IV systems would exclude Class II vehicles, risk of conflicts between Class II vehicles and smaller vehicles would be reduced; however, risk would still be present on mixed-use roads.

Alternative 5 is rated as “Low” for presence of play areas and “Low” for access to scenic views (see Table 40). Staging areas would provide opportunities for camping as well as day use (see descriptions in Chapter 2 of this EIS); Alternative 5 would provide four staging areas and no mapped trailheads (see Table 41).

Effects to Class I Users

Alternative 5 would allow for up to 38 miles of 50”-wide trail for Class I vehicles plus 9 miles of open mixed-use road within the designated trail system. These 38 miles would be available for use by

motorcycles but would be closed to Class II vehicles. This alternative would provide two staging areas specifically intended for use by ATVs (but available to any trail users with vehicle width of 50" or less). Staging areas would accommodate day use and overnight camping, and would include a warm-up or learner's loop.

Effects to Class II Users

Alternative 5 would allow for up to 12 miles of 80"-wide trail for Class II vehicles plus 8 miles of open mixed-use road within the designated trail system. These 12 miles would be available for use by all classes of vehicle. This alternative would provide one staging area specifically intended for use by Class II vehicles (but available to any trail users with vehicles 80" or less in width, including Class IV vehicles). Staging areas would accommodate day use and overnight camping.

Effects to Class III Users

Alternative 5 would allow for up to 50 miles of 24"-wide trail for Class III vehicles plus 12 miles of open mixed use road within the designated trail system. These 50 miles would be available for use by motorcycles only. This alternative would provide one staging area and one trailhead intended for use by motorcycles plus one shared staging area with a class II trail system. The staging areas and trailhead would accommodate day use and overnight camping.

Effects to Class IV Users

Alternative 5 would allow for up to 5 miles of 65"-wide trail for Class IV vehicles plus 1 mile of open mixed use road within the designated trail system. These 5 miles would be available for use by side by sides, atvs and motorcycles. This alternative would not provide a staging area specifically intended for use by side by sides, but the trail is connected to an open mixed use road that would provide trail access and would accommodate day use and overnight camping.

Non-Motorized Recreation Experience

Oregon State law and the Forest Service require that OHVs be no louder than 99 dB at 20 inches from the exhaust opening. Some untested individual OHVs currently using the Lookout Mountain Ranger District may be louder than 99 dB. If implemented, an action alternative may provide more active management of OHV use and consequently more effective monitoring and enforcement. If this is achieved, overall sound levels may decrease over the existing condition. Monitoring and testing could be more efficient at identified staging areas and allow law enforcement and volunteers a better opportunity to test for compliance at key locations and times. Vehicles that are tested and found to be over the 99 dB sound threshold would not be able to operate on public land.

Sound dissipates over distance. If the effects of terrain, vegetation and wind are excluded, sound intensity decreases about 6 decibels (dB) per doubling of distance (Shilling 1993). A decibel level of 30 is characterized as somewhere between "quiet" and "very quiet" and equates to a quiet rural area (OMSI 2005). Assuming an OHV emitting a sound pressure of 99 dB at 20 inches from the exhaust opening (the highest that Oregon State law allows in this area), the sound would dampen to 45 dB at about 4,700 feet or 0.89 miles from the source (Sengpiel audio 2009) and would probably not be heard by the casual observer. Therefore, most people who are likely to be annoyed by the sounds of OHVs would not be annoyed at distances over 0.89 miles because they would probably not hear the sounds. When the effects of terrain, vegetation, wind, and higher background sounds are included, that distance can be shorter.

Even if an OHV cannot register on a sound meter, some people may still hear the sound and could be annoyed by it. A sound source such as an OHV can be clearly audible above the background, in some cases, even if its measured sound level is below that of the background (Harrison et al. 1993). This is especially evident if a person knows or thinks the sound is happening.

Alternative 1

Under this alternative, designated routes for motorized use would not be changed from the current network of opportunity on open mixed use roads and highway legal roads. As described in detail in the Transportation section of this EIS, within the project area there are 799 miles of road open to motorized use. Of those, 659 miles are open to mixed use, thus allowing for travel by non-highway legal OHVs as well as highway legal vehicles such as passenger cars, trucks and dual sport motorcycles. Under this alternative, recreationists may be able to hear motorized equipment including OHVs operating on these open roads, as well as in rock pits that are open to cross country travel (as displayed on the MVUM maps). Sound analysis was not completed for the existing open road system as it is considered to be part of the existing environment. Therefore sounds greater than 45db are not displayed for this alternative in Table 48, even though noise at this level or higher is present within the project area.

Alternative 1 would retain the current condition of user-created and unauthorized routes as no mechanisms for closure, increased compliance and law enforcement focus or rehabilitation of these routes are proposed under this alternative. The potential for recreationists to hear motorized uses on these routes will persist.

Alternatives 2-4

Table 48 displays the areas where sounds may be heard at greater than 45db when OHVs are riding on the designated OHV trail system by alternative. Using the threshold for clearly audible sound at 0.45db, it is assumed this would be the boundary for effects associated with noise from motorized vehicles.

Table 48. Sites/Areas from which sounds of OHVs might be audible at > 45 db.

Site/Area	Alt 2	Alt 3	Alt 4
Dispersed Camping Sites	35	18	37
Dispersed camping roads within noise band (miles)	65	26	73
Equestrian Endurance Event Route (miles)	1.89	1.46	2.12
Keeton Trail (miles)	0.03	0.02	0.02
Scotts Camp	X		X
Ochoco Divide Sno-Park	X	X	X
Keeton Trailhead	X	X	X
Walton Sno-Park	X	X	X
Cottonwood Pit	X	X	X
Crystal Springs Organizational Camp		X	X
ROS acres within noiseband by ROS Classification			
Roaded Modified	10,837	5,818	12,771
Roaded Natural	1,668	1,059	2,220
Semiprimitive Non-Motorized	276	117	292

Many non-motorized recreationists prefer to avoid areas where motorized recreation occurs. The presence of a designated and managed trail system for motorized recreation may benefit non-motorized recreationists within the Ochoco Summit project area, particularly hikers and equestrians, by identifying and signing areas where OHVs may be operated legally and providing maps of the designated trail areas. Non-motorized recreationists who prefer to avoid OHVs would easily be able to identify areas where OHVs would be expected to be used. As described in the Project Design Criteria for recreation (Chapter 2 of this EIS), Routes not intended for OHV travel that cross designated OHV routes will be identified at crossings with the appropriate trail marker (ie. Nordic ski

trail, horse trail, snowmobile trail, or hiking trail markers), so that they are easily identified as not being part of the designated OHV trail system. Action alternatives were specifically designed so that no portion of the OHV trail system would overlap (share) any designated non-motorized trail. Direct effects to non-motorized recreation, including user conflict, within the proposed "OHV management areas" are expected to be minimized or avoided because the recreation uses would be separated by trail designation except when non-motorized users choose to access the motorized trail system during the months when it is available for motorized access. Designation of a motorized trail system would allow the Ochoco NF to compete for OHV-related grants, which would help pay for increased education, enforcement and management of recreation resources within the OHV management area. An increased Forest Service presence would be beneficial to all Forest users within the OHV management area because access to information or emergency response would increase.

Because the open OHV season under all alternatives would overlap very little of the big game hunting seasons on the Ochoco NF, user conflict between OHV recreationists and hunters is expected to be very infrequent. While hunters would not be permitted to operate OHVs on the motorized trail system outside of its open season of use, OHV trails may provide access for hunters on foot or on horseback.

There are stream crossings proposed under each action alternative; some of these are located on perennial fish-bearing streams (see discussion in the Hydrology and Aquatic Species section of this EIS). Conflicts between OHV users and anglers are not expected under any action alternative because the OHV trail system would be designated, well-defined and identified on maps and easily avoidable by anglers.

Cumulative Effects

Motorized Recreation

In order to put the Ochoco Summit project area in context with other OHV riding areas and opportunities in Central and Eastern Oregon, Travel Management Plans from Ochoco and adjacent Forests were reviewed, as well as riding area descriptions posted on the Oregon State Parks and Recreation and other Forest's web pages (refer to Table 49, Figure 1 and Figure 2).

In Central Oregon six of twelve riding areas offer some form of opportunity for operators of Class II vehicles: Christmas Valley Sand Dunes (8,000 acres), Klamath Sportsman's Park (20 acres), Edison Butte (25 miles), Rim Butte (17.6 miles), Three Trails (21 miles) and Millican Valley (only on open roads). In Eastern Oregon three of eleven riding areas offered some form of opportunity for Class II vehicle operators: Morrow County (20 miles), Mt. Emily (30 miles) and Virtue Flat (5,000 acres). All of the remaining riding areas posted on the State Parks web sites were limited to vehicles 50" or less in width, with the exceptions of West End ATV (Sunflower) near Spray, which allows UTVs up to 65" in width, and Upper Walla Walla which is limited to class III (single track motorcycles).

In the Central Oregon Region, the six riding areas offering opportunities for class I and III vehicles (50" and less) total approximately 662 miles of designated routes. In the Eastern Oregon Region, the six riding areas offering opportunities for Class I and III vehicles (50" and less) total approximately 338 miles of designated routes. In the Eastern Oregon Region, the riding area offering opportunities for Class I, III and IV vehicles (65" and less) includes 3,700 acres, while the area limited to Class III (motorcycle) includes 40 miles of designated routes. Additional opportunities will soon be available following construction of trails planned under the Three Trails Off-Highway Vehicle Project on Deschutes National Forest; Cline Buttes on Prineville District BLM; and the Rock Creek and McCubbins Gulch areas under the Mt. Hood National Forest Off-Highway Vehicle (OHV) Management Plan. Fremont-Winema is currently in the process of planning the South Chiloquin Motorized Trail Project.

In addition to designated riding areas and designated trails, OHVs may also travel on open roads that have been approved for mixed use (highway legal as well as non-highway legal vehicles). On the Deschutes and Ochoco National Forests, with implementation of the Travel Management Plan, OHVs would be allowed to utilize approximately 6,700 miles of mixed use road and 1,230 acres of gravel pit areas across the two Forests. Elsewhere in Central Oregon, the Fremont-Winema National Forest offers approximately 5,900 miles of mixed use road and 165 miles of mixed use trail under their Travel Management Plan. Some of these routes are open year-round while others are subject to seasonal restrictions. Though the miles available for mixed use on open roads do not provide the same quality of recreational experience as motorized trails, they do offer opportunities for recreational experiences and motorized access for those who are not looking for technically difficult routes.

The cumulative effect of this project on motorized recreation opportunities would be to provide additional trails for multiple vehicle classes in a location that is between the riding areas to the west on Deschutes, Willamette and Mt. Hood National Forests or Prineville BLM, and the riding areas to the east such as those at Morrow County, Spray and Mt. Emily. The Ochoco Summit OHV trails would provide a unique forest riding environment not found in the nearby, lower elevation high desert environments such as Millican, Cline Buttes and East Fort Rock. Ochoco Summit would provide a nearby opportunity when these trail systems are too dry, hot and dusty to enjoy. Additionally, the drier and more open forest environment would provide a unique experience not found in the more moist and dense forests found at Three Trails, Santiam and McCubbins Gulch. Refer to Figure 1 for a visual display of where the Ochoco Summit Project area is positioned relative to the other designated OHV areas in Oregon. This positioning provides increased opportunity for operators of highway legal vehicles (such as dual sport motorcycles or street legal Four-wheelers) to travel between riding areas, utilizing open roads to connect between riding areas. This positioning also provides opportunities for local riders to access a legal system of trails with a shorter travel distance from homes in Prineville, Mitchell, Madras, Redmond or Paulina.

Table 49. Selected OHV opportunities close to the Ochoco Summit project area.

Name	Managing Agency	Location	ATV Classes	Season	Description
Green Mountain OHV Trail	Ochoco National Forest	20 miles NE of Prineville	I and III	All year	8.5 miles of easiest to more difficult trails, not open to Class II
Henderson Flat	Crooked River National Grassland	13 Miles S of Madras	I and III	Closed Dec 1 through March 31	18 miles easiest to more difficult trails, not open to Class II
East Fort Rock	Deschutes National Forest	21 miles east of Bend on US 20	I and III, Class II on Shared Use Roads Only, Groundhog Rock Crawl Pit	All year, some trails affected by Green Dot Closure in October	318 miles of easy to most difficult trails
Edison Butte	Deschutes National Forest	24 miles SW of Bend	I, II and III	Closed Dec 1 through March 31 except for Class I vehicles	25 miles of more to most difficult trails. Restricted to vehicles under 80 inches
Cline Buttes	Prineville BLM	9 miles N of Bend on Hwys 20 and 126	I, II, and III	Generally, most trails open dependent upon snow	Up to 90 miles for various class of vehicles with varied terrain

Table 49. Selected OHV opportunities close to the Ochoco Summit project area.

Name	Managing Agency	Location	ATV Classes	Season	Description
Millican/ ODOT Pit Play area	Prineville BLM	27 Miles E of Bend on Hwy 20	I and III	All Year	Open play area provides challenges for all levels of experience
Rosland Pit Play Area	Prineville BLM	26 miles S of Bend at Wickiup Jct.	I and III	All year	3.5 miles of trails, a learners' loop, a beginner play area and an advanced play area
North Millican	Prineville BLM	24 miles E of Bend off Hwy 20	I, II and III	Closed Dec 1 through April 30	102 miles of easiest to most difficult trails; 24 miles open to Class II
Millican Plateau	Prineville BLM	20 miles NE of Bend on George Millican Road	I, II and III	All Year	111 miles of easiest to more difficult trails; 37 miles open to Class II
South Millican	Prineville BLM	22 miles E of Bend off Hwy 20	I, II and III	Closed Dec 1 through April 30	43 miles of easiest to more difficult trails; 11 miles open to Class II
Santiam Pass	Willamette National Forest	22 miles west of Sisters	I, II, and III	Mid-June-mid-November (snow free)	49 miles of mostly easiest to most difficult trails.
Rim Butte	Deschutes National Forest	40 miles south of Bend, east of La Pine	II	Mid-June-mid-November (snow free)	17.6 miles of trail including 14 miles of technical routes
Three Trails	Deschutes National Forest	60 miles south of Bend off Hwy 97, near Crescent	I, II and III	May 1 to October 31 (condition dependent)	142 miles of trails plus 80 miles connecting roads
Source: Oregon Parks and Recreation Department: http://atv.prd.state.or.us/places.php.					

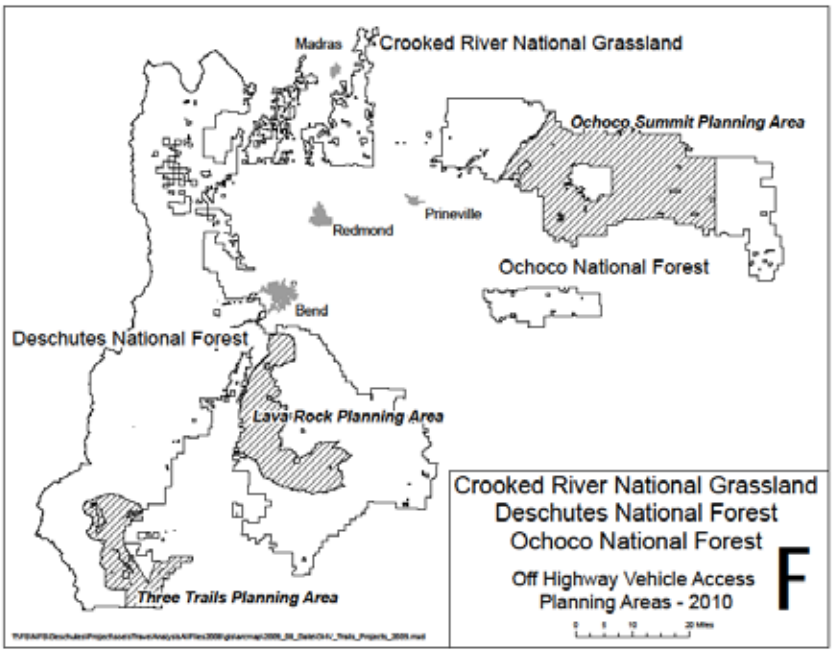


Figure 1. Planning areas (recent and current) for OHV trail projects on the Deschutes and Ochoco National Forest.

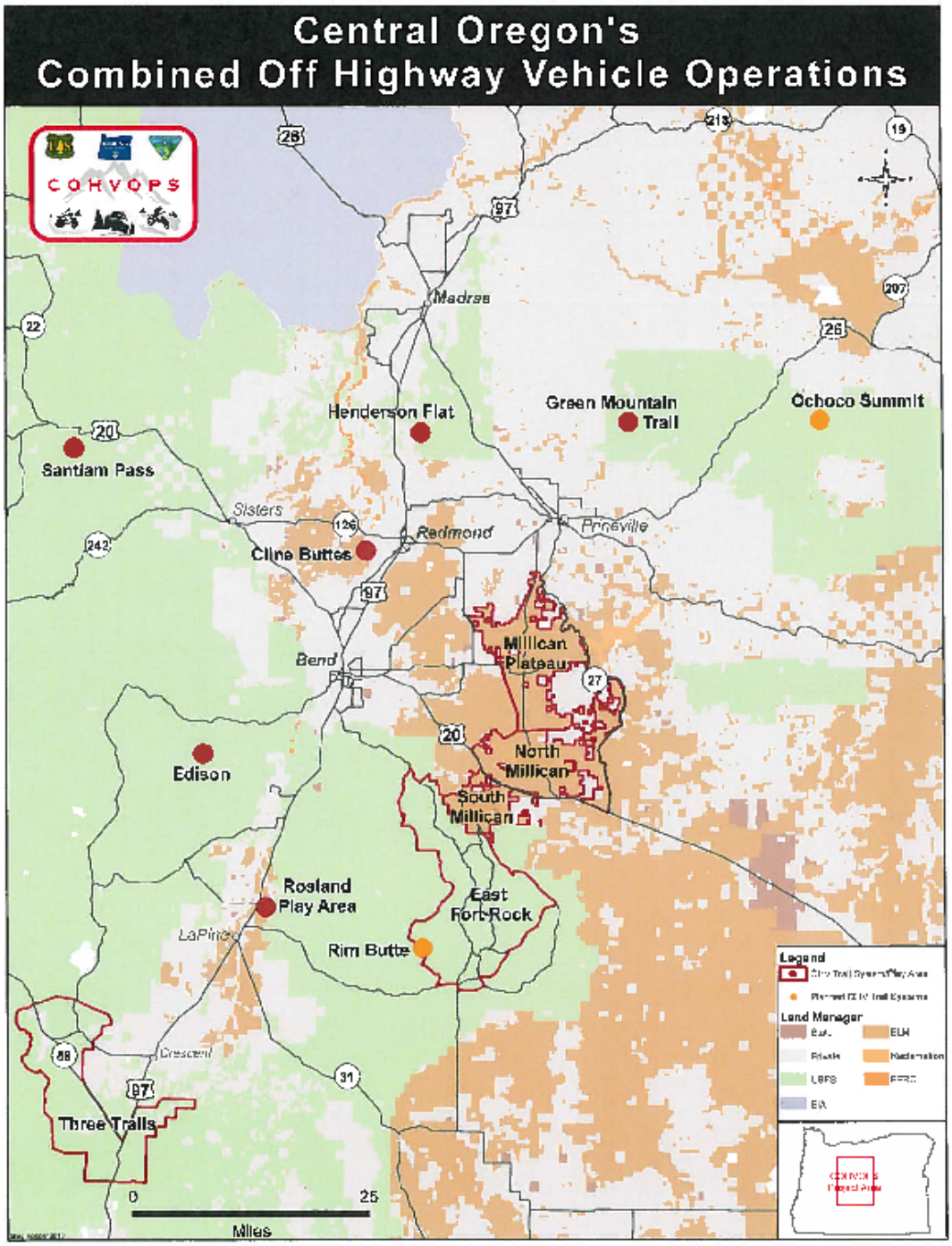


Figure 2. Central Oregon OHV opportunities.

Non-Motorized Recreation

Non-motorized recreation can include a wide array of activities that are not dependent on motorized use. Examples include: kayaking, rock climbing, fishing and hunting However, for purposes of this effects analysis, non-motorized trail opportunities such as hiking, trail running, mountain biking, snowshoeing, and cross-country skiing are the emphasis of the non-motorized recreation discussion.

There currently exists a wide range of non-motorized trail opportunities locally on the Ochoco National Forest, Prineville BLM, and State, County and City parks. The neighboring National Forests of Malheur to the east, Deschutes to the west and Fremont-Winema to the South also provide a vast array of trail opportunities within a relatively short day-trip drive from the cities and towns in Central Oregon.

These public, non-motorized trail systems also are represented in a range of Recreation Opportunity Spectrum (ROS) classes from "Primitive", such as hand built trails in Wilderness Areas to "Urban" at the other end of the spectrum, such as City and County Park paved trails. The Ochoco National Forest has 132 miles of non-motorized trails represented from "Primitive" to "Roaded Natural" spectrum classes.

In addition, trails also range in a "development scale" of Class I through Class V. A Class 1 trail is very primitive with scant use and maintenance such as a string of rock cairns. A Class V trail is highly developed such as a wide paved trail with convenient amenities such as benches, hand railings, stairs, lighting and interpretive displays. The Ochoco NF non-motorized trails range from Class II which is less developed, native surface with a natural emphasis to a Class IV which is more highly developed, often paved with convenient amenities.

As previously discussed, the Travel Management Rule has significantly changed the extent of area where OHVs are allowed. Because OHVs are now only legally operated on approved routes and areas as represented on Motor Vehicle Use Maps, it is assumed that non-motorized activities and opportunities may be enhanced where OHVs are prohibited from cross country travel. Furthermore, it is widely recognized that although the quality of the experience can be subjective, non-motorized use of motorized trails provides an advantage of access, if desired. Whereas motorized users cannot utilize non-motorized routes, non-motorized access is allowed on any motorized route in the project area. Therefore, this trail system and associated staging areas would be a benefit to non-motorized recreation creating new, designated trails with looping opportunities in areas of the forest that previously lacked this type of opportunity. Because access to the trails by motorized vehicles would be limited to the open season (the open season varies by alternative, but is generally late spring through late summer) and non-motorized recreationists would be able to use the trails year-round, the action alternatives would result in a cumulative increase in access for non-motorized trail-based recreation. In particular, the action alternatives would combine with the current and proposed mountain bike trail systems to cumulatively increase that opportunity on the Ochoco NF.

Geology

All the percentages listed in this section are based on the acres of federal and private land contained in the project boundary.

The project area is underlain mainly by a mixture of rhyolite, basalt, andesite and sedimentary rocks. The climate 60 million years ago to the present has evolved from a warm moist tropical regime to the temperate four distinct seasons of today. The tectonic movement, uplift of the Blue Mountain anticline and mass wasting processes combined to create the moderately dissected and hummocky terrain which is the predominant landform. Landslides played a major role in the shaping of the watersheds creating large areas of hummocky terrain, seeps, ponds and springs. Present day erosion processes are primarily sheet and rill, with minor mass wasting in the form of small landslides, rock topple and slope creep. The watersheds are a groundwater recharge collection area for regional and local aquifers. Mt. Mazama erupted approximately 7,000 years ago, depositing a 1.5 feet thick blanket of volcanic ash across the Ochoco Mountains. This volcanic ash has mixed with the evolving soils. Annual precipitation ranges from 15 to 31 inches per year.

The project area encompasses the Large Meadow Complex, North Slope Ochoco, Scab Stringer and South Slope Ochoco Level 5 Ecoregions, which have a broad range of characteristics.

Existing Condition

Lithology

The Ochoco Summit Trail System analysis area lies within portions of 9 separate fifth-field watersheds. For the purposes of this project, the lithologies with similar erosion characteristics have been lumped together. The Quaternary alluvium (Qal), landslide terrain (Qls) and fanglomerate (Qf) are moderately to highly erosive, composed of unconsolidated materials, underlies 7% of the planning area. The Quaternary basalt (Qb) and Quaternary/Tertiary basalt (QTb) are more resistant lava flows (<0.01%). The Clarno Formation (Tca), Tertiary sedimentary (Ts) and the John Day Formation (Tsfj) are moderately erosive, being composed of volcanic sandstones, pyroclastic tuff and mudflows, comprises 21% of the planning area. The Tertiary Picture Gorge Basalt (Tcp), Tertiary volcanic intrusive (Tvi), Tertiary (Tat), Tertiary rhyolite (Tr) and Tertiary (Tct) are primarily resistant to erosion, composed of rhyolite, andesite and basalt flows, comprises 72% of the planning area. The Mesozoic Cretacious Sedimentary units (Ks) are moderately erosive (<0.05%). Table 50 summarizes the project area lithologies.

Table 50. Lithology across the Ochoco Summit Trail System Project Area by watershed.

Watershed (5th Order)	Quaternary Highly Erosive (acres)	Quaternary Resistant (acres)	Tertiary Moderately Erosive (acres)	Tertiary Resistant (acres)	Mesozoic Moderately Erosive (acres)	Total Acres
Bridge Creek	5,750	0	5,664	4,027	154	15,595
Deep Creek	270	0	0	54,292	0	54,562
Lower Beaver Creek	92	17	696	22,805	0	23,610
Lower North Fork Crooked River	0	3	0	21,455	0	21,457
Mountain Creek	7,599	0	6,279	5,366	0	19,244

Table 50. Lithology across the Ochoco Summit Trail System Project Area by watershed.

Watershed (5th Order)	Quaternary Highly Erosive (acres)	Quaternary Resistant (acres)	Tertiary Moderately Erosive (acres)	Tertiary Resistant (acres)	Mesozoic Moderately Erosive (acres)	Total Acres
Paulina Creek	0	0	0	16,095	0	16,095
Rock Creek	1,335	0	0	12,845	0	14,180
Upper North Fork Crooked River	3,325	0	9,222	76,239	0	88,786
Upper Ochoco Creek	2,200	0	42,507	3,126	0	47,833
Grand Total	20,571 (7%)	20 (0.01%)	64,368 (21%)	216,250 (72%)	154 (0.05%)	301,362

Landslide Terrain

Although the lithology map shows landslide terrain, the scale of mapping doesn't always pick up the rest of the dormant or active landslide terrain. Between field investigations and aerial photo interpretation, additional acres have been identified for the project area (Table 51).

Table 51. Landslide terrain by subwatershed (acres) in the Ochoco Summit Project Area.

Watershed (5th Order)	Active Landslide (Acres)	Dormant Landslide Terrain (Acres)	Watershed (5th Order) Total Acres	Percentage (active) Dormant
Bridge Creek	8	9,361	15,595	(0.05%) 60%
Deep Creek	0	642	54,562	1.2%
Lower Beaver Creek	0	158	23,610	0.7%
Lower N Fork Crooked River	0	0	21,457	0%
Mountain Creek	0	8,674	19,244	45%
Paulina Creek	0	23	16,095	0.1%
Rock Creek	0	1,584	14,180	11.2%
Upper N Fork Crooked River	0	7,446	88,786	8.4%
Upper Ochoco Creek	4	11,441	47,833	(0.01%) 24%
Grand Total	12	39,329	301,362	(0.004%) 13%

Mineral Sources

A number of mineral sources exist within the project area. These sites have been utilized for extraction of gravel, rip rap, boulders or other rock products. Some mineral sources are available for travel by Off Highway Vehicles (OHV), as displayed on the current Motor Vehicle Use Maps (MVUM). Within the project area the 2012 MVUM allows motorized use on designated portions of the following mineral source areas: Crystal, Ahalt, Walton Lake, Scott's Camp, Aspen, Remington, Thornton, Podo Meadow, Grasshopper, Flow Top, Juniper and Six Corners. Although the actual acres at risk for introduction or expansion of existing populations of noxious weeds within mineral sources are a small percentage of the overall forest acres, an introduction of invasive plants at these sites could mean the closure of the area as an aggregate source for use on the Forest. This could result in increased aggregate haul costs on future projects.

Environmental Effects

Alternative 1 (No Action)

Implementation of Alternative 1 would result in no changes from the current conditions in the project area. Motorized travel would be permitted on designated routes only, as described by the MVUM, on mixed use roads; motorized access to mineral source areas would be as displayed on the MVUM.

Effects Common to All Action Alternatives

To varying degrees, each of the three Action Alternatives incorporates the use of mineral sources as OHV staging or other OHV areas. Specific information is included for each alternative later in this section.

The Mazama Ash component of the soils (see section titled "Soils" in Chapter 3 of this document) provides an erosive potential for the systems, especially when on a grade.

All action alternatives cross a number of Class 1, 2, 3 and 4 stream systems. As part of the protection for the streams, a combination of bridges, culverts, boardwalks and hardened fords have been proposed. Specific information is included for each alternative.

Where new routes cross dormant landslide terrain, the concern is for the protection of any seeps or springs the route might cross. Initiating large scale slope stability isn't a concern with these routes, however, there is the potential to see smaller sloughs created by routes on steeper slopes or coming into drainages. Specific information is included for each alternative.

Recreational use of mineral material sources may result in introduction and/or spread of invasive plant species into the material source. Invasive species can compromise the utility of the sources, because materials that are used for Forest Service projects must be weed-free in order to prevent the spread of invasive species to new project areas.

Alternative 2 (Proposed Action)

Under Alternative 2, a combination of Class I, Class II and Class III routes total 170 miles of designated OHV trail system that cross different lithologies with varying resistance to erosion (Table 52). Segments of the proposed routes also cross dormant landslide terrain (Table 53). The distribution of the designated OHV trails for this alternative begins on Hwy 26, passing from Hwy 26 to Walton Lake, across the slope north of Big Summit Prairie to Six Corners on Paulina District. The routes are a combination of existing roads in open, closed and decommissioned status and new routes.

Table 52. Lithology for each proposed trail type in Alternative 2 of the Ochoco Summit Project (acres).

Type	Quaternary Landslide Terrain	Clarno Formation	Tertiary Picture Gorge Basalt	John Day Formation	Grand Total
Class I/New Route	1.41	2.58	14.53	0.22	18.75
Class II/New Route	0.09	0	11.81	0.05	11.95
Class III /New Route	0.37	0	12.05	0	12.41
Closed/Decommissioned	0	4.58	74.80	0	79.39
Open Roads	2.41	0.08	62.90	2.18	67.57
Grand Total (acres)	4.28	7.25	176.09	2.46	190.07

Table 53. Acres of dormant and active landslide terrain for each trail type in all action alternatives of the Ochoco Summit Project.

Trail Type	Active Landslide Terrain				Dormant Landslide Terrain			
	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Class I/New Route	0	0	0	0	1.29	2.34	3.39	1.52
Class II/New Route	0	0	0	0	1.93	0	0.5	0.44
Class III /New Route	0	0	0	0	0.36	0.23	0.14	0.23
Closed/Decommissioned	0	0	0.05	0.05	3.00	3.68	6.44	6.53
Open Roads	0	0	0	0	1.95	0.67	1.97	0.67
Total	0	0	0.05	0.05	9.57	6.88	12.44	9.39

Alternative 2 proposes construction of three play areas, six trail heads, one parking area and a total of ten staging areas split between the three vehicle classes: six staging areas for the Class I (ATV), two staging areas for the Class II (jeeps) and two staging areas for the Class III (motorcycles). The OHV areas are spread across the proposed trail route. The majority of the trailheads, play areas and staging areas are on Picture Gorge Basalt, which in general is relatively resistant to erosion. The play area, staging area and the parking area at Ahalt are on dormant landslide terrain. The staging area and the parking area at Bandit Springs Snopark are underlain by the John Day Formation. One trail head is underlain by the John Day Formation. Four of the ten staging areas are located in active mineral material sources (Six Corners, Aspen, Walton Lake and Scott's). Three mineral material sources (Thornton, Scott's Camp and Ahalt) are ready for reclamation; converting them to staging areas, play areas or trail heads is a reasonable next use. Thornton Material Source is also known as Cottonwood Pit. Of the mineral material sources included as staging areas, trail heads or play areas under Alternative 2, the Scott's mineral source is the only one not already open to year-round cross-country travel under the MVUM. There would be increased potential for introduction of invasive plants compared to No Action at this site. There may also be increased potential for introduction or spread of weeds at the other three active mineral material sources due to increased traffic resulting from being included in a designated motorized trail system.

Alternative 3

Under Alternative 3, a combination of Class I and Class III routes that cross different lithologies with varying resistance to erosion are proposed (Table 54). Implementation of Alternative 3 would result in 101 miles of designated trail system being developed from a combination of new routes and existing roads currently in open, closed and decommissioned status (Table 54). Segments of the proposed routes also cross dormant landslide terrain (Table 54). The distribution of the designated OHV trails for this alternative includes a western system, between Hwy 26 and Indian Butte, and an eastern system, between Peterson Creek and Six Corners.

Table 54. Lithology for each proposed trail type in Alternative 3 of the Ochoco Summit Project (acres).

Type	Quaternary Landslide Terrain	Clarno Formation	Tertiary Picture Gorge Basalt	Grand Total(acres)
Class I/New Route	1.94	5.45	5.85	13.24
Class III /New Route	0	0	13.73	13.73
Closed/Decommissioned	0	13.69	39.92	53.61
Open Road	1.28	1.16	17.66	20.10
Grand Total	3.22	20.3	77.16	100.68

Alternative 3 proposes construction of 4 staging areas: two staging areas for the Class I (ATV), two staging areas for the Class III (motorcycles). The OHV areas are spread across the proposed trail route. Two of the four staging areas are located in active mineral material sources: Six Corners and Walton Lake. One staging area is located in a closed material source: Thornton (Cottonwood Pit). The fourth area is the Bandit Springs Snopark.

The majority of the staging areas are on Picture Gorge Basalt, which in general is relatively resistant to erosion. The staging area and the parking area at Bandit Springs Snopark are underlain by the John Day Formation.

Of the mineral material sources included as staging areas under Alternative 3, all are already open to year-round cross-country travel under the MVUM. There may be increased potential for introduction or spread of weeds at the two active mineral material sources proposed as staging areas due to increased traffic resulting from being included in a designated motorized trail system.

Alternative 4

Implementation of Alternative 4 would result in 212 miles of designated trail system being developed from a combination of new route and existing roads currently in open, closed, or decommissioned status (Table 55). These routes cross different lithologies with varying resistance to erosion; segments of the proposed routes also cross dormant landslide terrain (Table 55). The distribution of the designated OHV trails for this alternative begins on Hwy 26, passing from Hwy 26 to Walton Lake, across the slope north of Big Summit Prairie to Six Corners on Paulina District, with additional loop trails for Class I, Class II and Class III vehicles.

Table 55. Lithology for each proposed trail type in Alternative 4 of the Ochoco Summit Project (acres).

Type	Quaternary Landslide Terrain	Clarno Formation	Tertiary Picture Gorge Basalt	John Day Formation	Total (acres)
Class I/New Route	2.55	6.94	20.76	0.58	30.82
Class II/New Route	0	0	10.86	0	10.86
Class III/New Route	0	0	10.71	0	10.71
Closed/Decommissioned Roads	0	24.87	83.05	0.50	108.42
Open Roads	1.87	2.84	69.74	2.71	77.16
Grand total	4.42	34.65	195.13	3.78	237.97

Alternative 4 proposes construction of one play area and a total of ten staging areas split between the three vehicle classes: six staging areas for the Class I (ATV), two staging areas for the Class II (Jeeps) and two staging areas for the Class III (motorcycles). The OHV areas are spread across the proposed trail route.

For Alternative 4, the majority of the staging areas are on Picture Gorge Basalt, which in general is relative resistant to erosion. The play area and staging area at Ahalt are on dormant landslide terrain. One staging area is underlain by the John Day Formation. Three of the ten staging areas are located in active mineral material sources (Six Corners, Walton Lake and Scott's). Two mineral material sources (Thornton and Ahalt) are ready for reclamation; using them next as staging areas or play areas is reasonable. Thornton Material Source is also known as Cottonwood Pit.

Of the mineral material sources included as staging areas or play areas under Alternative 4, the Scott's mineral source is the only one not already open to year-round cross-country travel under the MVUM. There would be increased potential for introduction of invasive plants compared to No Action at this site. There may also be increased potential for introduction or spread of weeds at the other three active mineral material sources, due to increased traffic resulting from being included in a designated motorized trail system.

Alternative 5

Implementation of Alternative 5 would result in 133.54 miles of trail being developed from a combination of new route and existing roads currently in Maintenance Level 1 (closed road status). It currently covers 157 acres (Table 56). The distribution of the designated trails for this alternative begins on Hwy 26, passing from Hwy 26 to Walton Lake, across the top of Big Summit Prairie to 6 Corners on Paulina District, with additional loop trails for Class 1, Class 2, Class 3 and Class 4 vehicles.

Table 56. Alternative 5 lithology (acres) for class 1, class 2, class 3, and class 4 routes.

Type	Qls (acres)	Tca(acres)	Tcp(acres)	Total(acres)
Class I & III/New Route	1.07	4.65	20.09	25.81
Class II/New Route	0	0	7.55	7.55
Class IV/New Route	0	0.15	0	0.15
Closed/Decommissioned	0.65	26.28	53.28	80.21
Open Roads	0.41	9.34	32.99	42.74
Grand total	2.13	40.27	113.91	156.46

In Alternative 5, there would be an estimated need for 23 bridges and 73 culverts for a total of 96 structures (Table 57). Of these, 1 bridge on a new route along a tributary of Crystal Creek, 1 bridge on an open road and 1 culvert on a closed road are on dormant landslide terrain. The bridge on the new route would need to be carefully designed with a geotechnical investigation and a geology report.

Table 57. Alternative 5 crossing type for stream class and vehicle class.

Stream Class/Crossing Type	Vehicle Class 1	Vehicle Class 2	Vehicle Class 3	Vehicle Class 4	Total
1/Bridges			4		4
1/Culverts					
2/Bridges	10	3	3	1	17
2 /Culverts					
2/Boardwalk					
3/Ford					
3 /Bridge	2				2
3 /Culvert					
4&9/Bridge					
4&9 /Culvert	20	22	26	5	73
4 &9/Ford					
4&9 /Boardwalk					
Total by vehicle class	32	25	33	6	96

Alternative 5 proposes construction of 1 trailhead and a total of 4 staging areas split between the four vehicle classes: 1 Staging area for the Class I (ATV), 1 Staging area for the Class II (Jeeps)/Class III (Motorcycles), 2 Staging areas for the Class III (motorcycles) and 1 trailhead for Class III (Motorcycles). The trail system areas are spread across the proposed trail route.

For Alternative 5, the trailhead and 3 staging areas are on Picture Gorge Basalt, which in general is relative resistant to erosion. One staging area is underlain by the Clarno Formation which is moderately resistant to erosion. The concern is that 2 of the 5 staging areas/trailhead are located in active mineral material sources (Six Corners and Walton Lake), 1 mineral material source (Thornton) is ready for reclamation (which becoming a staging area is a reasonable next use). Thornton Material Source is also known as Cottonwood Pit.

Comparing the four action alternatives, Alternatives 3 and 5, after construction of the trail, with road closures, would have less impact than Alternative 2 and Alternative 4 (Table 58). Alternatives 3 and 5 have less bridges, culvert, boardwalk and fords on the proposed trail system, than the other two alternatives. Alternative 5 proposes either bridges or culverts for all crossings. Alternatives 3 and 5 also have the least number of active mineral material sources being used for staging areas, which leads to less potential for invasive plant problems. Since Alternative 5 is proposing all bridges and culverts for perennial stream crossings and the new route miles are the same as Alternative 3, Alternative 5 would have slightly less impact than Alternative 3.

Table 58. Comparison of the action alternatives.

Comparison Item	Alternative 2 (PA)	Alternative 3	Alternative 4	Alternative 5
Staging Areas and Trail Heads located in Active Material Sources	4	2	3	2
Staging Areas and Trail Heads located in Closed Material Sources	3	1	1	1
Creek/Wetland Crossings	142	62	170	96
New Route (miles)	69.12	50.32	84.48	50.34
Total Route (new route and existing/closed roads for all Classes) (Miles)	170.07	100.91	212.22	133.54
Acres on Dormant (Active) landslide terrain	8.53 (0)	6.92 (0)	12.44 (0.05)	9.39 (0.05)

Cumulative Effects

The Travel Management decision (2011) prohibited motorized vehicle use except on designated routes and in designated areas. Due to reduced opportunity for OHV recreation, that decision may result in increased use of mineral material sources as OHV play areas; that could combine with the designation of material sources in these action alternatives to increase the risk of introduction of invasive species to mineral material sources in the project area.

Soils

This section is a summary of the Soils specialist's report; the entire report is in the Ochoco Summit Trail System project record, located at the Ochoco National Forest, Prineville, Oregon.

Management Direction

Soil Compaction and Displacement

The Forest Plan (p. 4-196) identifies the following standard and guideline for soil compaction and displacement:

The threshold level of detrimental compaction is defined as any bulk density increase of 15% or more (for residual soils and 20% for ash soils) or more. Or any macro pore space reduction of 40% or below 15%. These values are critical changes over the natural state in the top 12 inches.

In order to maintain site productivity, all project activities will be planned to reduce soil compaction and displacement to the lowest reasonable level. Strive to reduce compaction and displacement to get as close to 90 percent of the total activity area (including permanent, rocked, and non-surface roads) remaining in a non-compacted/non-displaced condition, as realistically possible, one year after any land management activity. The minimum will be 80 percent of the total activity area. Existing areas exceeding these standards will be scheduled for rehabilitation as soon as possible. An activity area is the total area for which a ground disturbing activity is planned, for example, a unit for a timber sale, slash disposal project, or grazing allotment. The area will also include transportation systems within and directly adjacent to the project.

On August 24, 1998, the Pacific Northwest Regional Forester issued a supplement to the 2520 Forest Service Manual (R-6 Supplement No. 2500.98.1). This supplement clarifies direction for planning and implementing activities in areas where soil standards are exceeded from prior activities.

2520.3 – Policy. Design and implement management practices which maintain or improve soil and water quality. Emphasize protection over restoration.

When initiating new activities:

Design new activities that do not exceed detrimental soil conditions on more than 20 percent of an activity area (this includes the permanent transportation system).

In areas where less than 20 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effect of the current activity following project implementation and restoration must not exceed 20 percent.

In areas where more than 20 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effects from project implementation and restoration must at a minimum, not exceed the conditions prior to the planned activity and should move toward a net improvement in soil quality.

2521.03.3 - Application of Soil Quality Standards.

Planning. Use soil quality standards to guide the selection and design of management practices and prescriptions on a watershed scale. Evaluate existing soil conditions on all ownerships within the watershed and consider cumulative effects with the addition of proposed actions on ecosystem sustainability and hydrologic function. On a planned activity area, evaluate existing soil conditions and design activities to meet soil quality standards. Document adjustments to management practices, soil conservation practices or restoration techniques necessary to meet threshold values for the affected soil properties and watershed conditions.

Erosion

The Forest Plan (page 4-196) directs that land management activities will be planned to achieve effective ground cover as displayed in Table 59.

Table 59. Effective ground cover objectives from the Ochoco Forest Plan (page 4-196).

Erosion Hazard Class	Minimum % effective ground cover, First Year	Minimum % effective ground cover, second year
Low	20-30	30-40
Moderate	30-40	40-50
Severe	50-60	60-75
Very Severe	60-75	75-90

Effective ground cover is defined as the basal area of perennial vegetation, plus litter and coarse fragments (greater than 2mm sizes), including tree crowns and shrubs that are in direct contact with the ground. Exceptions may occur where specific projects meet erosion control objectives without meeting the ground cover objectives stated above.

Soil Mass Wasting

The Forest Plan (page 4- 196) directs that when a project could result in an increased potential for mass wasting, which could cause significant soil loss or sedimentation, hazards to property, loss of fish habitat, or damage to other resource values, alternative project proposals will be evaluated and documented through the project's environmental analysis.

Fragile Areas

The Forest Plan (page 4-197) directs project planners to recognize the sensitivity and potential of certain areas and/or situations to be adversely affected by management activities and plan accordingly to minimize those effects. Fragile areas include scablands (shallow soil areas), elk wallows, and other isolated soil areas which exhibit sensitivities that require special care.

Scablands are recognized as among the most fragile ecosystems on the Ochoco National Forest. Damage to the soil and vegetation as a result of management activities is nearly impossible to mitigate. This is a result of their having very shallow soils which are subject to severe water saturation and frost heaving during winter, thus making revegetation virtually impossible. For this reason, all management activities will be analyzed as to their effect of scablands prior to implementation.

Existing Condition

Landtypes

The landtype is the basic unit of landscape stratification. It delineates and identifies naturally occurring bodies on the landscape consisting of unique characteristic features, such as soil mantle, bedrock, vegetation, climate, hydrology, and landform, which are significant to management use and interpretations (Paulson et al. 1977). An acreage summary by major landtype within the project area is provided in Table 60.

Table 60. Major landtypes in the Ochoco Summit Trail System project area (from Paulson, 1977, ONF SRI).

Landtype Group	Acreage	Percent of Watershed- USFS Lands	Parent Material
P Landtypes	148,980	50	Picture Gorge Basalt
Y Landtypes	54,949	18.3	Basalt
T Landtypes	47,696	15.9	Tuffs- Clarno/John Day
L Landtypes	19,459	6.5	Landslide Debris
B Landtypes	14,584	4.9	John Day- Clarno Basalts and Tuffs
M Landtypes	6,817	2.3	Mixed Alluvium-Meadows
C Landtypes	4,061	1.4	Slope Colluvium
A Landtypes	1,819	0.6	Mixed Alluvium
S Landtypes	1,050	0.4	Basalt Scablands
X Landtypes	1,053	0.4	Tertiary Basalts

Landscape Patterns

Most of the project area is scab stringer terrain; this terrain typically has an average of 30 percent scabland plateaus dissected by timbered stringers. Soils within the stringer sides and bottoms have deeper ash soils. Deeper ash soils are typically classified as L2, L6, P1, P2, P9 and Y2 landtypes. These deep soils are also found on alluvial meadows (M landtypes). Approximately 82,082 acres (27%) within the project area are deeper ash soils. Approximately 78,230 acres (26 %) of the area is in non-forestlands. These include scablands, meadows and shrub lands. There are 57,354 acres (19%) of scabland in the Ochoco Summit project area. Scabland soils (largely P5, P54, P5Y, P85) range from very shallow to shallow (<20 inches to bedrock). Shrubland soils range from moderately deep to deep (from >20 to 60 inches). Most meadow soils (M landtypes) are deep to very deep (greater than 40 inches). The remaining land area approximately 140,274 acres (47%) are shallower ash soils or residual soils derived from basalt parent material.

Most of the project area is on relatively flat ground. Approximately 90% of the project area is on slopes less than 35%. Topography within this project area, which is in the Eastern Ochoco Mountains, has a lesser proportion in steep ground (over 35% slope) than other areas of Ochoco National Forest, such as the Western Ochoco Mountains. This is fairly typical of Picture Gorge Basalt Formation terrain in the southwest Blue Mountain area. The Ochoco Mountains are the southernmost part of the Blue Mountains.

Infiltration and Runoff

Infiltration is very slow on the scablands on old basalt flow surfaces. Scablands function hydrologically as large "tin roofs," which shed runoff from rain and snowmelt very rapidly. Soils on these scablands are largely very shallow and shallow to bedrock. Many scab flats are incised with deep steep-sided drainways. Soils on these steep to very steep plateau drainages and lava flow scarps are moderately deep to deep on the northerly aspects and shallow to moderately deep on the southerly aspects. These drainway soils are derived from ash overlying or mixed with colluvium. The drain areas have served to collect wind and water eroded ash from the scablands, which have lithic soils derived from basalt. The interface along the edge between scablands and the forested areas below them are sensitive areas. Infiltration in the deep ash soils is rapid to very rapid. These edge areas provide critical buffers that help slow down and dissipate the rapid runoff from the scabs.

Soil Compaction and Displacement

There are 57,354 acres of scabland in the Ochoco Summit project area. Soils on these areas (P5 landtype, for instance) are usually clayey and very rocky with greater resistance to detrimental

compaction. However, they are very susceptible to detrimental puddling and postholing by equipment, vehicles and large herbivores. Subsequently these soils are classified as sensitive soils for use and management. They are relatively resistant to damage when dry, but susceptible when saturated.

In this project area it is estimated that 180,386 acres have been harvested since 1950. It is estimated that 15 to 35% of the tractor harvested acres, approximately 26,625 acres (8.9% of the project area), have been detrimentally compacted and/or displaced. Outside of harvest units another 1 percent is estimated to be disturbed by road construction. The overall compaction level is estimated to be approximately 10% across the project area. Soils within this area of existing disturbance have potential to produce changes in runoff and timing of peak flows compared to undisturbed soils. Some of this detrimental disturbance from past management activities has recovered with natural recovery processes, such as frost heaving, rodents, insects and root action. Depending on the severity of the disturbance, recovery of soils from compaction or displacement can occur in 7 to 50 years.

Environmental Effects

General Effects of OHVs on Soils

COMPACTION/DISPLACEMENT: Detrimental compaction is defined as a 15% increase in bulk density for residual soils and a 20% increase for ashy soils (Region 6 supplement to the 2520 Forest Service Manual (R-6 Supplement No. 2500.98.1). Three to four passes with large heavy four wheel drives (Class II OHVs) may produce this effect. Lighter OHVs such as motorcycles, ATVs and lighter UTVs do not produce much compaction at depth. The major effect of compaction is reduction in porosity, resulting in reduced water and air availability to tree roots. There is also increased mechanical resistance to tree root growth. Mychorrizal symbiosis has also been shown to decrease when soils are compacted. Clay surface soils with little or no ash capping commonly have clay loam surface A horizons quickly grading to heavier clay. These are generally on south and west facing aspects, which are hotter and drier than north or east aspects. These soils are not generally susceptible to detrimental compaction and displacement, depending on the depth to the smectitic clay, which shrinks and swells with each wet and dry season. OHV activity, as a contributor to erosion, is most pronounced along streams with ashy banks and steeper sideslopes on north and east aspects. Some Soil Resource Inventory Landtypes in this area which are largely ash soils are L26, P1, P2, T2, T6 and Y2.

DETRIMENTAL COMPACTION: This can have a negative effect on soil productivity. The reduction of soil pore space limits air, water and nutrient availability to roots. The reduction in infiltration results in higher peak flows, which means more energy for erosion and transport of sediment.

DETRIMENTAL DISPLACEMENT: This can have a negative effect of soil productivity. Detrimentally displaced soil has an altered hydrographic function and often does not allow normal growth to occur; the A horizon usually has been removed and piled up. Displaced soils are often channelized and loosened so that they are more susceptible to erosion from both water and wind. Wind erosion can be common along OHV tracks and dirt roads.

PUDDLING AND POSTHOLING: Puddling results from the breakdown of soil structure under wet conditions. Recreational vehicles (OHVs) can cause puddles to form in soils, potentially causing channelization and loss of permeability. Clay surface soils are susceptible to detrimental puddling (destruction of soil ped structure) via OHV vehicular traffic and would be susceptible to rutting and subsequent trail erosion during wet conditions, such as thunder storms or spring thaw conditions. These are soils with little or no ash capping. They commonly have clay loam surface A horizons quickly grading to heavier clay. These are generally on south and west facing aspects which are

hotter and drier than north or east aspects. Some Soil Resource Inventory landtypes in the project area that have shallow ash caps and clay closer to the surface are B4, B5, P5 and P3 landtypes.

WIND EROSION: Wind moves soil associated with vehicular traffic along roads and OHV trails. This contributes some fine sediment (commonly from volcanic ash) to waterways, although usually during the dry season only and at a much reduced rate compared to water transport from sheet, rill and gully erosion. Dust creation and wind erosion are more prevalent with the ash surface soils. The Ochoco Summit Trail System project area contains approximately 82,082 acres of ash soils having at least 7 inches of surface ash. The deepest ash soils occur on the north and eastern aspects. The southern and western aspects have the least amount of ash deposits. OHV activity, as a contributor to erosion, is most pronounced along streams with ashy banks and steeper sideslopes on north and east aspects. The streams with S and W aspects often have more rock and clay exposed which gives them somewhat more resistance to vehicular tire impacts. Some Soil Resource Inventory Landtypes in this area that are largely ash soils are L26, P1, P2, T2, T6 and Y2.

OVERLAND FLOW: Overland flow occurs when the infiltration rate or capacity of a soil has been exceeded by the amount of incoming precipitation or by the rate of snowmelt. Independent variables include all the soil and plant factors that influence infiltration rate, intensity and duration of precipitation, steepness of slope and whether or not the soil is frozen. The magnitude of management-induced overland flow increases over background levels is the major concern.

The volcanic ash soils of the Blue Mountains have several properties that can make erosion hazard assessment difficult. In an uncompacted state, these soils have infiltration rates often exceeding 10 inches per hour. Permeability of applied water through the ash layers is also rapid. However, because of their lack of structural development (weak granular to singular grain), they are easily susceptible to erosion in situations where water is channeled on the soil surface such as roads, waterbar outlets, and near drainage structures (Ash Soil Guidelines for OR/WA 1985). Trails also have potential to channel water. Seasonal OHV use restrictions help prevent rutting and subsequent flow concentrations. This reduces potential for sediment delivery to drainways.

MECHANICAL IMPACTS: OHV trail use damages soils when the type and level of use exceed the soil's capacity to resist impact. A soil's capacity to resist impact varies depending on textural class, moisture level, and other environmental and site characteristics, but the processes by which soils are impacted are generally the same. Trail use damages soils directly by mechanical impact from surface traffic and indirectly by hydraulic modifications, soil transport, and deposition. The southern and western aspects have the least amount of ash deposits, often having more rock and clay exposed, which gives them somewhat more resistance to vehicular tire impacts. OHV activity, as a contributor to erosion, is most pronounced along streams with ashy banks and steeper sideslopes on north and east aspects.

Direct mechanical impact has several components: abrasion, compaction, shearing, and displacement.

- Abrasion strips surface vegetation and roots.
- Compaction reduces soil voids and causes surface subsidence.
- Shearing is the destructive transfer of force through the soil.
- Displacement results in the mechanical movement of soil particles.

Indirect impacts include hydraulic modifications, such as the disruption of surface water flow, reductions in infiltration and percolation, surface ponding, and the loss of water-holding capacity. Other indirect impacts include those associated with erosion: the loss of soil particles by wind or water erosion and deposition of transported particles. An associated impact is the hydraulic pumping that occurs when a destructive flow of water is forced through a saturated soil.

Both direct and indirect impacts can degrade soils along trail segments. The impacts generally occur in the following progression:

Abrasive loss of protecting surface vegetation, organic material and root mass (direct impact)

↓

Compaction and surface subsidence (direct impact)

↓

Hydraulic disruption (indirect impact)

↓

Breakdown of soil structure from shearing and pumping (direct impact)

↓

Soil particle erosion and deposition (indirect impact)

While most of the stages in this progression are familiar concepts, the shearing and pumping components may not be as familiar to some readers.

Shearing describes a transfer of force through a soil. When an applied force exceeds the capacity of the soil body to absorb it, a portion of the soil body can be displaced along a shear plane, the place where soil particle cohesion is weakest. The most common example is when the passage of a wheeled vehicle forms ruts. The downward force of the wheel shears--or displaces--the soil beneath it, forcing the soil to bulge upward beside the wheel. The shearing action destroys soil structure by crushing soil peds (natural soil aggregates) and collapsing voids. Shearing is most likely to occur on finely textured soils under moist to saturated conditions. It is uncommon in coarse soils.

Shearing and pumping actions reduce soils to a structureless or "massive" condition. This condition is characterized by the loss of distinguishable soil structure and a reduction in pore space voids, and interped passages (the space between peds). An example of soil in a massive state is a dried mud clod or an adobe brick. In a massive state, soils have significantly reduced infiltration rates, percolation, water storage capacity, and gas exchange. This reduces a soil's ability to support vegetation growth, leads to surface ponding of water, and increases the soil's sensitivity to additional impacts.

Trail use has a predictable path of surface impact. The degree of impact is modified only by the natural resilience of the soil, enhanced resistance through amendments and the intensity of trail use. In an ideal situation, a natural balance is maintained between soil resilience and use, and trail use occurs without significant soil degradation. However, on sites with wet, unstable, and sensitive soils, that equilibrium is easily upset. Even low levels of trail use can have environmental consequences if not carefully designed, constructed and maintained.

Typically, trail degradation follows one of two pathways: surface erosion or surface failure. Surface erosion occurs when wind or water displaces exposed trail surfaces. This usually occurs on steep terrain or on sandy soils that are susceptible to wind erosion. Surface failure occurs when trail surfaces degrade into muddy tracks with deep muck holes. This usually occurs on flat areas with finely textured soils. Either pathway can lead to environmental impacts that are extremely difficult to stabilize or reverse. Without stabilization, expansion of soil degradation can begin that leads to impacts to adjacent surfaces. This cycle begins with the widening of trail surfaces, as users avoid degraded surfaces, and impacted area expands along with the development of multiple parallel trails.

Soil compaction can lead to surface subsidence (the lowering of the trail relative to the adjacent ground surface). Trails can become entrenched. This lower surface intercepts and drains water from adjacent surfaces and channels that flow along the trail. This dramatically increases the risk of water erosion on sloped areas and the pooling of water in low-lying sections. As with surface erosion, without stabilization or adequate surfacing, expansion of soil degradation can begin that leads to impact to adjacent surfaces. When trail surfaces degrade due to rutting or the formation of muck

holes, users may widen the trail and seek new routes, usually on adjacent soils where environmental conditions are identical to the original impact site. This cycle may repeat itself until the area is scarred with a number of routes in various stages of use and abandonment. This condition is called trail braiding. Trail braiding can significantly expand the environmental impacts of trail use. Trail braiding may occur when trail use levels repeatedly exceed the carrying capacity of soils to support that use (USDA Forest Service Technology and Development Center; 2002, Managing Degraded Off-Highway Vehicle Trails in Wet, Unstable, Sensitive Environments; 0223-2821-MTDC).

Crossings with routes that are not part of the proposed trail system (such as old skid trails, user created routes and closed roads) would be blocked through entrance closures and camouflage such as logs, rocks and slash. Scarification of soil surfaces in preparation for seeding or planting as part of the rehabilitation of these unwanted routes may occur. The main purpose of tillage or scarification is to decompact the soil such that there is an improvement in soil moisture infiltration and aeration. Resistance to root growth is lessened also. There are potential short term and long term effects of tillage or scarification. The long term effects are largely beneficial, due to the improved infiltration, percolation, aeration and lessened bulk density. Short term effects may include increases in localized erosion potential before effective vegetative ground cover is established. This short term hazard would be reduced by the use of water bars and slash placement.

Microbiotic crusts are formed by living organisms and their byproducts, creating a crust of soil particles bound together by organic materials. Chemical and physical crusts are inorganic features, such as a salt crust or platy (vesicular) surface crusts. These crusts are more prevalent on the scabland soils and on interspaces between rocks along the edges of timbered stringers. These crusts can be disturbed by vehicle and animal hoof action. There are approximately 57,354 acres of scabland in the project area. Existing trails and roads would be used in these areas to the extent that they are available to avoid creating new disturbance. Some new disturbance would be unavoidable as is described for each alternative below. New routes on scabland increase the potential for disturbance of soil crusts.

Each action alternative may require installation of new cattle guards (see section titled “Range Resources” in Chapter 3 of this document). Effects to soils would be minimal as most of the cattle guard-related activity would be within the existing road prism or other existing disturbance.

Alternative 1

This alternative proposes no management actions that would affect the soil resource in the short term. Existing natural processes would continue. No soil restoration tillage would be performed under this alternative. Recovery of existing soil (compaction) would occur through natural processes. These processes include frost heaving in the top 4 to 6 inches of soil and biopedoturbation (soil disturbance by organisms such as rodents, insects, arthropods and various worms). These natural processes can take 10 to 50 years or more to fully restore damaged ash soils, while clayey residual soils may recover in 1-2 years due to shrinking and swelling actions. OHV travel would proceed as currently allowed, restricted to designated mixed use roads as displayed on the MVUM maps. Alternative 1 would meet Forest and Regional Standards and Guidelines for soils.

Alternative 2

This alternative proposes the second most trail miles (170 miles, 237 acres), 142 stream crossings, 10 staging areas and 6 trailheads. New routes would comprise 69 miles (31.7 acres). See Table 61 for comparison of acreages.

This alternative has the second most potential (of the four action alternatives) to increase the amount of detrimental soil compaction, displacement, and sedimentation. Short term impacts to uplands soils and streambanks would occur with initial trail construction such as contouring (blading, excavation), bridge construction (excavation of abutments) and culvert placement (excavation and filling). Longer

term potential sedimentation would be reduced with these crossing features and the installation of relief culverts, water bars, rolling dips and bed armoring near crossings.

The total distance of OHV trails proposed in Riparian Habitat Conservation Areas is 17.22 miles, most of which would be on existing crossings. Trail design standards such as bridges, culverts and armored fords and trail approaches plus seeding would reduce sediment delivery potential at these points. Effects would be unmeasurable in the long term as seeded and planted vegetation becomes established, providing effective cover for construction disturbance adjacent to the trail beds. Short term construction impacts would occur in the first year or two.

Implementation of this alternative would comply with the regional soil standards.

Alternative 3

This alternative proposes the fewest trail miles (101 miles, 83 acres), 62 stream crossings, 4 staging areas. New routes would comprise 50 miles (17.9 acres). No Class II OHV trails for jeeps and small trucks (80 inch category) would be included in this alternative, which contributes to the reduction in impacted acreage. See Table 61 for comparison of acreages.

This alternative would result in the fewest trail impacts of all the action alternatives; this alternative has the least potential to increase the amount of detrimental soil compaction, displacement, and sedimentation. Short term impacts to uplands soils and streambanks would occur with initial trail construction such as contouring (blading, excavation), bridge construction (excavation of abutments) and culvert placement (excavation and filling). Longer term potential sedimentation would be reduced with these crossing features and the installation of relief culverts, rolling dips and bed armoring near crossings. Planting of native or cultivars of native species of grass and/or shrubs would help in providing effective cover for construction disturbance adjacent to the trail beds.

The total distance of OHV trails proposed in Riparian Habitat Conservation Areas is 17.22 miles, most of which would be on existing crossings. Trail design standards, such as bridges, culverts and armored fords and trail approaches, plus seeding would reduce sediment delivery potential at these points. Effects would be unmeasurable in the long term. Short term construction impacts would occur in the first year or two.

Implementation of this alternative would comply with the regional soil standards.

Alternative 4

This alternative proposes the most trail miles (212 miles 173 acres), 170 stream crossings and 10 staging areas. New routes would comprise 81 miles (38.4 acres). See Table 61 for comparison of acreages.

This alternative proposes the most trail impacts overall. This alternative has the most potential (of the four action alternatives) to increase the amount of detrimental soil compaction, displacement, and sedimentation. Short term impacts to uplands soils and streambanks would occur with initial trail construction such as contouring (blading, excavation), bridge construction (excavation of abutments) and culvert placement (excavation and filling). Longer term potential sedimentation would be reduced with these crossing features and the installation of relief culverts, rolling dips and bed armoring near crossings. Planting of native or cultivars of native species of grass and/or shrubs would help in providing effective cover for construction disturbance adjacent to the trail beds.

The total distance of OHV trails proposed in Riparian Habitat Conservation Areas is 22.04 miles, most of which would be on existing crossings. Trail design standards, such as bridges, culverts and armored fords and trail approaches, plus seeding would reduce sediment delivery potential at these points. Effects would be unmeasurable in the long term as seeded and planted vegetation becomes

established, providing effective cover for construction disturbance adjacent to the trail beds. Short term construction impacts would occur in the first year or two.

Implementation of this alternative would comply with the regional soil standards.

Alternative 5

Alternative 5 is a blend of Alternative 3 and parts of Alternative 4 along with two additions:

1. A Class IV OHV loop on the west side of the project area using portions of existing roads 2610-015 (0.3 mi), 2610-024 (0.3 miles) and 2610-012 (2.53 mi), for a net addition of 3.13 miles or 5.7 acres).
2. An additional loop north of Jackson Creek (net addition of 1.25 mi or 2.3 ac)

This alternative proposes the third most trail miles (133.6 miles, 112.7 acres), 88 stream crossings and 1 staging area. New routes would comprise 50.3 miles (41.4 acres). See Table 61 for comparison acreages. Class II OHV trails for jeeps and small trucks (80 inch category) would be included in this alternative which contributes to the increase in impacted acreage. Additional Class IV (motorcycle) trail mileage of 3.13 miles on existing road prisms is included also.

This alternative proposes the third most impacts overall. This alternative has the third most potential (of the four action alternatives) to increase the amount of detrimental soil compaction, displacement, and sedimentation. Short term impacts to uplands soils and streambanks would occur with initial trail construction such as contouring (blading, excavation), bridge construction (excavation of abutments) and culvert placement (excavation and filling). Longer term potential sedimentation would be reduced with these crossing features and the installation of relief culverts, rolling dips and bed armoring near crossings. Planting of native or cultivars of native species of grass and/or shrubs would help in providing effective cover for construction disturbance adjacent to the trail beds.

Since the OHVs would largely be restricted to existing disturbance (i.e. existing road prisms), these impacts would be limited (133.6 total miles, ca 112.7 acres, of which, 50.3 miles are new trails, ca 41.4 acres). Initial trail construction disturbance would have a short term effect but would largely be un-measurable at the landscape scale due to the large project area acreages involved. For example, of the total 133.6 miles of proposed OHV trails, 82.3 miles are on existing disturbance. OHV use on existing roads is only 4 percent of the total 1,820 miles (3,320 acres = 1.1 percent) of system and non-system road in the ca. 300,548 total project acreage. The proposed new trail construction adds 50.3 miles or 41.4 acres. These new trails add only 3 percent to the total 1,820 miles of roads and trails. Total existing roads and trail acreage impacts would be increased by less than 0.014 percent across this project area (1.10% to 1.11%).

Total miles of new OHV trails within 300 feet of drainways is 6.6 miles, most of which are at existing crossings. Trail design standards such as bridges, culverts and armored fords and trail approaches plus seeding would reduce sediment delivery potential at these points. Effects would be unmeasurable in the long term. Short term construction impacts would occur in the first year or two.

Implementation of this alternative would comply with the regional soil standards

Table 61. Miles/acres of proposed trails by alternative.

	No Action			Proposed Action			Alternative 3			Alternative 4			Alternative 5			
OHV Vehicle Class	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	IV
Total Route Miles	0	0	0	69	49	52	38.5	0	62.4	129	30	52	48.1	20.1	62.3	3.1
Total Route Acres	0	0	0	53.3	39.3	45.7	27.4	0	55.6	104.8	21.1	46.7	34.2	16.1	54.4	3.8
New Route Miles Portion of Total	0	0	0	31	12	26	22	0	28	48	11	22	17.8	7.8	24.7	0

Table 61. Miles/acres of proposed trails by alternative.

	No Action			Proposed Action			Alternative 3			Alternative 4			Alternative 5			
New Route Acres Portion of Total	0	0	0	15.7	9.7	6.3	11.1	0	6.8	24.2	8.9	5.3	12.7	6.3	22.4	0
Stream Crossings-by OHV class	0	0	0	61	56	25	26	0	36	107	41	22	33	23	27	5
Miles of Trail in Riparian Hab. Cons. Areas (RHCAs) by Vehicle Class	0	0	0	7.9	5.1	4.2	2.3	0	5.04	12.8	4.3	4.9	4.3	3.6	3.6	0.9
Total RHCA trail miles by Alternative	0			17.22			7.34			22.04			12.4			
Stream Crossings-Total	0			142			62			170			59			
Staging Areas*	0			10			4			10			4			
Trailheads*	0			6			0			0			1			
Play Areas*	0			3			0			0			0			
Parking*	0			1			0			0			0			

Vehicle Class: Class I- ATV (50" wide trail); Class II-Jeep or Small Truck (80" wide trail); Class III- Motorcycle (24" wide trail); Class IV-UTV/Side-by-Side (65" wide trail)

***Note:** Staging areas (ave 3 acres each); Trail Heads (ave. 2 acres each) and Play Areas (ave 1 acre each along with the parking area (ave 1 acre) are mainly in existing rock pit areas or Snopark areas which have rocked, graveled or paved surfaces and are armored against wind and water erosion thereby limiting any potential sediment movement.

Cumulative Effects

Reasonably Foreseeable Activities

Livestock Grazing: The following allotments overlap the project area: Burn, Marks Creek, Crystal Spring, Snowshoe, Canyon Creek, Reservoir, Lookout, Brush Creek, Pringle, Antler, Gray Prairie, Lost Horse, North Fork, Fox Canyon, Big Summit, Deep Creek, Roba, Pisgah, Elkhorn, Badger, Indian Creek, Happy, Derr, Little Summit, Wolf Creek, Rock Creek, Bearskull/Cottonwood and Buck Pasture. Twenty-five of the allotments are active allotments; one allotment is grazed by sheep, and the remaining active allotments are grazed by cattle. Cattle would continue to have an effect on riparian soils in this area. Impacts from sheep on riparian areas are usually limited to crossings and watering sites as the flocks are managed by herding.

With implementation of the selected alternative from the Travel Management Project Final Environmental Impact Statement for the Deschutes and Ochoco National Forests and Crooked River National Grasslands, the national forests and are be closed to motorized travel unless designated open. Motorized travel is to be restricted to designated routes and to within 300 feet of these designated routes. Green dot restrictions would continue to be in effect on the Paulina District and South Boundary portions of this project area. Uncontrolled OHV use may occur from spring through fall, mainly associated with antler hunting, mushroom gathering, spring turkey hunting, general recreation, camping and big game hunting. Localized impacts may continue, mainly associated with dispersed recreation sites.

Timber sales associated with the Howard Elliot Johnson, Jackson and Canyon Projects are currently being implemented in the Ochoco Summit project area. These are largely thin from below silviculture treatments and would meet INFISH guidelines with regard to stream buffers and stream protection measures identified in the Riparian Management Objectives (RMOs).

Completed Activities and Events

The effects of past timber sales are included in the analysis of the existing condition. Past sales within the project area include a variety of harvest prescriptions. Records from the Big Summit and

Paulina Ranger Districts indicate the following amount of past harvest treatments within the area since 1980:

- Regeneration Harvest Total – 5108 acres (tractor only)
- Overstory Removal – 5,508 acres.
- Partial Removal Cutting (thinning, selection cutting) – 16,009
    - These sales include: 1960s: Marks Creek, Wolf Creek, Bug Creek, Metal Creek; 1970s: Jackson Creek Salvage, 1980s: Haypress-Buker, Jackson, Lava, Happy Dead, Chuckles Dead, Deadwood Salvage, Dendro Salvage, Crazy, Woodrow, Aspen, Brer Rabbit, Yuma, Alder, Blue Bull, Bull Pine, Sugar, Watson, EP, Connally, Fry, Hewed Log, Indian, Round Meadows; 1990s: Alder, Connally, Indian, Watson, Yuma, Davis Spring, Fry, Indian, Indian Butte, Lutsey, Chamberlin, DCWR, Fry, Koch, Potter, Rainier, Thunder, Beaverfield Claypool, H & G, Rough, Upper Al, Chuckwagon, Hedgepath, 2210 Salvage, Marks, Morgan, Ochococreek, Coyle Salvage, Howie, Morgan, Pisgah Fiber, Deep Salvage, Dippy Beaver, Harpo, Aqua, Summit, Fryton, Gray, Barn, Biscuitroot, Blackbear; 2000s: Barn, Biscuitroot, Blackbear, Gray, Summit, Jungle, Flat Bucket, Fryton, Zane, Halfway.
- Additional harvest prior to 1980s is known to have occurred in the area but is not recorded in the district GIS records. Historical records indicate that harvest was likely occurring within the project area as early as 1950 and covered much of the forested lands within the project area. This older harvest was primarily focused on individual tree harvest, often removing large high value trees that were deemed at risk to insect mortality.
- In 2006 the Maxwell Fire burned approximately 7,145 acres within the project area. The majority of the area burned at a low intensity with little effect on tree species and structure.
- In 2008 the Bridge Creek Fire burned 4,891 acres largely in the Bridge Creek Wilderness and adjacent private grounds. Effective ground cover was recovered to the 60 to 80 percent level in 2 years after burning (J. David, personal observation and monitoring).

Ongoing Activities

Beaver Management: There is a trapping moratorium on beavers on the Ochoco National Forest which has been in effect since 1993. This has helped populations re-establish in a few areas.

Maintenance of exclosures: No measurable effect to soils for maintenance activities. When maintained, these exclosures would help reduce the effect of hooves of large herbivores in the inside of the exclosure areas.

Roading: Currently, the net amount of road in this watershed area is approximately 1,820 miles, including both system and non-system roads.

Road Maintenance: Ongoing road maintenance activities would continue. This includes activities such as cleaning culverts and ditches, installing drain dips, blading road surfaces, and replacing road signs. Road maintenance has short term effects to soils but helps reduce the magnitude of long term impacts.

Firewood cutting: The firewood synopsis specifies no cutting within riparian habitat conservation areas. Cutting is currently limited to within 600 feet of designated roads. Localized impacts associated with illegal firewood cutting and the proliferation of user created firewood cutting roads may continue.

ATV/OHV use: This is an ongoing use, largely during hunting season. Wet season use in the spring for turkey hunting, antler hunting, and mushroom hunting has been shown to contribute to erosion

and delivered sediment in localized areas. Off road travel is limited to within 300 feet of open routes to access dispersed camping sites except where otherwise designated open.

Invasive Plant Treatments: Most invasive plant treatments occur along roads and in rock pits. Given the limited extent of treatment, this has no measurable effect on soils. Soils along Forest roads and the highway are often mixtures of subsoil, aggregate, cobble, stone and cinders. Such treatments help reduce colonization of undesirable plant species, many of which limit the re-colonization of disturbed sites by desirable natives or native cultivars.

Fences and Water Developments: Fences and water developments are maintained via ATV or pickups sometimes with 2 track trails along the fence lines and to springs, troughs and ponds. There are approximately 126 water developments located on ONF managed lands in the Ochoco Summit Trail System project area. These comprise springs, troughs and ponds. Each water development includes approximately one acre of land immediately adjacent to the development that has detrimentally impacted soils associated with livestock use of the development. Impacts include compacted, displaced, post holed/plugged and exposed soils. These areas are generally denuded of vegetation. The estimated extent of detrimentally impacted soils associated with the existing developments is approximately 126 acres.

There are about 225 miles of fenceline in the project area. Primary impacts are associated with the use of motorized vehicles ranging from OHVs to pickups to transport materials from roads to the site of the construction. Soil compaction and displacement would be limited to areas where vehicles were driven. Assuming a 10-foot wide "road," one mile of fence would result in approximately 1.2 acres of soil experiencing detrimental soil impacts. 225 miles of fence translates into 270 acres (225 mi x 1.2 ac/mi= 270 acres).

Decommissioned/Obliterated Roads: Treatment can involve removing culverts, removal of fills from the flood plain, reestablishment of stream channels to their "natural" contour, surface scarification or deep ripping and sub-soiling, water barring and ditch removal. It may also include such things as removal of unstable fills; insloping or outsloping of the roadbed to improve slope hydrology; and distribution of an erosion seed mix, fertilizer, and weed-free straw to protect soils from surface erosion. A decommissioned road is "storm proofed" (or "hydrologically obliterated"), even though the landscape is not restored or recontoured to near original shape.

Decommissioning or obliteration of roads can affect soils. Short term erosion may increase depending on future storm events, but long term erosion from the road surface and ditches would be reduced. Infiltration would be enhanced through tillage, and runoff would be reduced. Trees and other vegetation would recolonize these sites.

Effects of Proposed Activities in Combination with Effects from Past, Present and Reasonably Foreseeable Actions

Refer to Table 61 for miles of proposed trail and estimate of acres impacted under each alternative. The proposed alternatives increase the amount of area exposed to soil disturbance. However, at the landscape scale the increase is relatively small in comparison to the existing level of disturbance across the project area. The magnitude of this increase is described for each alternative below in relationship to the level of disturbance that has resulted from development of the existing network of roads, including both system and non-system road beds.

Alternative 1: OHV travel would proceed as currently allowed, restricted to designated mixed use roads as displayed on the MVUM maps. The miles of route legally open for travel by OHV would not change under this alternative.

Alternative 2: Since the OHVs would largely be restricted to existing disturbance (i.e. existing road prisms), impacts would be limited (170 total miles, ca 237 acres, of which, 69 miles are new trails, ca

32 acres). Initial trail construction disturbance would have a short term effect that would largely be unmeasurable at the landscape scale due to the large project area acreages involved. For example, of the total 170 miles of proposed OHV trails, 101 miles are on existing disturbance. OHV use on existing roads is only 5.5 percent of the total 1,820 miles (3,312 acres = 1.1 percent) of road in the approximately 301,000acre project area. The proposed new trail construction adds 69 miles or 32 acres. These new trails would add only 3.8 percent to the total 1,820 miles of roads and trails. Total existing roads and trail acreage impacts would be increased by only 0.01 percent across this project area (1.10% to 1.11%).

Alternative 3: Since the OHVs would largely be restricted to existing disturbance (i.e. existing road prisms), impacts would be limited (101 total miles, ca 88 acres, of which, 50 miles are new trails, ca 18 acres). Initial trail construction disturbance would have a short term effect that would largely be unmeasurable at the landscape scale due to the large project area acreages involved. For example, of the total 101 miles of proposed OHV trails, 51 miles are on existing disturbance. OHV use on existing roads is only 2.8 percent of the total 1,820 miles (3,312 acres = 1.1 percent) of road in the approximately 301,000 acre project area. The proposed new trail construction adds 50 miles or 18 acres. These new trails would add only 2.7 percent to the total 1,820 miles of roads and trails. Total existing roads and trail acreage impacts would be increased by less than 0.01 percent across this project area (1.10% to 1.108%).

Alternative 4: Since the OHVs would largely be restricted to existing disturbance (i.e. existing road prisms), these impacts would be limited (212 total miles, ca 173 acres, of which, 81 miles are new trails, ca 38 acres). Initial trail construction disturbance would have a short term effect that would largely be unmeasurable at the landscape scale due to the large project area acreages involved. For example, of the total 212 miles of proposed OHV trails, 131 miles are on existing disturbance. OHV use on existing roads is 7.2 percent of the total 1,820 miles (3,312 acres = 1.1 percent) of road in the ca. 300,548 total project acreage. The proposed new trail construction adds 81 miles or 38 acres. These new trails would add 4.5 percent to the total 1,820 miles of roads and trails. Total existing roads and trail acreage impacts would be increased by about 0.01 percent across this project area (1.10% to 1.11%)

Alternative 5: Since the OHVs would largely be restricted to existing disturbance (i.e. existing road prisms), these impacts would be limited (133.6 total miles, ca 112.7 acres, of which 50.3 miles are new trails, ca 41.4 acres). Initial trail construction disturbance would have a short term effect that would largely be unmeasurable at the landscape scale due to the large project area acreages involved. For example, of the total 133.6 miles of proposed OHV trails, 84 miles are on existing disturbance. OHV use on existing roads is 4.6 percent of the total 1,820 miles (3,312 acres = 1.1 percent) of road in the ca. 300,548 total project acreage. The proposed new trail construction adds 50.3 miles or 41.4 acres. These new trails would add 2.8 percent to the total 1,820 miles of roads and trails. Total existing roads and trail acreage impacts would be increased by about 0.01 percent across this project area (1.10% to 1.11%)

Hydrology and Aquatic Species

This section includes a summary of the Hydrology and Aquatic Species specialists' report and Biological Evaluation; the entire report is hereby incorporated by reference and can be found in the Ochoco Summit Trail System project record, located at the Ochoco National Forest, Prineville, Oregon.

Introduction

This report includes the entire Biological Evaluation (BE) for Threatened, Endangered, and Sensitive aquatic species in the Ochoco Summit Trail System project area. The BE documents the review and findings of the Forest Service planned programs and activities for possible effects on species (1) listed or proposed for listing by the US Fish and Wildlife Service (USFWS) and NOAA (National Oceanic and Atmospheric Administration) as Threatened or Endangered; or (2) designated by the Pacific Northwest Regional Forester as Sensitive. It is prepared in compliance with the requirements of Forest Service Manual (FSM) 2630.3, FSM 2672.4, and the Endangered Species Act of 1973, as amended (ESA) (Subpart B; 402.12, Section 7 Consultation). Changes to the R6 Regional Forester's Sensitive Species List were instituted in July 2015.

Determination of effects based on the analysis described in this section is described in Table 62.

Table 62. Determination for threatened, endangered and sensitive aquatic species.

Species	Listing	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Bull trout (determined) *Salvelinus confluentus*	threatened	NE	NE	NE	NE	NE
Mid-Columbia River steelhead trout (determined) *Oncorhynchus mykiss ssp.*	threatened	NE	NE	NE	NE	NE
Redband trout *Oncorynchus mykiss* ssp. (determined)	sensitive	NI	MIIH	MIIH	MIIH	MIIH
Columbia spotted frog *Rana luteiventris* (determined)	sensitive	NI	MIIH	MIIH	MIIH	MIIH
Western ridged mussel *Gonidea angula*	sensitive	NI	NI	NI	NI	NI
Harney Basin duskysnail *Coligyrus depressus*	sensitive	NI	NI	NI	NI	NI
Shortface lanx (Gastropoda) *Fisherola nuttalli* (suspected)	sensitive	NI	NI	NI	NI	NI
Metolius pebblesnail *Fluminicola sp. Nov. (Metolius)*	sensitive	NI	NI	NI	NI	NI
Indian ford juga *Juga hemphilli ssp. Nov. (indian ford)*	sensitive	NI	NI	NI	NI	NI
Blue Mountains juga *Juga sp. Nov. (Blue Mountains)*	sensitive	NI	NI	NI	NI	NI
Opal Springs (Crooked River) juga *Juga sp. Nov. (Opal Springs)*	sensitive	NI	NI	NI	NI	NI
Pristine springsnail (mollusk) *Pristinicola hemphilli* (determined)	sensitive	NI	NI	NI	NI	NI
Columbia clubtail *Gomphus lynnae*	sensitive	NI	NI	NI	NI	NI
A caddisfly *Moselyana comosa*	sensitive	NI	NI	NI	NI	NI
Effects Determinations *Threatened and Endangered Species:* NE - No Effect NLAA - May Affect, Not Likely to Adversely Affect LAA - May Affect, Likely to Adversely Affect BE - Beneficial Effect		*Sensitive Species:* NI - No Impact MIIH - May Impact Individuals or Habitat, but Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species WIFV - Will Impact Individuals or Habitat with a Consequence that the Action May Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species BI - Beneficial Impact				

Pertinent Rules and Regulations

Water Quality

Direction for managing water quality, water quantity, and riparian areas on the Ochoco National Forest are found in the Forest Service Manual, Title 2500 - Watershed and Air Management (FSM 1984), Forest Service Inland Native Fish Strategy Environmental Assessment (INFISH 1995), Code of Federal Regulations (36 CFR 219), General Water Quality Best Management Practices (BMP 2012), the Clean Water Act (CWA 1972), Executive Orders 11988, 11990 and 12088, the Organic Administration Act of 1897, and the Ochoco National Forest Land Resource and Management Plan (LRMP 1989).

Goals are generalized statements that provide broad direction for future management of the Forest. Objectives represent projected, potential outputs in support of overall goals and are based on available inventory data and assumptions. Desired future conditions summarize the anticipated physical changes that are likely to occur as a result of carrying out planned management practices over time.

Goals of the Ochoco National Forest include:

- Maintain or improve water quality, quantity, and timing of run-off.
- Comply with the objectives of the "Clean Water Act" and State of Oregon water quality standards (Memorandum of Understanding (MOU) with DEQ, 2014).
- Provide water of consistently high quality to users and dependent resources.

Objectives of the Ochoco National Forest include:

- Maintenance or improvement of water quality through the proper management of entire watersheds at all times, with special attention given to riparian areas.
- Maintain or improve all riparian areas to "excellent condition".
- Water quantity reflects the surface water leaving the Forest as a result of natural run-off and any increased run-off expected to result from the manipulation of vegetation. Year to year variations in precipitation are likely to obscure any increase or decrease in run-off resulting from management activities.

Desired future condition of the Ochoco National Forest includes:

- In ten years, individual watersheds on the Forest that are currently in excellent condition are expected to remain so and those not presently in good condition will be given first priority for improvement.
- Fifty years and beyond, it is expected that 90 to 95 percent of the riparian areas on the Forest will be in "excellent condition" by the year 2040. No significant increases in run-off for the Forest are expected.

Aquatic Species

Threatened and Endangered species: Bull trout and Mid-Columbia River steelhead trout are threatened and located on the Ochoco National Forest and Crooked River National Grassland. The proposed project is not within bull trout watersheds and will have no effect (NE) on threatened bull trout (*Salvelinus confluentus*) or their designated or proposed critical habitats. The threatened Mid-Columbia River steelhead trout (*Oncorhynchus mykiss ssp*) are present in Rock Creek, Mountain Creek and Bridge Creek watersheds within the project area (see Table BF-2 on p. 18). A portion of the proposed OHV trail crosses into Upper and Middle Rock Creek, West Branch Bridge, and Upper and Middle Mountain Creek Subwatersheds. Construction of the trail would not impact steelhead trout or its habitat, and the trail would not contribute sediment into these subwatersheds; because there is minimal trail construction within subwatersheds that contain steelhead habitat, and trails constructed are ridgetop and would not affect any PACFISH RMOs or habitats. There would be no

effect (NE) on steelhead trout or their designated or proposed critical habitats. Consultation with NMFS or USFWS is not needed.

Management Indicator Species: Rainbow (*Oncorhynchus mykiss*) and brook trout (*Salvelinus fontinalis*) are identified as management indicator species in the FEIS for the Forest Plan. In the past, these fish have been stocked by the Oregon Department of Fish and Wildlife. They are no longer stocked in the streams in the Ochoco Summit Project Area, but may still naturally reproduce in many Class I and II streams. See MIS report for this project.

R6 Regional Forester sensitive species list: The Western ridged mussel (*Gonidea angulata*), Harney Basin duskysnail (*Colligyrus depressus*), Shortface lanx (*Fisherola nuttalli*), Metolius pebblesnail (*Fluminicola sp. nov.*), Indian ford juga (*Juga hemphilli ssp. nov.*), Blue Mountains juga (*Juga sp. nov.* (*Blue Mountains*)), Opal Springs (Crooked River) juga (*Juga sp. Nov* (*Opal Springs*)), Pristine springsnail (*Pristinicola hemphilli*), Columbia clubtail (*Gomphus lynnae*), and A caddisfly (*Moselyana comosa*) are on the R6 Regional Forester's Sensitive Species list (July 2015). They are not known to inhabit or have habitat in the project area and will not be discussed further.

Redband trout (*Oncorhynchus mykiss ssp.*) historically were present throughout the project area and can be found in Class I and Class II streams: Allen, Deep, Jackson, Little Summit, Peterson, Beetle, Big Spring, Crazy, Crystal, Derr, Double Corral, East Porter, Elliot, Fox, Happy Camp, Howard, Indian, Looney, Toggle, and West Fork Fox Creeks.

The Columbia spotted frog (*Rana luteiventris*) is sensitive species on the R6 Regional Forester's Sensitive Species list. There are currently known populations of Columbia spotted frogs throughout the project area identified from informal surveys.

For this report, analysis is for redband trout and Columbia spotted frogs, the species present within the project area.

Management Area Prescriptions - Riparian

A management area is composed of lands with similar capabilities or characteristics, and is allocated to emphasize a particular resource or mix of resources. In conjunction with Forest-wide standards and guidelines, management areas provide a site-specific management emphasis and desired future condition for that area.

Riparian areas include land adjacent to water, where plants that are dependent on a perpetual source of water occur. They normally have high water tables and soils which exhibit characteristics of wetness. Riparian areas provide food, cover, and a source of large woody material for aquatic insects, fish and land animals. The vegetation of streamside areas filter sediment and shade the water surface to help maintain stable stream temperatures.

Management emphasis for riparian areas includes:

- Manage streamside vegetation and habitat to maintain or improve water quality. Meet temperature and turbidity levels as required by state standards under the Clean Water Act.

Desired future condition for riparian areas includes:

- Exhibiting a low, but apparent level of management. Vegetation may or may not appear manipulated, depending on the condition of the stream. Suitable amounts of large woody material will be apparent within the riparian area to provide streambank stability and habitat.
- Within the limits of ecological potential, a shady, brushy condition with a canopy of alder, willow, aspen, or other deciduous vegetation will exist.
- Where coniferous evergreens are a natural component of the ecosystem, a variety of size classes will exist to perpetuate the supply of shade and woody debris over time. Sites unable to support a canopy of deciduous or evergreen species will be characterized by vigorous

stands of forbs, grasses, and grass-like riparian species.

- Bank slopes containing high plant densities, thick root masses, embedded angular boulders, and old logs will also characterize these areas. Extensive scouring of streambanks will be an uncommon occurrence as will soil deposition outside the norm for the individual stream system. Streambeds will be commonly covered by native aquatic growth on assorted sizeds of rocks and boulders.
- Where cobble and gravel bars are prominent, they will become covered by sandy loam soils as riparian vegetation filters and traps stream sediments. As stream banks are rebuilt and cutbanks stabilized, a narrower, deeper channel will gradually develop.
- Springs and wet meadows are not specifically included in this management area prescription, but should receive appropriate protection as stated in Forest-Wide Standards and Guidelines for Water.

Forest-Wide Standards and Guidelines – Water

Standards and guidelines state the bounds or constraints within which all practices are to be carried out in achieving the planned goals, objectives and desired future conditions. They are intended to supplement, but do not replace, policy direction found in Forest Service Manuals and Handbooks, and the Regional Guide for the Pacific Northwest Region. They also must comply with applicable State and Federal laws and regulations.

Water Quality

Comply with State requirements in accordance with the Clean Water Act for protection of waters of the State of Oregon (Oregon Administrative Rules, Ch. 340-041-0001), through planning, application, and monitoring of Best Management Practices (BMP 1988) in conformance with the Clean Water Act, regulations, and federal guidelines issued thereto.

Floodplains and Wetlands (including springs and wet meadows)

Consider the presence of, and potential impacts to, any inventoried floodplain in project area environmental analysis.

Do not locate major structures, roads, or other facilities within floodplains unless no feasible alternative sites exist outside floodplain.

Allow projects causing short-term impacts on floodplain values only if specific mitigation measures designed to minimize the impacts are documented in the project environmental analysis. Restore natural floodplain characteristics after the activity has ceased.

See Management Area F15 Riparian for emphasis and desired future condition of riparian as a management area prescription (not including springs and wet meadows), and management area standards and guidelines for desired resource areas, such as Fire, Recreation, Timber, Transportation System, and Water.

Management Area Standards and Guidelines, Resource – Water

Temperature – Standard and Guideline

The requirements for shade along streams will generally correspond to provisions for more than 80 percent of the surface shaded. Where this can not be attained, 100 percent of the potential for shade is the standard.

Shade requirements may be reduced in cases where management is necessary to sustain a thrifty community of shade providing species over time, but activities may not result in an increase in termperatures above the limits specified (MA-F15 Riparian).

Turbidity – Standard and Guideline

Allow no more than 10 percent cumulative increase in stream turbidity. Short-term (less than five days) deviations from this standard to accommodate emergency or other legitimate activities will comply with state requirements for notification and approval (MA-F15 Riparian).

Project Activities – Standard and Guideline

Give preferential consideration to riparian-dependent resources over other resources in cases of unresolvable conflicts.

Vegetation and ground cover requirements:

- Where site potential and topographic factors permit, manage riparian areas to provide the shade necessary to meet stream temperature goals.
- Maintain upper streambanks in a stable condition along at least 80 percent of the length of a stream.
- Retain at least 80 percent of the potential ground cover in grass-forb riparian communities. Also, retain at least 80 percent of the potential tree or shrub cover in riparian areas dominated by trees or shrubs. In riparian areas with mixed layers, the cover requirement may be met by taking credit for the effective cover provided by all vegetative layers of the riparian community including shrubs, tree understories, and the dominant overstory. Consider the mitigating effect of stream size and orientation as well as surrounding topography when determining the amount of cover that may be removed.

The Clean Water Act (CWA 1972)

The objective of the Clean Water Act (CWA) is to restore and maintain the chemical, physical, and biological integrity of all waters to protect the Beneficial Uses as documented according to criteria by the Oregon Department of Environmental Quality (ODEQ 2010). A beneficial use is a resource or activity that would be directly affected by a change in water quality or quantity.

To help implement the objectives of the Clean Water Act, Oregon Department of Environmental Quality (DEQ) has developed and adopted water quality standards. Water quality standards include beneficial uses, narrative and numeric criteria, and antidegradation policies. Standards are designed to protect the most sensitive beneficial use within a water body. A determination that water quality is impaired can be based on: evidence of a numeric criterion exceedance; evidence of a narrative criterion exceedance; evidence of a beneficial use impairment; or evidence of a declining trend in water quality such that it would exceed a standard prior to the next listing period (ODEQ 2010).

Executive Orders

The following Executive Orders pertain to this project:

Executive Order 12088 requires Federal compliance with pollution control standards (i.e. the Clean Water Act).

Executive Order 11988 requires agencies to avoid adverse impacts associated with the occupancy and modification of floodplains.

Executive Order 11990 requires agencies to avoid adverse impacts associated with the destruction or modification of wetlands.

PACFISH and INFISH

PACFISH provides interim direction to protect habitat and populations of anadromous fish habitat in eastern Oregon, eastern Washington, Idaho, western Montana, and portions of Nevada. There are no subwatersheds with anadromous fish species or habitat in the Ochoco Summit Project Area that

contain proposed trail locations that would have any effect on the species or its habitat. No further evaluation will be discussed as PACFISH does not apply to the Ochoco Summit Project Area.

INFISH (1994) provides direction to protect habitat and populations of resident native fish outside of anadromous fish habitat in eastern Oregon, eastern Washington, Idaho, western Montana, and portions of Nevada. For the Ochoco Summit Project Area, INFISH provides protection for redband trout.

Riparian Management Objectives (RMOs) describing good habitat were developed to describe desired conditions for fish habitat. See Appendix A (INFISH 1995; Rosgen 1996; Cordova 1995; Rosgen, Silvey 1998). INFISH Riparian Management Objectives that will be discussed in this report relate to pools, temperature, large woody debris and bank stability. Lower bank angle and width to depth are not discussed further. Pools, large woody debris and temperature would be indicators of affects to redband trout and Columbia spotted frog habitat as a result of OHV proposals. Although sediment is not an INFISH RMO, it is an indicator of effects to redband trout and Columbia spotted frog and will be discussed in the effects section of this report.

Recreation Management is addressed in INFISH (1995 p. A-9). It states:

RM-1 Design, construct, and operate recreation facilities, including trails and dispersed sites, in a manner that does not retard or prevent attainment of the Riparian Management Objectives and avoids adverse effects on inland native fish. Complete watershed analysis prior to construction of new recreation facilities in Riparian Habitat conservation Areas within priority watershed. For existing recreation facilities inside Riparian Habitat Conservation Areas, assure that the facilities or use of the facilities would not prevent attainment of Riparian Management Objectives or adversely affect inland native fish. Relocate or close recreation facilities where Riparian Management Objectives cannot be met or adverse effects on inland native fish can not be avoided.

RM-2 Adjust dispersed and developed recreation practices that retard or prevent attainment of Riparian Management Objectives or adversely affect inland native fish. Where adjustment measures such as education, use limitations, traffic control devices, increased maintenance, relocation of facilities, and/or specific site closures are not effective in meeting riparian Management Objectives and avoiding adverse effects on inland native fish, eliminate the practice or occupancy.

Implementing INFISH is to achieve a high level of habitat diversity and complexity through a combination of habitat features, to meet the life-history requirements of the fish community inhabiting a watershed. Project proposals are to not retard the attainment of RMOs. To “retard” would mean to slow the rate of recovery below the near natural rate of recovery if no additional human caused disturbance was placed on the system (INFISH 1995 p. A-3).

Riparian Management Objectives for Redband Trout

Riparian Management Objectives (RMOs) describing good habitat were developed to describe desired condition for fish habitat. The reference information for RMOs better describe the habitat in the project area than INFISH.

Table 63 is in part taken from Table A-1. Interim Riparian Management Objectives (RMOs) from INFISH (1995).

Table 63. Riparian Management Objectives for the Ochoco Summit Trail System project area (INFISH 1995).

Habitat Feature	Interim Objective
Water Temperature	No measurable increase in maximum water temperature (7-day moving average of daily maximum temperature measured as the average of the maximum daily temperature of the warmest consecutive 7-day period). Maximum water temperatures below 59F

	within adult holding habitat and below 48F within spawning and rearing habitats.
Bank Stability (non-forested systems)	>80 percent stable.
Large Woody Debris	>20 pieces per mile; >12 inches diameter; >35 foot length
Pool Frequency	Varies by width; 10-foot channel width = 96 pools/mile, 20-foot channel width = 56 pools/mile, 25-foot channel width = 26 pools/mile, etc.

INFISH Riparian Management Objectives concerning pools, large woody debris, temperature and cutbank were analyzed and discussed in this report. For this project, OHVs driving on gravel and dirt roads create a disturbance to road surfaces that can cause increased sedimentation in streams during rain events when located within the 300-ft sediment delivery zone. Sediment is not an INFISH RMO; however it was analyzed, since OHV use has the potential to cause erosion and delivery of fine sediment to streams, affecting water quality and fish habitat.

Issues developed that could impact pools, sediment, and temperature:

- Trail could directly impact fish habitat at and below stream crossings
- Trail could reduce effectiveness of recent and ongoing restoration efforts in Deep, Crazy, Little Summit and Allen Creeks
- Potential impacts to streambanks (increase in sediment)
- Potential changes to upland soil movement and delivery to riparian areas (roads channelizing sediment during rain and snow events)

Analysis Design

Watersheds within the Project Boundary that were not Analyzed

Subwatersheds that do not contain streams that are within 300 feet of proposed trails were not analyzed as part of this analysis. This is based on a review by Belt et al. (1992) of studies in Idaho and elsewhere that concluded non-channelized sediment flow rarely travels more than 300 feet and that 200-300 foot riparian "filter strips" are generally effective at protecting streams from sediment from non-channelized flow. Table 64 lists the subwatersheds that were not analyzed and their Hydrologic Unit Codes (HUC). The accuracy of proposed trail locations for Alternatives 3 and 4 indicate that the trail locations extend to within 300 feet of perennial tributary to Duncan Creek; however, based on the location of existing disturbance determined from aerial photography, the trail would not actually extend into the Duncan Creek Subwatershed. The Duncan Creek Subwatershed was, therefore, removed from this hydrology and aquatic species analysis.

Table 64. Name and HUCs for subwatersheds not analyzed within the Ochoco Summit project boundary.

Field	Area	Name	Hydrologic Unit Code
1st	Region	Pacific Northwest	17
2nd	Sub-region	Middle Columbia River	1707
3rd	River Basin	John Day River	170702
4th	Sub-basin	Upper John Day River	17070201
5th	Watershed	Mountain Creek	1707020113
6th	Subwatershed	Upper Mountain Creek	170702011301
		Middle Mountain Creek	170702011302
5th	Watershed	Rock Creek	1707020114
6th	Subwatershed	Upper Rock Creek	170702011401
		Middle Rock Creek	170702011402
4th	Sub-basin	Lower John Day River	17070204
5th	Watershed	Bridge Creek	1707020403

Table 64. Name and HUCs for subwatersheds not analyzed within the Ochoco Summit project boundary.

Field	Area	Name	Hydrologic Unit Code
6th	Subwatershed	West Branch Bridge Creek	170702040302
3rd	River Basin	Deschutes River	170703
4th	Sub-basin	Beaver-South Fork	17070303
5th	Watershed	Paulina Creek	1707030309
6th	Subwatershed	Upper Paulina Creek	170703030901
		Dry Paulina Creek	170703030902
5th	Watershed	Lower Beaver Creek	1707030310
6th	Subwatershed	Wolf Creek	170703031002
		Drift Canyon	170703031004
4th	Sub-basin	Upper Crooked River	17070304
5th	Watershed	Upper North Fork Crooked River	1707030403
6th	Subwatershed	Gray Creek	170703040301
		Headwaters North Fork Crooked River	170703040305
5th	Watershed	Lower North Fork Crooked River	1707030405
6th	Subwatershed	Lower North Fork Canyon	170703040502
4th	Sub-basin	Lower Crooked River	17070305
5th	Watershed	Upper Ochoco Creek	1707030502
6th	Subwatershed	Headwaters Ochoco Creek	170703050201
		Lower Marks Creek	170703050204
		Duncan Creek	170703050205

Potential Issues Acknowledged but not Analyzed

The following potential issues are briefly discussed, but for reasons described were not considered further in this analysis of effects to hydrology and aquatic species:

Contamination of Surface or Groundwater from chemicals potentially released at staging areas (e.g. petroleum, bacteria, and nutrients). Only one staging area is located within 300 feet of a perennial stream channel in the Ochoco Summit Project Area, Ochoco Divide Snopark. This existing Snopark staging area is proposed for Alternatives 2, 3, 4 and 5 as an OHV staging area. It is at just under 300 feet from Marks Creek where it transitions from intermittent to perennial and is already in use. The staging area is not located within the RHCA, indicating a relatively deep water table and a relatively low risk of staging areas to water quality. No staging areas are within required wetland Riparian Habitat Conservation Areas (RHCAs) based on INFISH RHCA requirements and wetland locations based on Potential Natural Vegetation wetland vegetation type locations. In addition, project design criteria direct that "All fuel-powered vehicles and tools would be refueled at least 75 feet from any live stream." None of the streams within the project area are listed by Oregon Department of Environmental Quality on the 303(d) list for any contaminants other than stream temperature.

Methods

Stream Surveys

Bottom Line Surveys (BLS) were conducted between 1991 and 2003 on the Ochoco National Forest on perennial and intermittent streams to determine if a streamside management unit was in compliance with the riparian zone standards and guidelines. These surveys included measurements of shade, large woody debris, cutbanks, and pools.

Level II Stream Surveys were conducted between 1989 and 2014 on Ochoco National Forest perennial streams to identify existing riparian and aquatic ecosystem conditions on a basin-wide scale.

PIBO (PACFISH/INFISH Biological Opinion) monitoring data is available for several streams in the project area. PIBO data is collected on a five-year cycle to monitor the effects of land use activities on aquatic and riparian resources. These surveys include measurements of large woody debris, pool quantity and quality, fine sediment, bank stability and width to depth ratios.

Table 65 lists all of the habitat indicators that will be analyzed and gives specific criteria that will determine how well each indicator is functioning at the watershed-scale. Some criteria were defined by the National Marine Fisheries Service in the Matrix of Pathways and Indicators (NMFS 1996), some criteria were established by the interim Riparian Management Objectives in INFISH, and some were modified based on site-specific conditions. Shade and bank stability are forest plan standards and will be displayed as either meeting or not meeting established standards.

Table 65. Criteria for habitat indicator condition rating. Some criteria were defined by the National Marine Fisheries Service in the Matrix of Pathways and Indicators (NMFS 1996), some criteria were established by the interim Riparian Management Objectives in PACFISH, and some were modified based on site-specific conditions.

Pathway	Issue	Habitat Indicator	Properly Functioning (Good) MET (Meets Forest Plan Standards)	Functioning At Risk (Fair)	Not Properly Functioning (Poor) DNM (Does Not Meet Forest Plan Standards)
Water Quality	**Stream Temperature**	**Shade (Forest Plan Standard)**	>80% stream shade		<80% stream shade
		water temperature (RMO)	10-14ºC	14-18ºC	>18ºC
	Sediment/ Turbidity	**bank stability (Forest Plan Standard)**	>80% stable		<80% stable
		fine sediment (RMO)	<12% fines at surface (silt/ organics)	12-20% fines at surface (silt/ organics)	>20% fines at surface (silt/ organics)
Habitat Access	**Fish Passage**	**physical barriers**	any man-made barriers present in watershed allow upstream and downstream fish passage at all flows	any man-made barriers present in watershed do not allow upstream and/or downstream fish passage at base/low flows	any man-made barriers present in watershed do not allow upstream and/or downstream fish passage at a range of flows
Habitat Elements	**Large Woody Material**	**large woody material (RMO)**	>69 pieces/mile (Class I, II, III) >12 inches diameter >35 foot length >48 pieces/mile (Class IV) >12 inches diameter >35 foot length	currently meets standards for properly functioning, but lacks potential sources from riparian areas of large wood recruitment to maintain that standard	does not meet standards for properly functioning and lacks potential large wood recruitment
	Pools	**pool frequency (RMO)**	meets pool frequency standards outline in Table 66	meets pool frequency standards but large wood recruitment inadequate to	does not meet pool frequency standards

Pathway	Issue	Habitat Indicator	Properly Functioning (Good) MET (Meets Forest Plan Standards)	Functioning At Risk (Fair)	Not Properly Functioning (Poor) DNM (Does Not Meet Forest Plan Standards)
				maintain pools over time	
		pool quality	pools >1 meter deep with good cover and cool water; minor reduction of pool volume by fine sediment	few deep pool >1 meter present or inadequate cover/temperature; moderate reduction of pool volume by fine sediment	no deep pool >1 meter present and inadequate cover/temperature; major reduction of pool volume by fine sediment
	Channel Condition and Dynamics	**width/depth ratios (RMO)**	varies by channel type; see Table 67	within 1 number of width/depth ratio for channel type in Table 67	greater than 1 number outside of width/depth ratio for channel type in Table 67

Table 66. Interim objectives for pool frequency (PACFISH, USDA 1995).

Wetted width (feet)	10	20	25	50	75	100	125	150	200
Pools per mile	96	56	47	26	23	18	14	12	9

Table 67. Width to depth ratio by channel type (Rosgen 1996).

Channel Type	A	B	C	D	DA	E	F	G
Width/Depth Ratio	<12	>12	>12	>40	<40	<12	>12	<12

Water Quality

Stream Temperature

Stream Shade

Stream shading is one of the top environmental conditions related to redband trout densities, based on a study by Meyer et al. (2010). Stream shade not only contributes to lower stream temperatures, but it also affects the habitat quality of the stream by providing improved cover for trout or increased invertebrate food supply.

Reductions in solar input resulting from shading are a primary factor affecting stream temperature. The term “stream shade” often refers to all shade on any part of the stream that blocks solar input to the stream channel. Shade functions (Beschta, et al., 1987) generally occur within 100-200 feet of the channel. Stream shade is primarily a function of stream orientation, channel width, tree heights adjacent to the stream, and ground slope above the bankfull channel. Very little if any shade is provided to the stream from trees located on the north side of east-west trending streams (Zwieniecki and Newton 1999; Ice 2001).

Shade is measured with a Solar Pathfinder 2 above water surface at mid-channel. Shade is recorded for hardwoods (include alder, aspen, sage brush, current, snowberry, etc.) as well as overall shade that includes tree species and steep valleys. Shade values for a channel reach are determined by placing this instrument above the channel midpoint, reading areas across the curve that display a reflection of trees or other shading features, and summing the values for those shaded areas.

On the Ochoco National Forest, the Forest Plan standards and guidelines direct that at least 80 percent of stream surfaces should be shaded, or that 100 percent of potential shade levels should be present when 80 percent shade cannot be attained (e.g. open wet meadow areas). Stream shade comes from adjacent conifer forests, topographic shading in steep drainages, or riparian vegetation near the stream. Open meadow areas are common in the watershed and have a low potential for meeting the 80 percent shade criteria due to the absence of bordering forest and hillsides. Sources of shade in open meadows generally include sedges, rushes, and other riparian vegetation that tends to flourish where the water table is high most of the year.

Water Temperature

Aquatic species viability within the project area is limited by habitat quantity and quality, particularly water temperature. Temperatures have increased due to channelization and incision of stream channels, loss of riparian vegetation providing shade, removal of large woody material, a shift in dominate riparian vegetation type and removal of beavers. Redband trout have been found to typically be present in small- to medium- sized streams between 50oF (10oC) and 61oF (16oC), outside of this range they are less likely to be present (Meyer et al. 2010).

The Oregon Department of Environmental Quality (ODEQ) has designated streams in the Gap project area for salmon and trout rearing and migration (ODEQ, Oregon Water Quality Standards Fish Use Maps, Figure 130A). No streams in the project area were designated for salmon and steelhead spawning (ODEQ, Oregon Water Quality Standards Fish Use Maps, Figure 130B). The state standards (340-041-0028, approved by EPA Mar 2004) say the seven-day-average maximum temperature of streams identified as having salmon and trout rearing and migration should not exceed 18.0ºC (64.4ºF). The state of Oregon assumes that waters meeting this standard will provide water temperatures suitable for redband trout spawning.

In order to assess stream temperatures in the Ochoco Summit project area, monitored summer stream temperatures within and directly adjacent to the project boundary were compiled and 7-day-average maximum temperatures were determined for all sites. When all or most 7-day-average maximum temperatures fell between 50 and 57 degrees Fahrenheit, it was given a condition rating of Good. If most sites 7-day average maximum temperatures ranged between 57 and 64 degrees Fahrenheit the condition was determined to be Fair. Finally, if 7-day-average maximum temperatures consistently exceeded 64 degree Fahrenheit, then the existing condition was determined to be Poor.

<u>Fine Sediment/Turbidity</u>

Bank Stability

Soil disturbance on ridges or side slopes may never affect water quality, but disturbance of a channel bed or bank is immediately reflected in downstream sediment levels. Unstable stream banks associated with mechanical disturbance (including trampling), loss of vegetative root strength, decreases in roughness associated with large woody material (LWM) and vegetation removal, or stream banks of incised streams are highly susceptible to changes in flow or sediment load. Not only does quantity of riparian vegetation have an effect on bank stability, but the value of the vegetation type can greatly influence root density and bank stability (Liquori and Jackson, 2001). Bank erosion can account for most of the sediment load in a drainage system. If the discharge and/or the sediment load are substantially increased, the flow may erode the streambanks or deposit sediment to reach a new equilibrium. A high incidence of raw banks (i.e. cutbanks), headcuts, and/or braided channels (Rosgen channel type D) are indicative of unstable stream banks.

Environmental effects of unstable streambanks include increased turbidity and sediment yield, development of cutbanks, and changes in channel morphology. The result of these changes may result in water quality conditions that are lethal to aquatic organisms. Changes in channel morphology would primarily be seen with changes in entrenchment and width to depth ratios

(Marcuson 1977, Duff 1979). Streams with unstable banks typically erode laterally (i.e. become wider and shallower), which increases the width to depth ratio.

To determine existing condition, the percent of stable bank was derived from measurements of cutbank (BLS and Level II over multiple years). Percent of stable banks were calculated by stream survey to assess existing condition of each subwatershed relative to bank stability. Bank stability is a forest plan standard, so any location with bank stability less than 80% is not meeting forest plan standards.

Fine Sediment/Turbidity

The amount of sediment actually delivered to the stream is the component of surface erosion that affects the aquatic species habitat. Magnitudes of sediment delivery are primarily controlled by overland flow characteristics and vegetative filtering (Croke and Hairsine, 2006). Sediment delivery to the stream channel is of a particular concern in semi-arid climates. Semi-arid climates, such as the climate found in Central Oregon, are expected to be elevated relative to other climates as a results of these climates having sufficient precipitation to drive erosion, but limited amounts of vegetation that stabilize hillslopes from erosion (Goode et al. 2012). Generally, vegetated filter strips between 200 to 300 feet from the stream are considered to be effective in controlling sediment that is not channelized depending upon the riparian buffer slope (Belt et al. 1992).

The numerous organisms forming the base of the aquatic food chain find shelter and habitat in the open spaces within stream gravel and cobble. Filling these spaces with sediment reduces the habitable volume of the stream. As sediment sources and delivery exceeds 20 percent of the total area on the substrate, deposits within the larger cobble material of the streambed produce an embedded channel, with consequent loss of aquatic habitat. Gravel embeddedness of less than 20 percent is essential to maintain a healthy salmonid population, particularly in those areas identified as potential or existing spawning areas (Bjorn and Reiser, 1991). If fine sediment exceeds 20 percent, the spaces between the rocks in the substrate are filled and oxygenation of eggs is reduced. Reduced oxygenation results in reduced success of fish and frog eggs surviving.

Estimates of the percent of surface substrate which is composed of silt and organics were compiled from Level II streams surveys in the project area. These data were then weighted by reach length and averaged by subwatershed. These weighted average fine sediment percentages were then compared to the criteria in Table 65 to determine whether the water quality in the streams in each subwatershed appear to be Properly Functioning, Functioning at Risk or Not Properly Functioning relative to fine sediment in streams.

Habitat Access

Fish Passage Barriers

Aquatic organism passage through artificial barriers in streams is critical to maintaining connectivity among habitat. Culverts and other barriers can also degrade habitat by altering or limiting the downstream movement of sediment, large woody material, and other organic material. Connectivity is important, because anadromous salmonids migrate upstream and downstream during their lifecycle; in addition, many resident salmonids and other aquatic species move extensively upstream and downstream to seek food, shelter, better water quality, and spawning areas. Where these barriers occur, fish can no longer reach suitable habitat. By reducing the amount of accessible habitat in a watershed, fish populations may be limited.

Based on the Matrix of Pathways and Indictors developed by NMFS (1996), habitat access is considered Properly Functioning (Good) if any man-made barriers present in a watershed allow upstream and downstream fish passage at all flows; it is considered Functioning at Risk (Fair) if any man-made barriers present in watershed do not allow upstream and/or downstream fish passage at

base/low flows; and it is considered Not Properly Functioning (Poor) if any man-made barriers present in watershed do not allow upstream and/or downstream fish passage at a range of flows.

Habitat Elements

Large Woody Material

Large woody material (LWM) is widely recognized as a major element in the physical and biological structure of forested stream ecosystems (McDade et al, 1990). LWM also affects the routing of other watershed products, particularly sediment, and their influence on ecosystems. By concentrating and dispersing hydraulic forces, LWM can greatly diversify physical conditions in streams and provide habitat for various species and age classes in aquatic communities (Lisle 2002). Native salmonids and other aquatic organisms have evolved in steam systems where LWM and fluvial processes develop and maintain suitable channel morphology for all or part of their life stages. LWM helps retain organic and inorganic particulate matter that is important for channel stability, biological diversity, and productivity. It also plays an important role in pool formation. Within the watershed, the majority of pools are formed and maintained by LWM.

For LWM frequency, INFISH gives an interim objective of at least 20 pieces per mile. The natural amount of LWM reflects differences in physical processes that shape valley floors and the subsequent successional stages of terrestrial plant communities on these geomorphic surfaces. These processes vary across broad spatial scales. Reference conditions for LWM have been documented in streams of unmanaged, mix conifer forests in the Oregon Blue Mountains (Cordova 1995), a physiographic province more similar to the watersheds within the Gap project area. We will use LWM frequencies from this study, instead of the INFISH interim objective, as the standard for the Gap project area watersheds.

On page 93 of Cordova (1995), Table 16 shows wood frequency by wood diameter for all pieces over 1 meter in length. The INFISH interim objective for wood frequency is based on wood over 12 inches diameter and over 35 fee t long. Because Cordova doesn't give results for wood frequency with the same size class as the INFISH interim objective, the following assumptions were made:

- Cordova shows separate length and diameter frequency distributions (1995, Figure 7) that indicate roughly 50% of all wood pieces were over 35 feet in length and 37% of all wood pieces were over 12" diameter.
- Based on personal communications with Cordova, diameter was tightly correlated to length (i.e. the larger diameter pieces were more likely to be greater in length).
- Therefore, we are making the assumption that most of the pieces over 12" diameter were over 35 feet in length.

Based on these assumptions, we will use the wood frequencies given in Table 16 (Cordova 1995) as our Riparian Management Objective and the measure for Properly Functioning (Good). In moderately constrained channel types (typical of Class I, II, and III streams in the project area) LWM frequencies greater than 69 pieces per mile is considered Properly Functioning; in constrained channel types (typical of Class IV streams in the project area) LWM frequencies greater than 48 pieces per mile are considered Properly Functioning (Good). Streams that currently meet LWM frequency standards for Properly Functioning (Good), but lack potential sources of LWM recruitment to maintain that standard are considered Functioning at Risk (Fair). Streams that do not meet standards for Properly Functioning and lack potential LWM recruitment are considered Not Properly Functioning (Poor).

Pools

Pool Frequency and Quality

Pools can be either freely formed by the interaction of flow and sediment transport or forced by local obstructions, such as boulders and LWM, which cause flow convergence and turbulent velocity

fluctuations that scour the channel bed. Extensive literature documents the influence of LWM on channel morphology in forested mountain streams. In small channels, individual pieces of LWM trap sediment, cause local bed and bank scour, and create step pools. In larger channels, LWM accumulations locally influence bed and bank scour, side channel development, bar stability, and island formation (Montgomery et al 1995). Channels without LWM can quickly evolve to very simple forms. Moderately sized channels with gradients of about 1 to 4 percent are particularly prone to simplify, because they have a weak tendency to form bars and pools without exogenous structure (Montgomery and Buffington 1997). These conditions typify the fish-bearing streams in the project area. Pool depth and complexity are also a function of sediment routing. Large pulses of sediment moving through a stream system can restrict pool depth and ultimately limit habitat capability.

Pools provide critical habitat for salmonids and other aquatic species. Salmonid production is typically greatest in streams with a pool-to-riffle ratio of approximately 1: 1. Pools are inhabited throughout the year by adult and juvenile salmonids and are important as refuge from high flow or frozen conditions during the winter (Raleigh et al 1984). Pools differ in their ability to provide resting areas and cover; Lewis (1969) found that streams with deep, low velocity pools containing extensive cover had the most stable trout populations.

The frequency and volume of pools is dependent on stream gradient and drainage area, generally as stream size (order) increases, pools become larger but more infrequent. INFISH gives interim objectives for pool frequency based on channel width. These values are used as Riparian Management Objectives for the project and as condition criteria. Streams that meet pool frequency standards are considered Properly Functioning (Good). Streams that meet pool frequency standards but that have large wood recruitment values inadequate to maintain pools over time are considered Functioning at Risk (Fair). Streams that do not meet pool frequency standards are considered Not Properly Functioning (Poor).

Based on the Matrix of Pathways and Indictors developed by NMFS (1996), pool quality is considered Properly Functioning (Good), if there are numerous pools greater than1 meter deep with good cover and cool water and only minor reduction of pool volume by fine sediment. Streams with only a few pools greater than1 meter deep or inadequate cover or cool temperatures, and a moderate reduction of pool volume by fine sediment are considered Functioning at Risk (Fair). Streams with no pools greater than 1 meter deep and inadequate cover or cool temperatures, and a major reduction of pool volume by fine sediment are considered Not Properly Functioning (Poor).

<u>Channel Condition and Dynamics</u>

Width/Depth Ratio

Width/Depth ratio is the ratio of the bankfull surface width to the mean bankfull depth of the channel. This ratio is important to the understanding of the distribution of flows within the channel and their ability to move sediment (Rosgen 1996). This is one of the most sensitive indicators to changes in channel stability as a result of disturbance to riparian vegetation, channels or watersheds. As width/depth ratios increase, the channel becomes wider and shallower, resulting in higher bank erosion. Increased sediment supply from increased bank erosion then results in a loss in the capability of the channel to transport the same amount of sediment, further accelerating bank erosion.

Ideally, to determine whether a stream channel is properly functioning relative to its width/depth ratio, reference reaches within the same channel types and hydro-physiographic regions should be surveyed to determine appropriate ranges. Identifying these reference reach sites and collecting the reference reach data is an intensive process; therefore, this data is unavailable for streams in the Ochoco Summit project area. In absence of this reference reach data, width/depth ratios used by Rosgen for classification of primary stream types were used to assess whether the surveyed stream

channels within Ochoco Summit project area were Properly Functioning, Functioning at Risk, or Not Properly Functioning.

Sediment/Turbidity

Environmental effects of unstable streambanks include increased turbidity and sediment yield, development of cutbanks, and changes in channel morphology. The result of these changes may result in water quality conditions that are lethal to aquatic organisms. Changes in channel morphology would primarily be seen with changes in entrenchment, width to depth ratios, and ultimately channel type (Rosgen 2009). Streams with unstable banks typically erode laterally (i.e. become wider and shallower), which increases the width to depth ratio. See soils report for additional descriptive information on soil erosion, channel erosion, bank erosion, and overland flow from compaction and/or displacement.

There is a body of literature that evaluates sediment loading rates above natural to determine stream transport thresholds with resultant detrimental aquatic effects, but very little quantitative information has been collected locally. Erosion and sediment transport are dynamic in time and space, and are dependent on multiple independent variables (i.e. climate, geology, topography, vegetation, weather, etc.). Additionally, natural episodic events, such as large fires and floods, can elevate sediment loading rates by orders of magnitude above average observed conditions (Elliot 2002, Elliot 2012, Megahand and King 2004). Two studies located in the Idaho Batholith identified 'thresholds levels' for observable stream aggradation and resultant detrimental aquatic effects in the Northern Rockies. The cited threshold values include 100% over natural (Megahan and Kind 2004), to percentages over natural based on Rosgen stream type: A channels – 100%, B channels – 45%, and C channels – 35% (Stowell et al 1983). Sediment-habitat response curves were developed in Stowell et al 1983 and show that in 'C' channel types, substrate embeddedness is virtually unchanged below 35% increase over natural background sediment and that fine sediment does not increase appreciably when sediment yield increases 50% over natural background. In terms of habitat-fish response, percent fine sediment by depth is estimated to have no impact on fry emergence if percent fine sediment is under 20%. Summer rearing capacity does not decrease significantly until embeddedness reaches at least 25% and winter carrying capacity until embeddedness reaches at least 15% for Age 0 steelhead (Stowell et al 1983). The project fisheries biologist and hydrologist have determined that using values from the Idaho Batholith for comparison is appropriate in the Ochoco Summit project area, because soils in the Idaho Batholith are more erosive than the soil types located in the project area.

An inverse relationship between the amount of fine sediments in spawning or rearing areas versus fish survival and abundance has been found in numerous studies (Stowell et al 1983). In general, when sediment yields are increased over natural rates, fish biomass decreases. Embryo survival, winter carrying capacity, and summer rearing capacity are related to in-stream sediment and could limit fish abundance.

The numerous organisms forming the base of the aquatic food chain find shelter and habitat in the open spaces within stream gravel and cobble. Filling these spaces with sediment reduces the habitable volume of the stream. As sediment sources and delivery exceeds 20 percent of the total area on the substrate, deposits within the larger cobble material of the streambed produce an embedded channel, with consequent loss of aquatic habitat. Gravel embeddedness of less than 20 percent is essential to maintain a healthy salmonid population, particularly in those areas identified as potential or existing spawning areas (Bjorn and Reiser 1991). If fine sediment exceeds 20 percent, the spaces between the rocks in the substrate are filled and oxygenation of eggs is reduced. Reduced oxygenation results in reduced success of fish and frog eggs surviving.

Studies have generally concluded that non-channelized sediment flow rarely travels more than 300 feet and that 200-300 foot riparian "filter strips" are generally effective at protecting streams from sediment from non-channelized flow (INFISH 1995, Belt et al. 1992). As a general rule the closer a

ground disturbing activity is to a stream, including stream crossings, the higher the potential for sediment delivery.

Soil disturbance on ridges or side slopes may never affect water quality, but disturbance of a channel bed or bank is immediately reflected in downstream sediment levels. Unstable stream banks associated with mechanical disturbance, loss of vegetative root strength, decreases in roughness associated with large woody material (LWM) and vegetation removal, or channelized stream banks are highly susceptible to changes in flow or sediment load. These stream banks can account for most of the sediment load in a drainage system. If the discharge and/or the sediment load are substantially increased, the flow may erode the streambanks or deposit sediment to reach a new equilibrium. A high incidence of raw banks (i.e. cutbanks), headcuts, and/or braided channels (Rosgen channel type D) are indicative of unstable stream banks.

Sediment Loading

Disturbed WEPP and WEPP:Road models were used to assess sediment impacts to streams in the Ochoco Summit project area. Disturbed WEPP was used to model natural background hillslope sediment loading by 6th code HUC and existing road sediment in project subwatersheds. Project-area 6th code HUCs were broken up by soil type (clay loam, silt loam, sandy loam, or loam) and, using Disturbed WEPP, natural background sediment was predicted. Vegetation cover in the project area was estimated at 60% (good grass), and hillslope gradient and horizontal length was estimated using GIS.

WEPP:Road was used to estimated sediment delivery from Ochoco Summit trail segments within 300' of stream and at trail-stream crossings. Soil texture and rock content were estimated by road segment and crossing using the Ochoco National Forest Soil Resource Inventory (SRI). Assumptions of the modeling exercise included: road design of "outsloped, rutted", 8% road gradient, 400 foot road length between drainage features, fill gradient of 67%, fill length of 15 feet, buffer gradient of 15% and buffer length of 150 feet. Road width was based on the proposed width of the trail system. Traffic level was changed depending on the type of use.

For trail-stream crossings, assumptions included: road design of "outsloped, rutted", 8% road gradient and 400 foot road length between drainage features. If the crossing is proposed to be a culvert, than a fill gradient of 67%, fill length of 5 feet, buffer gradient of 5% and a buffer length of 5 feet were used. If the crossing is proposed to be a ford, than a fill gradient of 5%, fill length of 1 foot, buffer gradient of 5% and a buffer length of 1 foot was used. Again, traffic level was changed depending on the type of use.

Slope Erosion Hazard

The Ochoco National Forest Slope Erosion Hazard Layer was used to assess the susceptibility of the soils to erosion within each Ochoco Summit Project Area Subwatershed. Percentages of high, moderate and low slope erosion hazard were determined within 300 feet of perennial and intermittent streams within each subwatershed. Subwatersheds with greater than 30% of the area within 300 feet of perennial and intermittent streams with a high slope erosion hazard were considered high, with more than 25% with a low slope erosion hazard were given a rating of low, and the remaining subwatersheds with a majority of the area within a moderate hazard rating were considered moderate.

Roads/Trails

Existing road densities within 300 feet of perennial and intermittent streams in the Ochoco Summit Project Area were used to assess the existing condition of roads located within the sediment delivery zone. Only non-paved roads with operational maintenance levels designated as Level I through V were considered for this analysis as potential sediment sources for sediment delivery to streams within the Ochoco Summit Project Area. Closed roads (Level I) were included in the analysis, since

road closures typically consist of installing a blockage of some sort at the road entrance to prevent use rather than stabilized hydrologically. Closed roads, therefore, can still contribute sediment to stream channels. For purposes of alternative analysis, densities proposed trails were added to existing roads to determine overall road/trail densities within 300 feet of perennial and intermittent streams. Each measurement factor was given a low, moderate, or high rating. A road/trail density within the 300 feet of streams with less than six miles per square mile was considered to be low, between six and seven miles per square mile was considered moderate, and greater than seven miles per square mile was considered high. Measurement factor ratings were then summarized into a single roads/trails rating for existing condition.

Channel Sensitivity and Recovery Potential

Varying stream forms and systems react differently to disturbance and recover at differing rates. Depending upon the geomorphic variables, such as entrenchment and bankfull width and depth, one stream may more resilient and may recover more quickly than another when exposed to disturbance. Stream channels with similar geomorphic variables react similarly to disturbances. In order to assess the existing condition and the potential effects on the stream channels in the Ochoco Summit Project Area, the streams were classified and rated accordingly based on their Rosgen Channel Type. This stream classification system, developed by Rosgen, classifies streams into stream types based on entrenchment ratios, width/depth ratios, sinuosity, channel gradient, and channel material (1996).

The width-to-depth ratio is an index of the cross-sectional channel shape, where both width and depth are measured at the bankfull level. Changes in discharge, bank stability, sediment load and/or bedload can rapidly alter the width and/or depth of the channel. Whether a stream erodes downward or outward or both can be influenced by bank shear stress, channel substrate type and the amount of riparian vegetation present on stream banks. Bank vegetation increases the resistance to erosion through its binding effects on banks, with erosion decreasing as the percentage of roots in the soil increases.

The entrenchment ratio is defined by Rosgen (1996) as the flood-prone area width divided by the bankfull width. Flood-prone area width is the width of the stream at twice maximum bankfull depth. Entrenched streams are typically vertically confined (within cutbanks) due to vertical channel erosion and have entrenchment ratios that are less than 1.4 (see Figure 3); higher entrenchment ratios indicate that channels are not confined and have access to floodplain. G and F-type channels are entrenched.

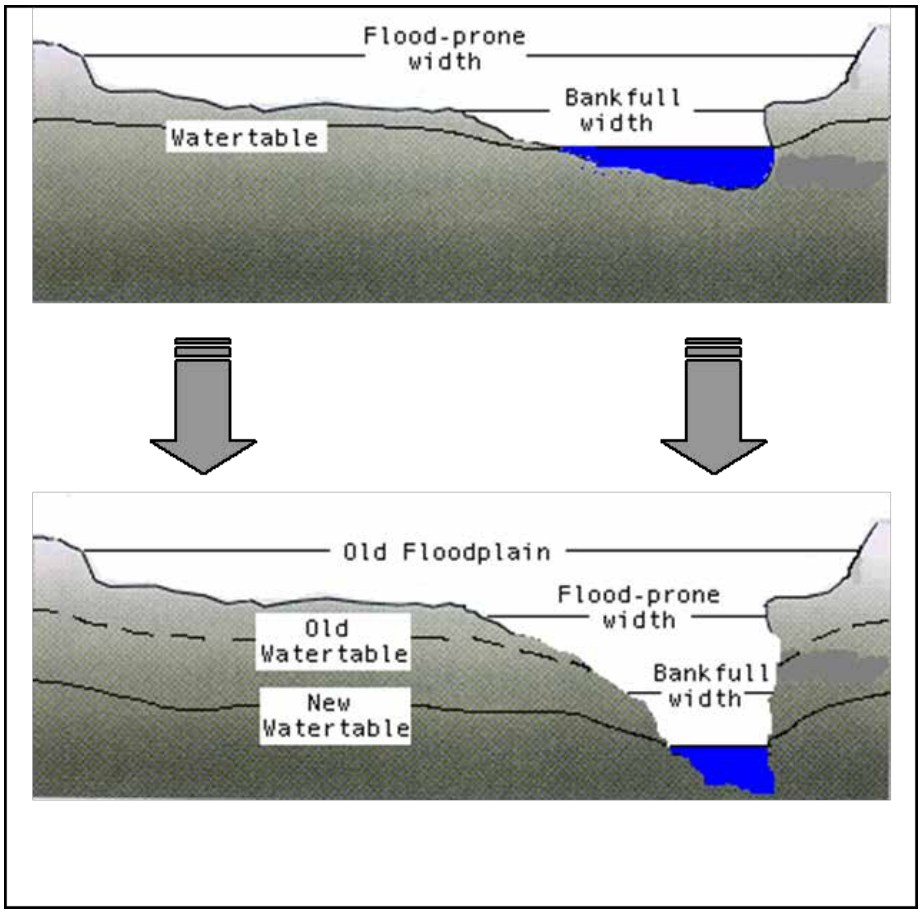


Figure 3. Changes in channel morphology and water table.

Channel disturbances such as increased sediment supply, excessive bank erosion, or increased flows can result in stream channel instability by upsetting the balance between sediment inputs and outputs. Increased sediment supply may result in channel aggradation, whereas excessive bank erosion typically results in channel widening. Both aggradation and channel widening change the ability of a stream channel to transport sediment downstream and may lead to a change in stream channel type.

Rosgen stream channel types are designated as a letter followed by a number. The letter refers to stream channels with similar forms. The number refers to the dominant channel material or substrate. Channel types present on the Ochoco National Forest include A, B, C, D, E, F and G. A channel types are steep, entrenched, cascading, step/pool streams. B channel types are moderately entrenched, moderate gradient, riffle dominated channels, with infrequently spaced pools. C channel types are low gradient, meandering, point-bar, riffle/pool, alluvial channels with broad, well defined floodplains. D channels are braided channels with longitudinal and transverse bars. E channels are low gradient, meandering riffle/pool streams with low width/depth ratios and little deposition. F channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios. G channels are entrenched "gully" step/pool and low width/depth ratios on moderate gradients. Stream type channel materials are represented by a 1 for bedrock, 2 for boulders, 3 for cobble, 4 for gravel, 5 for sand and 6 for silt/clay.

A stream channel's sensitivity to disturbance is related to the channel type and the dominant channel material (Rosgen 2009). In general, finer grained channel material results in a more sensitive stream channel, with the exception of clay, which can in some circumstances increase channel stability somewhat (Rosgen 2009). Finer grained (gravels and smaller) A, C, D, E, F, and G channels range

from high to extreme sensitivity to disturbance (Table 68). Finer grained B and DA channel types, however, are expected to have moderate sensitivity to disturbance.

Other channel stability factors based on channel type that can be considered include recovery potential, sediment supply, streambank erosion potential, and vegetation controlling influence. When these factors depart significantly from their stable state, it can result in degradation, aggradation, accelerated lateral erosion, avulsion or other channel instability. Ultimately, these instability consequences can lead to a change in channel type and a change in channel sensitivity as well as the other channel stability factors (Rosgen 2009).

Table 68. Generalized sensitivity to disturbance and recovery potential by stream type (Rosgen 2009).

Stream Type	Sensitivity to Disturbance	Recovery Potential	Overall Score	Overall Rating
A1	Very Low (1)	Excellent (1)	2	Good
A2	Very Low (1)	Excellent (1)	2	Good
A3	Very High (5)	Very Poor (6)	11	Poor
A4	Extreme (6)	Very Poor (6)	12	Poor
A5	Extreme (6)	Very Poor (6)	12	Poor
A6	High (4)	Poor (5)	9	Fair
B1	Very Low (1)	Excellent (1)	2	Good
B2	Very Low (1)	Excellent (1)	2	Good
B3	Low (2)	Excellent (1)	3	Good
B4	Moderate (3)	Excellent (1)	4	Good
B5	Moderate (3)	Excellent (1)	4	Good
B6	Moderate (3)	Excellent (1)	4	Good
C1	Low (2)	Very Good (2)	4	Good
C2	Low (2)	Very Good (2)	4	Good
C3	Moderate (3)	Good (3)	6	Fair
C4	Very High (5)	Good (3)	8	Fair
C5	Very High (5)	Fair (4)	9	Fair
C6	Very High (5)	Good (3)	8	Fair
D3	Very High (5)	Poor (5)	10	Poor
D4	Very High (5)	Poor (5)	10	Poor
D5	Very High (5)	Poor (5)	10	Poor
D6	High (4)	Poor (5)	9	Fair
DA4	Moderate (3)	Good (3)	6	Fair
DA5	Moderate (3)	Good (3)	6	Fair
DA6	Moderate (3)	Good (3)	6	Fair
E3	High (4)	Good (3)	7	Fair
E4	Very High (5)	Good (3)	8	Fair
E5	Very High (5)	Good (3)	8	Fair
E6	Very High (5)	Good (3)	8	Fair
F1	Low (2)	Fair (4)	6	Fair
F2	Low (2)	Fair (4)	6	Fair
F3	Moderate (3)	Poor (5)	8	Fair
F4	Extreme (6)	Poor (5)	11	Poor
F5	Very High (5)	Poor (5)	10	Poor
F6	Very High (5)	Fair (4)	9	Fair
G1	Low (2)	Good (3)	5	Fair
G2	Moderate (3)	Fair (4)	7	Fair
G3	Very High (5)	Poor (5)	10	Poor
G4	Extreme (6)	Very Poor (6)	12	Poor
G5	Extreme (6)	Very Poor (6)	12	Poor

G6	Very High (5)	Poor (5)	10	Poor

In order to evaluate the potential impacts to streams in the Ochoco Summit Project Area, the sensitivity to disturbance and the recovery potential were evaluated by stream type within the analysis subwatersheds (Table 65). Sensitivities to disturbance descriptive ratings from very low to extreme were quantified from one to six, respectively. Recovery potential descriptive ratings from excellent to very poor were quantified from one to six, respectively. These numerical scores were then added together based on the channel type to assess the overall sensitivity and recovery potential for each evaluated stream reach, which were then given a condition rating of poor for scores between 10 to 12, fair for scores between five and nine, and good for scores between two and four. This overall rating was then used to determine the potential of disturbance from the Ochoco Summit Project Alternatives to affect the stream channels in the vicinity of proposed trail locations, based on stream channel type.

Wetlands

Wetlands include wet meadows, springs, fens, and other wetlands that are dependent on groundwater. These systems not only provide essential habitat for wildlife, but also are the source of substantial portions of streamflow, particularly during baseflow conditions in the late summer and fall. Protection of wetlands maintains habitat and protects water quality.

INFISH interim guidance designates Riparian Habitat Conservation Area (RHCA) around a wetland greater than one acre of 150 feet and around a less than one acre wetland of 50 feet in non-priority watersheds. No watersheds within the Ochoco National Forest are designated as Priority Watersheds according to the INFISH designation.

In order to analyze the existing condition and the potential effects of the Ochoco Summit Proposed Action and the alternatives on wetlands, the existing road density and the proposed trail density were estimated within wetlands, wet meadows, and springs along with the appropriate RHCAs. For wetlands and wet meadows less than one acre and springs, a 50 foot RHCA was used. For wetlands or wet meadows greater than one acre in size, a 150 foot RHCA was used. These values were summarized by subwatershed and given a rating of low, moderate, or high. A road/trail density of less than six miles per square mile was considered low, between six and seven miles per square mile was considered moderate, and greater than seven miles per square mile was considered high. Departure from existing condition could then be evaluated.

Flow and Sediment Regimes

Roads have the potential to increase the drainage density of a stream network by intercepting runoff at stream crossings or by channelizing flow that would otherwise be sheet flow or groundwater flow (Wemple at al. 1996; Jones et al. 2000; Takken et al. 2008). By increasing the drainage density and providing a more direct route to stream channels, roads in effect can decrease the time it takes for the precipitation, in the form of runoff, to enter the stream channel and potentially resulting in increased peak flows (La March and Lettenmaier 2001; Storck et al. 1998; Woldie et al. 2009). In addition, since erosion risk from ATV trails has been shown to potentially equal that of a forest road network, it can be expected that trails have the potential to increase drainage densities and peak flows similar to forest roads (Meadows et al., 2008). Areas with high road densities, high drainage densities, and a high density of stream crossings typically result in higher connectivity of the road and stream network. The effects of roads (or trails) on increased peak flows is expected to be greatest downstream of areas with a high density of stream crossings (Jones et al., 2000).

In order to address potential effects of trail construction to the flow and sediment regimes within the Ochoco Summit project area, the existing condition of road densities, drainage densities, and intermittent and perennial stream crossing densities were estimated and rated relative to one another for each analysis subwatershed.

Road Density

Road densities were determined for the existing condition by estimating the total miles of Operational Maintenance Level 1-5 Roads within the analysis subwatershed and dividing this length my the total drainage area of the subwatershed in square miles. These values for road densities were then given a rating of low, moderate, or high. Low for the lowest third of road densities (<3.5 miles per square mile) for the analysis subwatersheds, moderate for the middle third (3.4-4 miles per square mile), and high for the highest third (> 4 miles per square mile). Closed roads (Level I) were included in the analysis, since road closures typically consist of installing a blockage of some sort at the road entrance to prevent use rather than stabilized hydrologically. Closed roads, therefore, can still contribute sediment to stream channels. For alternative analysis, trail lengths were added to road miles, to determine the overall road/trail densities. These values were then rated using the same values as for the road density existing condition. Departure from existing condition could then be evaluated.

Drainage Density

Drainage densities were determined for the existing condition by estimating the total miles of intermittent and perennial streams within the analysis subwatershed and dividing this length by the total drainage area of the subwatershed in square miles. These values for drainage densities were then given a rating of low, moderate, or high. Low for the lowest third of drainage densities (<2.2 miles per square mile) for the analysis subwatersheds, moderate for the middle third (2.2-2.5 miles per square mile), and high for the highest third (> 2.5 miles per square mile).

Stream Crossing Density

The potential effects of roads or trails delivering sediment to streams are most pronounced at stream crossings. In general, lower slope position roads (generally within RHCA) have much greater impact on stream channels and water quality than mid and upper slope position roads. However, where surface flows are continuous between roads and streams, as when ditches convey road runoff to stream channels, regardless of position on the slope, the runoff is considered hydrologically connected to the stream network (Furniss, et al. 2000). Where there is hydraulic connectivity, rapid runoff, sediments, and road associated channels generated, the road surface provides an efficient sediment route into the natural channel network. Stream crossings (mainly culverts) can cause a large amount of sediment to be mobilized when hydraulic capacity is exceeded, or when the culvert becomes plugged and the road fills are overtopped. When road fills are breached, sediment loading can greatly increase. Interception of interflow by cut slopes can generate substantial amounts of runoff converting subsurface flow into surface flows (Furniss, et al. 2000).

The existing condition relative to stream crossing density was determined by dividing the total number of intermittent and perennial stream crossings by the drainage area in square miles. Each of these factors was given a low, moderate, or high rating based on the number of crossings per subwatershed drainage area. Based on the overall ranges, subwatersheds with more than 3.5 crossings per square mile of drainage area were considered high, between 2.5 and 3.5 crossings per square mile were considered moderate, and less than 2.5 crossings per square miles were considered low. To analyze the Ochoco Summit project alternatives, the number of new trail stream crossings, in addition to the number of existing road/stream crossings per subwatershed drainage area, were assessed relative to the stream channel's existing condition, channel type, and flow-regime. Ratings for the alternative analysis were based on the same values as for existing condition. Departure from existing condition could then be evaluated.

Existing Condition

Watersheds

The Ochoco Summit Project Area includes all or portions of nine watersheds and 31 subwatersheds (see map 11) As discussed in the Analysis Design section of this report, watersheds and subwatersheds that do not contain streams that are within 300 feet of proposed trails were not analyzed as part of this analysis. Subwatersheds that were not analyzed are listed in the Analysis Design section. Nine subwatersheds were analyzed as part of this report, comprising all or portions of four watersheds: Lower Beaver Creek, Upper North Fork Crooked River, Deep Creek, and Upper Ochoco Creek. The ten subwatersheds intersected by the project area include North Fork Wolf Creek, Elliott Creek, Howard Creek, Peterson Creek, Porter Creek, Jackson Creek, Little Summit Prairie Creek, Lower Deep Creek, and Upper Marks Creek. Hydrologic Unit Codes (HUC), which break drainage systems into progressively smaller areas, and drainage names within the project area are listed in Table 69. Map 12 displays the project area RHCAs.

Table 69. Hydrologic Unit Codes for the Ochoco Summit project area.

Field	Area	Name	Hydrologic Unit Code
1st	Region	Pacific Northwest	17
2nd	Sub-region	Middle Columbia River	1707
3rd	River Basin	Deschutes River	170703
4th	Sub-basin	Beaver-South Fork	17070303
5th	Watershed	Lower Beaver Creek	1707030310
6th	Subwatershed	North Wolf Creek	170703031001
4th	Sub-basin	Upper Crooked River	17070304
5th	Watershed	Upper North Fork Crooked River	1707030403
6th	Subwatershed	Elliot Creek	170703040302
		Howard Creek	170703040303
		Peterson Creek	170703040306
		Porter Creek	170703040307
5th	Watershed	Deep Creek	1707030404
6th	Subwatershed	Jackson Creek	170703040401
		Little Summit Prairie Creek	170703040402
		Lower Deep Creek	170703040403
4th	Sub-basin	Lower Crooked River	17070305
5th	Watershed	Upper Ochoco Creek	1707030502
6th	Subwatershed	Upper Marks Creek	170703050203

Streams

Table 70 lists the named streams by watershed and subwatershed within the Ochoco Summit Project Area. The project area includes all streams in the Deep Creek watershed and only some of the streams in the other three watersheds. However, the Upper North Fork Crooked River watershed encompasses a majority of the named streams within the project area, followed by the Deep Creek Watershed, the Upper Ochoco Creek Watershed, and finally the Lower Beaver Creek Watershed. Proposed trail stream crossings are only across a select number of the streams within the project area (Table 70).

Streams within the Ochoco Summit Project Area have a dendritic drainage pattern with approximately 476 miles of mapped streams with defined channels (Class I – IV) within the analysis subwatersheds (Table 71). There are approximately 138 miles of fish bearing streams (Class I-II) within the analysis subwatersheds. Table 71 lists the lengths of streams by stream class within the project area summarized by watershed and subwatershed. Definitions of stream class are described in the fisheries report.

For the purposes of this analysis, only streams of class I, II, III, or IV streams are considered functional streams. Class V (or VIIII) streams are ephemeral draws that do not have established beds and banks and often are covered with vegetation. Ephemeral streams do not routinely transport sediment.

Table 70. List of streams in the Ochoco Summit project area by watershed and subwatershed.*

Watershed	Subwatershed	Streams			
Lower Beaver Creek	NORTH WOLF CREEK	**North Wolf Cr**		Widow Cr	
Upper North Fork Crooked River	ELLIOTT CREEK	**Crosswhite Cr**	**Elliot Cr**	**Fox Cr**	**Indian Cr**
		Shady Cr	**Stump Cr**	**West Fork Fox Cr**	
	HOWARD CREEK	East Fork Howard Cr		**Howard Cr**	Merritt Cr
		South Fork Howard Cr		West Fork Howard Cr	
	PETERSON CREEK	**Allen Cr**	**Beetle Cr**	**Peterson Cr**	Ross Cr
		Yellow Jacket Cr			
	PORTER CREEK	**Dry Porter Cr**	**East Porter Cr**		**Looney Cr**
		Porter Cr		Stupid Cr	
Deep Creek	JACKSON CREEK	**Cabbage Cr**	Deep Cr	**Derr Cr**	Dicer Cr
		Double Corral Cr		**Happy Camp Cr**	
		Haypress Cr	Hypress Cr	**Jackson Cr**	**Toggle Cr**
	LITTLE SUMMIT PRAIRIE CREEK	**Little Summit Cr**	Thornton Cr	West Fork Thornton Cr	
	LOWER DEEP CREEK	**Big Spring Cr**	**Buck Hollow**	**Crazy Cr**	**Deep Cr**
		East Fork Crazy Cr		**West Fork Crazy Cr**	
Upper Ochoco Creek	UPPER MARKS CREEK	Buck Cr	**Crystal Cr**	Deadman Cr	Marks Cr
		Long Hollow Cr		Nature Cr	**Rush Cr**
*Bolded streams have stream crossings proposed for at least one of the alternatives.					

Class I, fish-bearing streams within the Ochoco Summit Analysis subwatersheds include Allen Creek, Deep Creek, Elliot Creek, Fox Creek, Jackson Creek, Little Summit Creek, Marks Creek, the East Fork of Allen Creek, the North Fork Crooked River, Ochoco Creek, Peterson Creek and Toggle Creek. Approximately three quarters of fish-bearing streams in the analysis subwatersheds are located in Upper North Fork Crooked River and Deep Creek watersheds.

Table 71. Stream class miles by watershed and subwatershed.

Watershed	Subwatershed	Class I	Class II	Class III	Class IV	Total
Lower Beaver Creek	NORTH WOLF CREEK	-	6.9	5.9	27.2	40.0
Upper North Fork Crooked River	ELLIOTT CREEK	1.6	10.5	5.8	28.5	46.5
	HOWARD CREEK	-	10.7	11.3	11.2	33.3
	PETERSON CREEK	11.2	5.9	6.2	36.4	59.7
	PORTER CREEK	0.01	11.0	2.7	29.3	43.0
Deep Creek	JACKSON CREEK	6.4	17.9	4.7	39.3	68.3
	LITTLE SUMMIT PRAIRIE CREEK	4.3	8.1	3.3	37.8	53.5
	LOWER DEEP CREEK	7.9	6.1	11.7	20.5	46.3
Upper Ochoco Creek	UPPER MARKS CREEK	6.1	10.8	11.4	15.5	43.9
Total Stream Miles		37.6	88.0	63.0	245.8	434.4

The perennial streams equate to Forest Service Class I through Class III streams. Class I and II streams may; however, be intermittent if they are used by fish part of the year. Flow regime (i.e. perennial, intermittent, and ephemeral) characteristics for the subwatersheds in the project area are

summarized in Table 72. Overall, streams in the Ochoco Summit Project Area are dominated by intermittent streams. A majority of the perennial streams are located within the Upper North Fork Crooked River and the Deep Creek Watersheds, with approximately 46 miles and 47 miles of perennial streams within the analysis subwatersheds, respectively.

Table 72. Miles of perennial, intermittent, and ephemeral streams.

Watershed	Subwatershed	Perennial	Intermittent	Ephemeral	Total
Lower Beaver Creek	NORTH WOLF CREEK	3.2	36.8	-	40.0
Upper North Fork Crooked River	ELLIOTT CREEK	12.6	33.9	6.8	53.2
	HOWARD CREEK	7.7	24.6	5.1	37.5
	PETERSON CREEK	19.5	39.4	20.6	79.5
	PORTER CREEK	6.4	36.6	14.8	57.7
Deep Creek	JACKSON CREEK	28.6	39.7		68.3
	LITTLE SUMMIT PRAIRIE CREEK	5.3	48.1	-	53.5
	LOWER DEEP CREEK	13.3	32.9	-	46.3
Upper Ochoco Creek	UPPER MARKS CREEK	20.3	23.6	5.2	49.1
Total Stream Miles		117.0	315.7	52.5	485.1

Aquatic Species

Redband trout

Historically, redband trout may have occupied more aquatic habitat within the watershed project area than presently. Road densities, livestock grazing, timber harvest, and mining have contributed to a reduction in suitable habitat and increased fish passage barriers. Ochoco Dam and other non-passable irrigation diversions contribute to fragmentation of native redband trout populations. This further increases risk for localized extinctions and can limit the long-term sustainability of these native trout populations.

Redband trout typically inhabit cooler, well-oxygenated water that is less than 70°F, although they tolerate a wider range of water temperatures (from 32°F up to 80°F) better than many other salmonid species (Wydoski and Whitney 1979). Current research indicates that redband trout have developed phenotypic traits that allow them to tolerate marginal trout habitats in the high desert areas of Oregon (Rodnick et. al. 2004, Gamperl et. al. 2002). Despite various phenotypic traits, the preferred temperature for optimum metabolic performance in redband is 55.4°F (Gamperl et. Al. 2002) and the upper lethal temperature limits are 84.7-85.1°F, very similar to temperature profiles observed in most other *Oncorhynchus* species (Rodnick et. al., 2004).

Redband trout typically spawn between March and the end of June depending on water temperatures and timing of spring runoff. Egg deposition occurs in stream areas that have adequate water depth and velocity and appropriate sized gravels for redd construction. Water temperatures influence the number of days eggs incubate in the gravel before fry emergence. During the fry and parr life stages, redband trout are often observed along stream margins in slower waters. Adults are most often observed in pools near large wood or available cover. Food sources for young and adults include aquatic insects, amphipods, fish and eggs, and adults may also eat crustaceans when they are available (Wydoski and Whitney, 1979).

Columbia spotted frog

Historically the Columbia spotted frog was found at elevations ranging from near sea level to 7,370 feet. Their range extended from southeast Alaska through British Columbia, eastern Washington and Oregon to northeast California and eastward to western Montana and Wyoming, and northern Utah.

Columbia spotted frogs have been found throughout the Ochoco National and are present within the project area.

Columbia spotted frogs are highly aquatic, thus they are generally found in close proximity to water in riparian habitat. In winter months, the frogs burrow into mud in wet meadows or in streams. They breed in shallow water areas such as stream margins or pond edges, flooded meadows, or in pools of water formed by snow melt from early March through the end of May. Timing of breeding is dependent on snowmelt and rising water temperatures. After hatching, the larval stage (tadpole) remains in the water until metamorphosis into the adult form. Adults utilize both water habitat and nearby riparian areas for foraging and refuge needs.

Watershed and Subwatershed Descriptions

Lower Beaver Creek Watershed

Class III trails are proposed to be located in the headwaters portion of the Lower Beaver Creek watershed as part of the Ochoco Summit Project. Though the trail does intersect the very upper portions of the Wolf Creek Subwatershed along the ridge, only the North Wolf Creek Subwatershed encompasses streams that are within 300 feet, the sediment delivery zone, of proposed trails. Table 12 summarizes the existing condition within the North Wolf Creek Subwatershed based on identified potential hydrologic effects to the sediment, turbidity and the flow and sediment regimes in and near the streams within the project area.

Based on measured bank stability, slope erosion hazard, road densities near streams, channel sensitivity and recovery potential, and the density of roads in and near wetlands, the streams within the Lower Beaver Creek Watershed are identified as being in relatively fair condition for sediment and turbidity, with poor slope erosion hazard conditions and moderate road densities through the North Wolf Creek Subwatershed. The best conditions are found in the Widow Creek drainage. Based on overall road density, drainage density, and stream crossing density in North Wolf Creek and Widow Creek, the flow and sediment regime conditions are relatively poor to fair.

Table 73. Summary of existing condition in the Lower Beaver Creek Watershed.

Subwatershed	Sediment Loading (tons/year)	Water Quality (sediment/turbidity)	Flow/Sediment Regime
North Wolf Creek	215	Fair	Poor/Fair
* Status/Condition - All variables meeting standards = good; Some variables meeting standards = fair; Most or all variables not meeting standards = poor; No Data Collected (ND)			

North Wolf Creek Subwatershed

Three drainages flow out of the forest and leave the forest boundary within the North Wolf Creek Subwatershed. North Wolf Creek is the western-most drainage and is a perennial, fish-bearing stream with multiple intermittent tributaries. At the forest boundary, the no-name stream east of North Wolf Creek is an intermittent, fish-bearing stream and Widow Creek, the eastern-most drainage, is a perennial, non-fish-bearing stream.

North Wolf Creek is a perennial spring fed tributary of Wolf Creek. North Wolf Creek is approximately 11.5 miles in length and only the upper 6.3 miles flow within the Forest boundary. North Wolf Creek has been heavily utilized for its resources, i.e. livestock grazing, logging, camping, hunting, and fishing. Redband trout (both adult and fry) and Columbia spotted frogs have been observed. No ODFW fish survey data, including density estimates, is available for North Wolf Creek.

North Wolf Creek is a Class is II to river mile 4.8 from the US Forest boundary and Class IV for the last 1.5 miles of the headwaters on the mainstem. Table 74 below shows habitat survey reaches for streams in the North Wolf Creek Subwatershed, and overall condition rating for each habitat

parameter. Shaded boxes indicate that forest plan standards were not met or conditions were rated as "poor" at surveyed locations

Table 74. Habitat indicator condition rating by surveyed reach in the North Wolf Subwatershed.

Stream Name & Survey Type	Survey Reach & Year	Shade (FP Standard)	Water Temperature	Bank Stability (FP Standard)	Fine Sediment	Physical Barriers	Large Woody Debris	Pool Frequency	Pool Quality	Width/Depth Ratios
North Wolf (BLS)	1 – 1995	57 DNM	See Table 75 rating - Poor	87% MET		POOR	21 POOR	158 GOOD		
North Wolf (BLS)	2 - 1995	62 DNM		80% MET			42 POOR	137 GOOD		
North Wolf (BLS)	3 – 1995	62 DNM		83% MET			48 POOR	137 GOOD		
North Wolf (BLS)	4 - 1995	66 DNM		91% MET			48 POOR	11 GOOD		
North Wolf (Level II)	1 - 1991						14 POOR	30 POOR	0 POOR	
North Wolf (Level II)	1 - 2011			85% MET	31% POOR		6 POOR	32 POOR	1 FAIR	21 GOOD
North Wolf (Level II)	2 - 2011			79% DNM	14% FAIR		14 POOR	27 POOR	0 POOR	16 GOOD
North Wolf (Level II)	3 – 2011			29% DNM	42% POOR		2 POOR	17 POOR	0 POOR	16 POOR
North Wolf (Level II)	4 – 1995									
East Fork North Wolf (Level II)	1 – 2013			93% MET	28% POOR		16 POOR	32 POOR	0 POOR	42 POOR
East Fork North Wolf (Level II)	2 – 2013			68% DNM	46% POOR		15 POOR	7 POOR	1 FAIR	15 POOR

Table 75. Stream temperature rating by location and year in the North Wolf Subwatershed.

Site Name	Start Date	Stop Date	7-Day Average Maximum Temperature				Condition Rating
			#7-Day Averages Calculated	# <13.8°C	# 13.8°C – 17.8°C	# > 17.8 °C	
North Wolf Creek, at Forest Boundary	6/27/1995	9/23/1995	83	0	1	82	Poor
	5/07/1997	9/01/1997	77	0	15	62	Poor
	5/29/1998	9/24/1998	113	2	23	88	Poor
	6/15/1999	9/11/1999	83	0	9	74	Poor
	6/13/2002	10/20/2002	124	21	12	91	Poor
	7/10/2003	9/16/2003	63	0	4	59	Poor
	6/03/2005	9/06/2005	90	0	7	83	Poor

Generally, aquatic habitat in the North Wolf Creek watershed at surveyed locations is rated as being in poor condition. This is especially true for shade (did not meet forest plan standards at any site), large woody debris, temperature, fine sediment, physical barriers and pool quality, where almost all ratings at each surveyed location rated poor. Bank stability, pool frequency and width/depth ratios varied by surveyed reach. In general, bank stability in North Wolf Creek is meeting forest plan standards of at least 80% and is slightly better in East Fork North Wolf Creek. Recent Level II surveys show pool frequency is poor in North Wolf Creek. Width to depth ratios were good in the lower reaches of North Wolf Creek, but were poor in the upper reaches and in East Fork North Wolf

Creek. In general, habitat is not functioning at or near its potential in the North Wolf watershed at surveyed locations.

Table 76 summarizes the existing condition of streams for the two hydrologic issues identified for analysis within the North Wolf Creek Subwatershed. Based on stream surveys and existing Forest Service data layers, the North Wolf Creek Subwatershed was found to have poor slope erosion hazard conditions and moderate road density conditions within 300 feet of perennial and intermittent streams. In addition, this subwatershed was found to have moderate stream crossing densities, moderate road densities within wetlands and the associated RHCA, and moderate overall road densities. The overall drainage density is relatively high, which increases the potential for impact from roads and trails. North Wolf Creek was found to have very high channel sensitivity and good recovery potential. Widow Creek was found to have moderate channel sensitivity and excellent recovery potential.

Table 76. Summary of stream condition and impairments in North Wolf Creek Subwatershed.

Stream	Flow/Sediment Regime						
	Slope Erosion Hazard	Road Density w/in 300' of Streams	Channel Sensitivity/ Recovery Potential	Wetland	Road Density	Drainage Density	Stream Crossing Density
North Wolf	High	Moderate	Fair	Moderate	Moderate	High	Moderate
Widow			Good				
Overall	Poor	Fair	Fair/Good	Fair	Fair	Poor	Fair

Upper North Fork Crooked River Watershed

Trails are proposed across the northern portion of the Upper North Fork Crooked River Watershed as part of the Ochoco Summit Project. These proposed trail locations intersect portions of the Elliott Creek, Howard Creek, Peterson Creek, and Porter Creek Subwatersheds. Table 77 summarizes the existing condition within the Upper North Fork Crooked River watershed based on identified potential hydrologic effects to the sediment, turbidity and the flow and sediment regimes in and near the streams within the project area.

Populations of redband trout and Columbia spotted frogs are known to inhabit Allen, East Fork Allen, Peterson and Elliot Creeks (ODFW).

Based on measured bank stability, slope erosion hazard, road densities near streams, channel sensitivity and recovery potential, and the density of roads in and near wetlands, the streams within the Upper North Fork Crooked River Watershed are identified as being in relatively fair condition for sediment and turbidity. The best conditions relative to sediment and turbidity issues exist in the Peterson Creek Subwatershed with low road density conditions near streams and wetlands. Based on overall road density, drainage density, and stream crossing density in the Upper North Fork Crooked River Watershed, the flow and sediment regime conditions are relatively poor, with Elliot and Peterson Creek Subwatersheds having the best conditions within the watershed.

Table 77. Summary of existing condition in the Upper North Fork Crooked River Watershed.

Subwatershed	Sediment Loading (tons/year)	Sediment/Turbidity	Flow/Sediment Regime
Elliot Creek	432	Fair	Fair
Howard Creek	420	Fair	Poor
Peterson Creek	1080	Good	Fair
Porter Creek	583	Fair	Poor
Overall/Total	2515	Fair	Poor/Fair
* Status/Condition - All variables meeting standards = good; Some variables meeting standards = fair;			

Most or all variables not meeting standards = poor; No Data Collected (ND)

Elliot Creek Subwatershed

Elliott Creek Subwatershed drains into the north end of Big Summit Prairie (private property) and includes Crosswhite Creek, Elliott Creek, Fox Creek, Indian Creek, Shady Creek, Stump Creek, West Fork of Fox Creek, and other unnamed stream channels. Perennial fish-bearing streams include Indian Creek, Fox Creek, and Elliott Creek. Crosswhite Creek, Stump Creek, and multiple unnamed streams are intermittent streams where they cross the forest boundary into Big Summit Prairie. Redband trout are present in Elliott Creek and several of its tributaries, but no ODFW fish survey data, including fish densities, are available for the watershed.

Field observations by the fisheries biologist and hydrologist (8/10/10) indicate from walking approximately 1 mile of the stream north to south (to FR 22), (equivalent to reach 2 in the 1996 Bottom Line Survey) that the stream is a perennial Class II stream with 1 or less cfs for flow, has fish presence, and is a spring dominated system. Streambanks were impacted by grazing with postholing, hedged alder, and removal of riparian vegetation. The cut streambanks appear to be sheered by livestock recognized by their hoof prints. The stream is downcut from loss of vegetation. There is evidence of substantially more flow during spring runoff or high rain events including well developed pools and areas where overflow channels were accessed. Sediment deposition on the substrate indicates continuous sediment inputs from cut streambanks.

Table 78below shows habitat survey reaches for streams in the Elliott Creek Subwatersheds, and overall condition rating for each habitat parameter. Shaded boxes indicate that forest plan standards were not met or conditions were rated as “poor” at surveyed locations.

Table 78. Habitat indicator condition rating by surveyed reach in the Elliott Creek Subwatershed

Stream Name & Survey Type	Survey Reach & Year	Shade (FP Standard)	Water Temperature	Bank Stability (FP Standard)	Fine Sediment	Physical Barriers	Large Woody Debris	Pool Frequency	Pool Quality	Width/Depth Ratios
Elliott Creek (BLS)	1 – 1996	51% DNM	See Table 79 Rating - Poor	95% MET		POOR	58 POOR	47 POOR		
	2 – 1996	68% DNM		97% MET			26 POOR	53 POOR		
Elliott Creek (PIBO)	1 – 2003			98% MET				0 Poor		
	1 – 2008			100% MET				85 Poor		43 POOR
Fox Creek (LII)	2 – 2002			92% MET	16% FAIR		16 POOR	39 POOR	0 POOR	
	3 – 2002			87% MET	27% POOR		21 POOR	28 POOR	0 POOR	
	4 – 2002			85% MET	17% FAIR		25 POOR	27 POOR	0 POOR	
Fox Creek (BLS)	1 – 1994	57% DNM		97% MET			21 POOR	153 GOOD		
	2 – 1994	62% DNM		96% MET			63 POOR	116 GOOD		
	3 – 1994	57% DNM		97% MET			21 POOR	111 GOOD		
West Fork Fox (BLS)	1 - 1994	73% DNM		98% MET			16 POOR	26 POOR		
	2 – 1994	62% DNM		99% MET			69 GOOD	63 POOR		
Stump Creek (BLS)	1 – 1994	59% DNM		99% MET			21 POOR	26 POOR		

	2 – 1994	42% DNM		98% MET			53 POOR	37 POOR		
West Fork Stump Creek (BLS)	1 – 1994	53% DNM		99% MET			16 POOR			
Trib. 2 Stump Creek (BLS)	1 – 1994	45% DNM		99% MET			11 POOR			
Trib. 3 Stump Creek (BLS)	1 - 1994	41% DNM		100% MET			16 POOR			
Trib. 4 Stump Creek (BLS)	1 – 1994	25% DNM		99% MET			6 POOR			
Indian Creek (BLS)	1 – 1996	30% DNM		99% MET			0 POOR	85 POOR		
	2 – 1996	75% DNM		98% MET			26 POOR	69 POOR		
	3 – 1996	66% DNM		96% MET			58 POOR	85 POOR		
	4 – 1996	62% DNM		99% MET			26 POOR	53 POOR		
Indian Creek Trib. 1 (BLS)	1 – 1996	26% DNM		100% MET			5 POOR	3 POOR		
Indian Creek Trib. 2 (BLS)	2 – 1996	41% DNM		98% MET			26 POOR	5 POOR		

Table 79. Stream temperature rating by location and year in the Elliott Creek Subwatershed.

Site Name	Start Date	Stop Date	7-Day Average Maximum Temperature				Condition Rating
			#7-Day Averages Calculated	# <13.8°C	# 13.8°C – 17.8°C	# > 17.8 °C	
Elliott Creek, at Forest Bndry	6/19/1999	10/15/1999	113	17	13	93	Poor
Fox Creek, at Forest Bndry	8/10/1994	10/18/1994	63	13	10	40	Poor
	5/24/1995	9/15/1995	100	13	22	65	Poor
	6/19/1999	9/21/1999	90	0	32	58	Poor
	6/09/2000	11/01/2000	141	39	25	77	Poor
	6/05/2001	10/28/2001	140	31	39	70	Poor
Indian Creek, at Forest Bdry	6/08/1994	10/17/1994	121	18	57	45	Fair
	5/24/1995	9/05/1995	99	13	27	59	Poor
	6/13/1996	10/09/1996	113	1	32	80	Poor
	6/19/1999	9/21/1999	89	0	51	38	Fair
	6/07/2000	11/01/2000	142	21	45	76	Poor
	6/05/2001	10/28/2001	140	31	39	70	Poor

Generally, aquatic habitat in the Elliott Creek watershed at surveyed locations is rated as being in poor condition. This is especially true for shade (did not meet forest plan standards at any site), large woody debris, temperature, physical barriers, pool frequency and pool quality, where almost all ratings at each surveyed location rated poor. Bank stability met forest plan standards at every BLS survey reach, and fine sediment was rated as fair at two survey locations. At the PIBO sites, it should be noted that there was a general upward trend in bank stability and pool frequency between 2003 and 2008, which could indicate improving aquatic habitat condition trend in Elliott Creek. In general, habitat is not functioning at or near its potential in the Elliott Creek watershed at surveyed locations.

Table 80 summarizes the existing condition of streams for the two hydrologic issues identified for analysis within the Elliott Creek Subwatershed. Based on stream surveys and existing Forest Service data layers, the Elliott Creek Subwatershed was found to have poor slope erosion hazard conditions and low road density conditions within 300 feet of perennial and intermittent streams. In addition, this subwatershed was found to have low road densities within wetland RHCAs. Fox Creek was

found to have extreme channel sensitivity and poor recovery potential based on the channel type at the proposed stream crossing location. Based on the dominant channel type throughout the entire stream network, however, Fox Creek overall has a moderate channel sensitivity and an excellent recovery potential. With respect to flow and sediment regime, overall road density existing conditions are good and drainage densities are relatively high, which equates to a poor condition relative to roads and the stream crossing density existing condition is relatively fair.

Table 80. Summary of stream condition and impairments in Elliott Creek Subwatershed.

Stream	Sediment/Turbidity					Flow/Sediment Regime		
	Bank Stability	Slope Erosion Hazard	Road Density w/in 300' of Streams	Channel Sensitivity/ Recovery Potential	Wetland	Road Density	Drainage Density	Stream Crossing Density
Fox	Good	High	Low	Poor	Low	Low	High	Moderate
Overall	**Good**	**Poor**	**Good**	**Poor**	**Good**	**Good**	**Poor**	**Fair**

Howard Creek Subwatershed

Howard Creek Subwatershed drains into the northwest corner of Big Summit Prairie and includes East Fork Howard Creek, Howard Creek, Merritt Creek, South Fork Howard Creek, West Fork Howard Creek, and other unnamed stream channels. The contributing area to Howard Creek is situated between Round Mountain to the southwest, Ochoco Butte to the north and west, and Mount Pisgah to the north and east. The subwatershed drains into Big Summit Prairie from the northwest. The east and west forks of Howard Creek join together to form the main stem of Howard Creek, which is a major contributor to flow in the North Fork Crooked River. Greater than 90% of Howard Creeks' drainage area is located above the transient snow zone. Perennial fish-bearing streams include Howard Creek and East Fork Howard Creek. South Fork Howard Creek and West Fork Howard Creek are intermittent fish-bearing streams. Merritt Creek and multiple unnamed tributaries to Howard Creek are intermittent, non-fish-bearing streams.

All age classes of redband trout were represented in 1994 and 2001 electrofishing surveys (USDA 1994, 2001). The 1978 physical and biological survey (Frey et al. 1978) suggested similar distribution. Columbia spotted frogs have also been observed in Howard Creek in 2001. ODFW fish density data is available for Howard Creek. Figure 4 and Figure 5 below shows population estimates for redband trout in lower and upper Howard Creek, respectively.

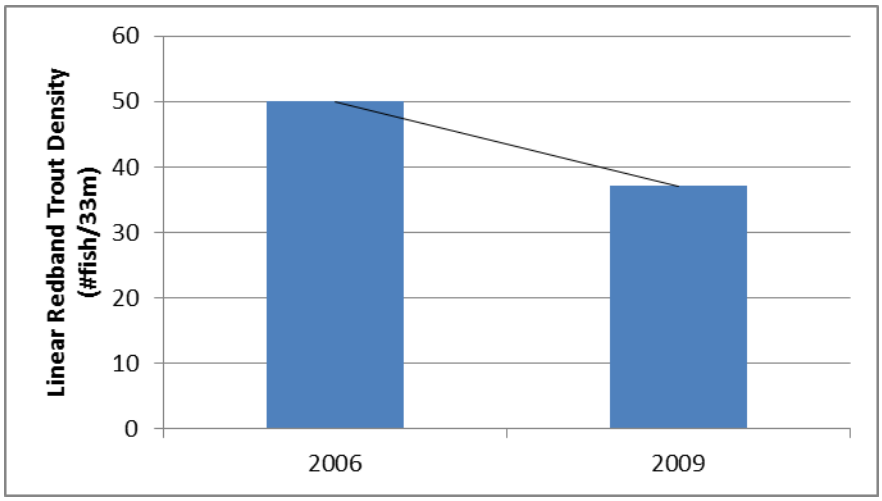


Figure 4. Linear fish densities (fish/33m) for Lower Howard Creek, 2006 and 2009 (ODFW 2014). Trendline for data is included.

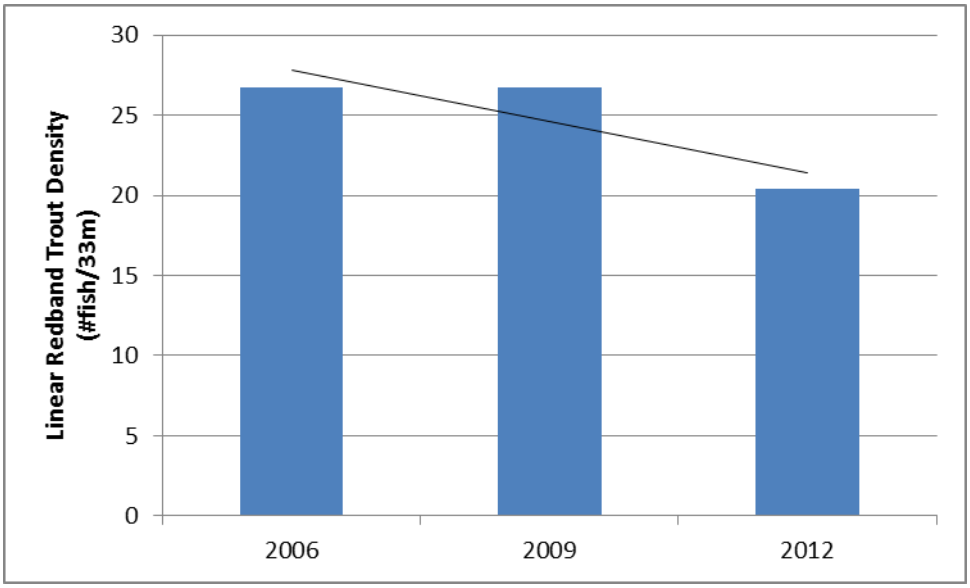


Figure 5. Linear fish densities (fish/33m) for Upper Howard Creek, 2006, 2009 and 2012 (ODFW 2014). Trendline for data is included.

ODFW data for Howard Creek shows linear fish densities between 20 and 30 fish/33 meters in the upper watershed to between 30 and 50 fish/33 meters in the lower part of the watershed. In general, trendlines show a decrease in fish densities in both the upper and lower sections surveyed. However, this cannot be taken as an indicator of overall declining populations of fish in Howard Creek, because population fluctuations can be due to a number of factors that influence fish presence in a particular area including water temperatures and water levels that are dependent on the type of climate conditions experienced during the year. Two to three data points are not adequate enough to determine overall trend in the population in Howard Creek.

Table 81 below shows habitat survey reaches for streams in the Howard Creek Subwatershed, and overall condition rating for each habitat parameter. Shaded boxes indicate that forest plan standards were not met or conditions were rated as "poor" at surveyed locations.

Table 81. Habitat indicator condition rating by surveyed reach in the Howard Creek Subwatershed.

Stream Name & Survey Type	Survey Reach & Year	Shade (FP Standard)	Water Temperature	Bank Stability (FP Standard)	Fine Sediment	Physical Barriers	Large Woody Debris	Pool Frequency	Pool Quality	Width/Depth Ratios
Howard Creek (LII)	1 – 1991		See Table 82 Rating - poor			POOR	33 Poor			
	2 – 1991						85 Good			
	3 – 1991						84 Good			
Howard Creek (BLS)	1 – 1994	65 DNM		98% MET			74 Good	85 POOR		
	1 – 2001	55		88%			18	65		

		DNM		MET			POOR	Poor		
	2 – 2001	60 DNM		95% met			69 good	72 poor		
	3 – 2001	63 dnm		97% met			25 poor	89 poor		
East Fork Howard Creek (LII)	1 – 1991						60 Poor			
	2 - 1991						389 G00D			
	3 - 1991						69 GOOD			
	4 – 1991						627 GOOD			
East Fork Howard Creek (BLS)	1 – 1994	42% DNM		98% MET			99 GOOD	130 GOOD		
	2 – 1994	43% DNM		99% MET			134 GOOD	83 POOR		
	3 – 1994	44% DNM		95% MET			32 POOR	73 POOR		
East Fork Howard Creek Tributary (BLS)	1 – 1992	44% DNM		99% MET			35 POOR			
West Fork Howard Creek (BLS)	1 – 1992	65% DNM		95% MET			33 POOR			
	1 – 1994	75% DNM		99% MET			79 GOOD	132 GOOD		
	1 – 1996	86% MET		99% MET			85 GOOD	121 GOOD		
	2 – 1994	35 DNM		99% MET			21 POOR	63 POOR		
	2 – 1996	48% DNM		99% MET			26 POOR	58 POOR		
West Fork Howard Creek Tributary (BLS)	1 – 1992	72% DNM		99% MET			62 POOR			

Table 82. Stream temperature rating by location and year in the Howard Creek Subwatershed.

Site Name	Start Date	Stop Date	7-Day Average Maximum Temperature				Condition Rating
			#7-Day Averages Calculated	# <13.8°C	# 13.8°C – 17.8°C	# > 17.8 °C	
Howard Creek, at Forest Boundary	6/08/1994	10/18/1994	121	46	33	42	Poor
	5/24/1995	9/05/1995	99	19	49	31	Fair
	6/13/1996	10/09/1996	113	29	24	60	Poor
	5/31/1997	9/26/1997	113	19	50	44	Fair
	6/19/1999	10/13/1999	111	31	43	37	Fair
	6/07/2000	11/09/2000	150	59	29	91	Poor
	6/05/2001	10/28/2001	140	39	48	53	Poor
Howard Creek, upstream of confluence with S FK Howard Creek	5/31/1997	9/26/1997	113	33	44	36	Fair
East Fork Howard Creek,	6/08/1994	10/18/1994	122	48	44	30	Fair

upstream of confluence with W Fk Howard Creek							
East Fork Howard Creek, at 2200-200 road/stream crossing	6/11/1994	8/24/1994	69	4	24	41	Poor
West Fork Howard Creek, at confluence with E Fk Howard Creek	6/08/1994	10/18/1994	122	99	23	0	Good
	5/31/1997	9/26/1997	113	93	20	0	Good

Generally, aquatic habitat in the Howard Creek Subwatershed at surveyed locations is rated as being in fair condition. Bank stability met forest plan standards at all surveyed locations, and large woody debris was considered in "good" condition at over half of the surveyed locations. Shade did not meet forest plan standards at any of the surveyed locations and is clearly increasing temperatures in mainstem Howard Creek and its tributaries. West Fork Howard Creek was the exception, where temperatures were considered "good" for redband trout. Pools are overall limited in the Howard Creek Subwatershed, but a few locations did meet "good" condition parameters. When looking at trends for BLS data collected in Howard Creek and West Fork Howard Creek, the general trend for mainstem Howard Creek between 1994 and 2001 was a downward trend in all habitat parameters, and an upward trend for West Fork Howard Creek from 1992-1996. Caution should be used, however, when discussing trends because this is only one survey location on the entire reach of stream. In general, pools and shade are not properly functioning in the Howard Creek Subwatershed, but large wood and shade are meeting or nearly meeting their potential. Temperatures are considered mostly poor in the Howard Creek Subwatershed with the exception of West Fork Howard Creek, where temperatures are considered good.

Table 83 summarizes the existing condition of streams for the two hydrologic issues identified for analysis within the Howard Creek Subwatershed. Based on stream surveys and existing Forest Service data layers, the Howard Creek Subwatershed was found to have fair slope erosion hazard conditions and high road density conditions within 300 feet of perennial and intermittent streams. In addition, this subwatershed was found to have fair road densities within wetlands and the associated RHCAs. East Fork Howard Creek, Howard Creek, South Fork Howard Creek, and West Fork Howard Creek were all found to have good bank stability through the surveyed portion of stream. With the exception of East Fork Howard Creek, the streams within the Howard Creek Subwatershed have good overall channel sensitivity/recovery potential conditions. Based on the channel type derived from stream survey field measurements, East Fork Howard Creek is expected to have very high channel sensitivity to disturbance and a good recovery potential. In addition, this subwatershed was found to have poor stream crossing density, poor road density, and fair drainage density.

Table 83. Summary of stream condition and impairments in Howard Creek Subwatershed.

Stream	Sediment/Turbidity				Flow/Sediment Regime		
	Slope Erosion Hazard	Road Density w/in 300' of Streams	Channel Sensitivity/ Recovery Potential	Wetland	Road Density	Drainage Density	Stream Crossing Density
East Fork Howard	Moderate	High	Fair	Moderate	High	Moderate	High
Howard			Good				
South Fork Howard			Good				

West Fork Howard			Good				
Overall	Fair	Poor	Fair/Good	Fair	Poor	Fair	Poor

Peterson Creek Subwatershed

Peterson Creek Subwatershed drains into the northeast corner of Big Summit Prairie and includes Allen Creek, Beetle Creek, Peterson Creek, East Fork Allen Creek, Ross Creek, Yellow Jacket Cr, and other unnamed stream channels. Peterson Creek is a Class I perennial tributary which originates from Peterson Spring and flows south-westerly approximately 10 miles to the Forest boundary near Peterson Creek Reservoir. The final 3.0 miles flow through private properties on Big Summit Prairie to the confluence with the North Fork of the Crooked River. In addition to Peterson Spring, Peterson Creek gains substantial flow from several spring-fed tributaries: McCarthy Spring which contributes 15% flow, Zane Spring tributary which contributes 60% flow. Water influx from seepage also adds substantial flow to the stream and assists in temperature regulations. Perennial fish-bearing streams include Allen Creek, East Fork Allen Creek, Beetle Creek, and Peterson Creek. Ross Creek is a perennial non-fish-bearing stream. Yellow Jacket Creek and multiple unnamed tributaries to Peterson Creek are intermittent, non-fish-bearing streams.

ODFW fish density data is available for Allen Creek. Figure 6 and Figure 7 below show population estimates for redband trout in lower and upper Allen Creek, respectively.

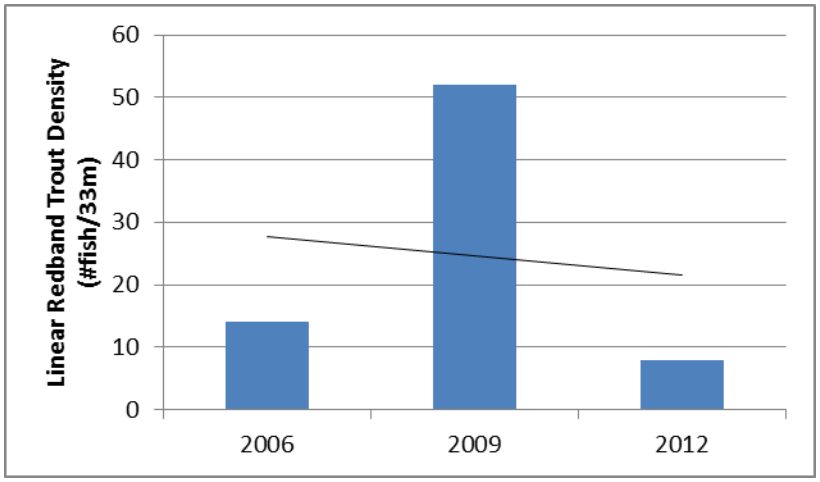


Figure 6. Linear fish densities (fish/33m) for Lower Allen Creek, 2006, 2009 and 2012 (ODFW 2014). Trendline for data is included.

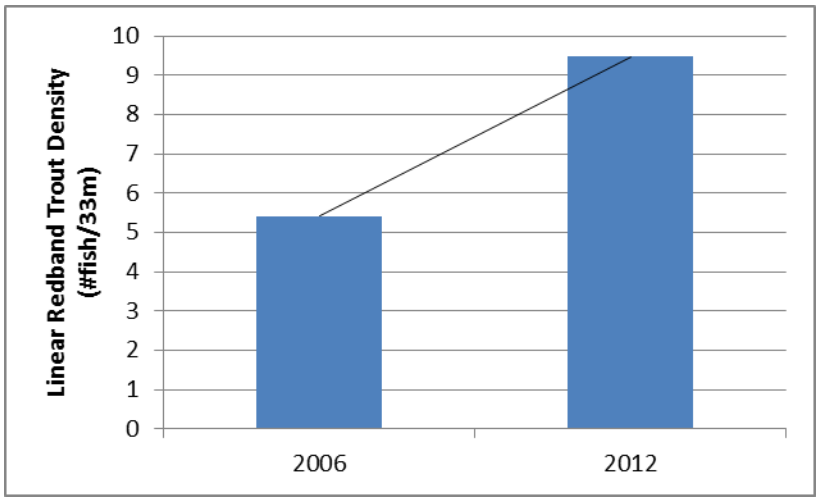


Figure 7. Linear fish densities (fish/33m) for Upper Allen Creek, 2006 and 2012(ODFW 2014). Trendline for data is included.

ODFW data for Allen Creek shows linear fish densities between 5 and 10 fish/33 meters in the upper watershed to between 8 and 55 fish/33 meters in the lower part of the watershed. In general, trendlines show a decrease in fish densities in both the lower sections surveyed and an increase in the upper section surveyed. However, this cannot be taken as an indicator of overall declining or increasing populations of fish in Allen Creek because population fluctuations can be due to a number of factors that influence fish presence in a particular area including water temperatures and water levels that are dependent on the type of climate conditions experienced during the year. There could also be movement or changes in fish densities in Allen Creek due to the Maxwell Fire in 2006. Two to three data points are not adequate enough to determine overall trend in the population in Allen Creek. However, based on habitat parameters being rated as mostly poor in the subwatershed, it is possible there is a correlation between declining fish densities and habitat conditions.

Table 84 below shows habitat survey reaches for streams in the Peterson Creek Subwatershed (including Allen Creek), and overall condition rating for each habitat parameter. Shaded boxes indicate that forest plan standards were not met or conditions were rated as "poor" at surveyed locations.

Table 84. Habitat indicator condition rating by surveyed reach in the Peterson Creek Subwatershed.

Stream Name & Survey Type	Survey Reach & Year	Shade (FP Standard)	Water Temperature	Bank Stability (FP Standard)	Fine Sediment	Physical Barriers	Large Woody Debris	Pool Frequency	Pool Quality	Width/Depth Ratios
Allen Creek – LII	1 – 2002		SEE TABLE 24 BELOW Rating = POOR	85% MET		POOR	18 POOR	83 POOR	0 POOR	7 GOOD
	2 – 2002			84% MET	15% FAIR		19 POOR	83 POOR	0 POOR	7 GOOD
	3 - 2002			75% DNM	23% POOR		54 POOR	103 GOOD	1 Fair	7 GOOD
	4 – 2002			79% DNM	26% POOR		48 POOR	56 POOR	0 POOR	6 GOOD
	5 – 2002			86% MET	24% POOR		49 POOR	48 POOR	0 POOR	6 GOOD
	1 – 1994	67% DNM		97% MET			42 POOR	143 GOOD		

Allen Creek – BLS	2 – 1994	70% DNM		95% MET			79 POOR	121 GOOD		
	3 – 1994	81% MET		97% MET			110 GOOD	142 GOOD		
	4 – 1994	50% DNM		98% MET			37 POOR	5 POOR		
East Fork Allen Creek – LII	1 – 2001			94% MET			39 POOR	61 POOR	0 POOR	9 good
	2 – 2001			97% MET			44 POOR	73 POOR	0 POOR	7 GOOD
	3 – 2001			100% MET			31 POOR	57 POOR	0 POOR	7 GOOD
Peterson Creek – LII	1 – 1992						16 POOR	33 POOR	0 POOR	7 GOOD
	1 – 2006			93% MET	19% FAIR		22 POOR	100 GOOD	1 Fair	7 GOOD
	2 – 1992						65 POOR	12 POOR	0 POOR	8 GOOD
	2 – 2007			89% MET	41% POOR		43 POOR	38 POOR	0 POOR	7 GOOD
	3 – 1992						14 POOR	7 POOR	0 POOR	7 GOOD
	3 – 2007			88% MET	42% POOR		32 POOR	34 POOR	0 POOR	6 GOOD
	4 - 2007			94% MET	13% FAIR		25 POOR	29 POOR	0 POOR	7 GOOD
	5 – 2007			86% MET	45% POOR		22 POOR	63 POOR	0 POOR	8 GOOD
	6 – 2007			67% DNM	0% GOOD		6 POOR	27 POOR	0 POOR	5 GOOD
Peterson Creek – PIBO	1 – 2006			97% MET	2% GOOD		180 GOOD	152 GOOD		28 GOOD
Peterson Creek – BLS	1 – 1994	32% DNM		94% MET			32 POOR	95 FAIR		11 GOOD
	1 – 2003	67% DNM		82% MET			13 POOR	70 POOR		12 GOOD
	2 – 1994	42% DNM		97% MET			85 POOR	95 FAIR		10 GOOD
	2 – 2003	70% DNM		91% MET			0 POOR	57 POOR		10 GOOD
	3 – 1994	29% DNM		98% MET			63 POOR	74 POOR		
	4 – 1994	43 DNM		95% MET			53 POOR	74 POOR		
	5 – 1994	38 DNM		91% MET			26 POOR	95 FAIR		
	6 – 1994	21 DNM		90% MET			5 POOR	10 POOR		

Table 85. Stream temperature rating by location and year in the Peterson Creek Subwatershed.

Site Name	Start Date	Stop Date	7-Day Average Maximum Temperature				Condition Rating
			#7-Day Averages Calculated	# <13.8°C	# 13.8°C – 17.8°C	# > 17.8 °C	
Allen Creek, near Forest Boundary	6/17/1994	8/31/1994	75	9	32	34	Poor
	5/24/1995	9/05/1995	99	32	54	13	Fair
	6/14/1996	10/09/1996	112	41	49	22	Fair
	6/19/1999	9/26/1999	94	39	50	5	Fair
	6/09/2000	11/04/2000	143	65	59	19	Fair
	7/10/2013	11/01/2013	109	43	47	19	Fair
	8/05/2006	10/10/2006	61	30	31	0	Fair

Allen Creek, at Road 2200-552 crossing	8/01/2007	10/09/2007	64	30	34	0	Fair
	7/04/2008	10/07/2008	90	38	45	7	Fair
East Fork Allen Creek, at confluence with Allen Creek	8/09/2006	10/10/2006	57	57	0	0	Good
	8/01/2007	10/09/2007	65	43	22	0	Fair
	7/04/2008	10/07/2008	90	45	45	0	Fair
Peterson Creek, at Forest Boundary	6/07/1994	10/17/1994	122	37	20	65	Poor
	5/24/1995	9/05/1995	99	4	22	73	Poor
	6/18/1996	10/19/1996	108	20	20	68	Poor
	6/19/2001	10/02/2001	100	6	20	74	Poor
Peterson Creek, at Road 3010-080 crossing	6/09/1994	10/17/1994	115	15	36	64	Poor
	5/22/1995	9/04/1995	100	14	20	66	Poor
	6/18/1996	10/10/1996	109	17	24	68	Poor
Peterson Creek, at end of Road 3010-050	6/09/1994	10/17/1994	115	15	38	62	Poor
	6/18/1996	10/09/1996	108	22	22	64	Poor

Generally, aquatic habitat in the Peterson Creek Subwatershed at surveyed locations is rated as being in poor condition. This is especially true for shade, large woody debris, pool frequency and pool quality. Bank stability met forest plan standards at all but three surveyed locations, and fine sediment was considered "good" at almost half of the surveyed locations. Shade did not meet forest plan standards at all but one of the surveyed locations and is clearly increasing temperatures in Peterson and Allen Creeks. Allen Creek tended to have better stream temperatures than Peterson Creek. When looking at trends for BLS data collected in Peterson Creek, the general trend shows the number of large woody debris appears to have significantly increased between 1994 and 2003 in reach 1 of Peterson Creek and significantly decreased in reach 2. The increase in wood in the lower reach most likely came from restoration project in 1995. Conifer shade has also significantly decreased from 1994 to 2003, while hardwood shade has significantly increased. Even though conifer shade was reduced from 1994 to 2003, there was a net increase in shade from hardwood growth. The other parameters did not change significantly between 1994 and 2003. Caution should be used, however, when discussing trends because this is only one survey location on the entire reach of stream. Professional judgment of conditions seen in streams in the area is that these trends are likely seen throughout the subwatershed. In general, pools, large woody debris and shade are not properly functioning in the Peterson Creek Subwatershed, but width to depth ratios and bank stability are meeting or nearly meeting their potential. Temperatures are considered mostly poor in the Peterson Creek and fair in Allen Creek.

Table 86 summarizes the existing condition of streams for the two hydrologic issues identified for analysis within the Peterson Creek Subwatershed. Based on stream surveys and existing Forest Service data layers, the Peterson Creek Subwatershed was found to have fair slope erosion hazard conditions and low road density conditions within 300 feet of perennial and intermittent streams. In addition, this subwatershed was found to have good road densities within wetlands and associated RHCAs. Based on the channel type derived from stream survey field measurements, all three streams are expected to have very high channel sensitivity to disturbance and a good recovery potential. In addition, this subwatershed has fair stream crossing density, good road density, and poor drainage density existing conditions.

In 2006, a wildfire called the Maxwell Fire affected approximately 2,317 acres in Allen Creek, East Fork Allen Creek, and Elliot Creek drainages. Potential sedimentation in stream reaches within and below moderate to high severity burn areas were identified as values at risk within Allen Creek, East Fork Allen Creek, and Elliot Creek (BAER 2006). Erosion during snow melt runoff during the spring of 2007 added to the loss of filtering vegetation from the wildfire in RHCAs along Allen Creek, East

Fork Allen Creek, and Elliot Creek. Roads were closed and culverts were pulled to reduce erosion and sediment delivery to streams. Specifically, culverts were removed and outlsoped drainage dips were installed on FR2200-500, FR2200-550, and FR2200-505 (BAER 2006).

Table 86. Summary of stream condition and impairments in Peterson Creek Subwatershed.

Stream	Sediment/Turbidity				Flow/Sediment Regime		
	Slope Erosion Hazard	Road Density w/in 300' of Streams	Channel Sensitivity/ Recovery Potential	Wetland	Road Density	Drainage Density	Stream Crossing Density
East Fork Allen	Moderate	Low	Fair	Low	Low	High	Moderate
Allen			Fair				
Peterson			Fair				
Overall	**Fair**	**Good**	**Fair**	**Good**	**Good**	**Poor**	**Fair**

Porter Creek Subwatershed

Porter Creek Subwatershed flows into the Lower Big Summit Prairie Subwatershed, which drains into the east side of Big Summit Prairie and includes Dry Porter Creek, East Porter Creek, Looney Creek, Porter Creek, Stupid Creek, and other unnamed stream channels. Porter Creek is a Class II stream and a major tributary of the North Fork Crooked River. Perennial fish-bearing streams include portions of Porter Creek and East Porter Creek. There are no perennial non-fish-bearing streams in the Porter Creek Subwatershed. Looney Creek is an intermittent fish-bearing stream. Stupid Creek, Dry Porter Creek, and multiple unnamed tributaries to Porter Creek are intermittent, non-fish-bearing streams.

Both redband trout and dace were observed in Porter Creek during surveys in 2006 and 2007. Sizes ranged from 1" up to 12" in length. Fish were detected in all three reaches surveyed. Columbia spotted frogs and garter snakes were also observed. No ODFW fish survey data, including fish densities, are available for Porter Creek or tributaries.

Table 87 below shows habitat survey reaches for streams in the Porter Creek Subwatershed, and overall condition rating for each habitat parameter. Shaded boxes indicate that forest plan standards were not met or conditions were rated as "poor" at surveyed locations.

Table 87. Habitat indicator condition rating by surveyed reach in the Porter Creek Subwatershed.

Stream Name & Survey Type	Survey Reach & Year	Shade (FP Standard)	Water Temperature	Bank Stability (FP Stanard)	Fine Sediment	Physical Barriers	Large Woody Debris	Pool Frequency	Pool Quality	Width/Depth Ratios
Porter Creek – LII	1 – 1992		SEE TABLE 88 RATING = POOR			POOR	12 POOR	15 POOR	1 FAIR	14 FAIR
	1 – 2006			94% MET	7% GOOD		23 POOR	84 POOR	1 FAIR	10 GOOD
	1 – 2014			95% MET	13% FAIR		6 POOR	4 POOR	0 POOR	8 GOOD
	2 - 1992						56 POOR	14 POOR	1 FAIR	16 POOR
	2 – 2007			77% DNM	32% POOR		36 POOR	61 POOR	1 POOR	10 GOOD

	2 – 2014			87% MET	17% FAIR		17 POOR	12 POOR	0 POOR	19 POOR
	3 - 1992						21 POOR	9 POOR	1 FAIR	11 GOOD
	3 – 2007			81% MET	15% FAIR		15 POOR	28 POOR	1 FAIR	8 GOOD
	3 – 2014			84% MET	20% FAIR		8 POOR	28 POOR	1 FAIR	31 POOR
	5 – 1992	45% DNM		85% MET			9 POOR	2 POOR		9 GOOD
East Porter Creek – LII	1 - 1992						15 POOR	5 POOR	0 POOR	
Porter Creek – BLS	1 – 1993	38% DNM		98% MET			5 POOR			
	1 – 1994	78% DNM		99% MET			32 POOR	142 GOOD		
	2 – 1993	63% DNM		98% MET			11 POOR			
	2 – 1994	31% DNM		95% MET			90 GOOD	85 POOR		
	3 – 1993	64% DNM		98% MET			11 POOR			
	3 – 1994	54% DNM		97% MET			32 POOR	53 POOR		
	4 – 1992	39% DNM		28% DNM			58 POOR			
	4 – 1993	47% DNM		97% MET			21 POOR			
	4 – 1994	45% DNM		98% MET			37 POOR	26 POOR		
	5 – 1993	25% DNM		96% MET			121 GOOD			
	5 – 1994	40% DNM		98% MET			26 POOR	79 POOR		
	6 – 1992	60% DNM		54% DNM			127 GOOD			
	6 – 1993	26% DNM		97% MET			32 POOR			
	6 – 1994	55% DNM		90% MET			79 GOOD	100 GOOD		
	7 – 1993	23% DNM		98% MET			127 GOOD			
	8 – 1993	23% DNM		97% MET			37 POOR			
	9 – 1993	38% DNM		97% MET			48 POOR			
	10 – 1993	68% DNM		98% MET			42 POOR			
	11 – 1993	31% DNM		91% MET			42 POOR			
Porter Creek – ODFW	1 - 2010	32% DNM		97% MET	14% FAIR		53 POOR	63 POOR	0 POOR	11 GOOD
	2 – 2010	39% DNM		96% MET	12% GOOD		24 POOR	43 POOR		19 POOR
	3 – 2010	37% DNM		94% MET	25% POOR		102 GOOD	48 POOR	0 POOR	9 GOOD
	4 – 2010	26% DNM		94% MET	11% GOOD		114 GOOD	16 POOR	0 POOR	13 FAIR
Porter Creek – PIBO	1 – 2001			79% DNM			196 GOOD	110 GOOD		37 GOOD
	1 – 2006			100% MET	4% GOOD		118 GOOD	73 POOR		38 GOOD
	1 – 2011			89% MET	6% GOOD		97 GOOD	78 POOR		26 GOOD
	2 – 2006			100% MET				0 POOR		
	2 – 2011			83%	9%		310	12		43

				MET	GOOD		GOOD	POOR		GOOD

Table 88. Stream temperature rating by location and year in the Porter Creek Subwatershed.

Site Name	Start Date	Stop Date	7-Day Average Maximum Temperature				Condition Rating
			#7-Day Averages Calculated	# <13.8°C	# 13.8°C – 17.8°C	# > 17.8 °C	
Porter Creek, at confluence with North Fork Crooked River	6/09/1994	8/21/1994	68	0	8	60	Poor
	6/14/1996	10/09/1996	112	17	29	66	Poor
	6/18/1999	9/04/1999	73	0	7	66	Poor
	6/23/2000	10/28/2000	122	25	28	69	Poor
	6/19/2001	10/02/2001	100	0	6	94	Poor
Porter Creek, upstream of confluence with Stupid Creek	6/09/1994	7/09/1994	27	0	4	23	Poor
Porter Creek, at confluence with Dry Porter Creek	6/09/1994	8/22/1994	69	1	15	53	Poor
	8/10/1996	10/07/1996	53	21	15	17	Poor

Generally, aquatic habitat in the Porter Creek Subwatershed at surveyed locations is rated as being in poor condition. This is especially true for shade, large woody debris and pool frequency. Bank stability met forest plan standards at all but three surveyed locations, and fine sediment was considered "good" or "fair" at 80% of surveyed locations. Shade did not meet forest plan standards at any surveyed locations and is clearly increasing temperatures. Stream temperatures rated poor at every location for every year surveyed. Poor quality is also restricting quality fish habitat in Porter Creek. Widths to depth ratios varied across surveyed locations, but generally were in good to fair condition. At the PIBO sites, it should be noted that there was a general upward trend in shade and a general downward trend in large woody debris, pools and width/depth ratios. However, large woody debris and width/depth ratios still rank as being in "good" condition. Percent surface fines <2mm stayed fairly constant between years. Between 2001 and 2006, pools did drop from "good" to "poor." In general, pools, large woody debris and shade are not properly functioning in the Porter Creek Subwatershed, but width to depth ratios and bank stability are meeting or nearly meeting their potential. Temperatures are considered poor in the Porter Creek Subwatershed.

Table 89 summarizes the existing condition of streams for the two hydrologic issues identified for analysis within the Porter Creek Subwatershed. Based on stream surveys and existing Forest Service data layers, the Porter Creek Subwatershed was found to have good slope erosion hazard conditions and high road density conditions within 300 feet of perennial and intermittent streams. In addition, this subwatershed was found to have poor road densities within identified wetlands and the associated RHCAs. Based on the channel type derived from stream survey field measurements, Porter Creek is expected to have moderate channel sensitivity to disturbance and an excellent recovery potential. Based on the dominant channel type in East Porter Creek, it is expected to have moderate channel sensitivity to disturbance and a good recovery potential. However, based on the channel type at the stream crossing, the stream channel at that location is expected to have a low channel sensitivity and excellent recovery potential. In addition, this subwatershed has poor stream crossing density, fair road density, and poor drainage density existing conditions.

Table 89. Summary of stream condition and impairments in Porter Creek Subwatershed.

Stream	Sediment/Turbidity	Flow/Sediment Regime

	Slope Erosion Hazard	Road Density w/in 300' of Streams	Channel Sensitivity/ Recovery Potential	wetland	Road Density	Drainage Density	Stream Crossing Density
East Porter	Good	High	Fair/Good	High	Moderate	High	High
Porter			Good				
Overall	**Good**	**Poor**	**Fair/Good**	**Poor**	**Fair**	**Poor**	**Poor**

Deep Creek Watershed

Deep Creek includes Lower Deep Creek, Jackson Creek, Little Summit Prairie Creek, Crazy Creek including East and West Forks, Happy Camp Creek, Double Corral Creek, and Toggle Creek in the project area. Deep Creek and its tributaries provide some of the premier trout fishing opportunities in the region due to its diversity and relatively abundant cold water and spring fed creeks entering throughout the watershed. The only resident native salmonid species is the redband trout. Columbia spotted frogs are present throughout the area.

However, water quality and fish habitat have declined due to increased sediment yields and stream temperatures, and reductions in pool habitat (USDA 2009). Many stream channels have widened and deepened within the flood plain, effectively lowering the water table and reducing the amount of area available to support riparian vegetation that trap sediment, stabilize stream banks and lower water temperatures. The lowering of the water table allows soils to dry out, leading to a shift in vegetation composition from deeply rooted riparian species to shallow rooted, less desirable ones (Whisenant, S.G.1999). There could be a combination of factors leading to this phenomenon, including a proliferation of more drought-tolerant species that may not have deep root systems and encroachment of upland vegetation in the floodplain. Furthermore, fire suppression activities have led to the encroachment of conifers in the riparian areas, replacing desirable riparian plant species (willows, sedges, and rushes) that provide soil/bank protection and shade with less shallow rooted plant species (USDA 2009).

As stated in the Deep Creek Restoration Plan (USDA 2009), Deep Creek includes Lower Deep Creek, Jackson Creek, and Little Summit Prairie Creek. The past century of use of forest lands within the Deep Creek Watershed has contributed to a decline in stream health, as well as trout and frog populations. Past and present activities within this watershed include timber harvest, domestic livestock grazing, big game management, recreation, fire suppression, off road travel and road construction. Water quality and fish habitat have declined due to increased sediment yields and stream temperatures, reductions in pool habitat and in-stream woody debris, and reduced upstream accessibility by aquatic species.

Trails are proposed across the landscape of the Deep Creek Watershed, from lower elevation to upper elevations, as part of the Ochoco Summit Project. These proposed trail locations intersect portions of the Jackson Creek, Little Summit Prairie Creek, and Lower Deep Creek Subwatersheds. Table 90 summarizes the existing condition within the Deep Creek Watershed based on identified potential hydrologic effects to the sediment, turbidity and the flow and sediment regimes in and near the streams within the project area.

Based on measured bank stability, slope erosion hazard, road densities near streams, channel sensitivity and recovery potential, and the density of roads in and near wetlands, the streams within the Deep Creek Watershed are identified as being in relatively fair to good condition for sediment and turbidity.

Table 90. Summary of Existing Condition in the Deep Creek Watershed.

Subwatershed	Sediment Loading (tons/year)	Water Quality (Sediment/Turbidity)	Flow/Sediment Regime

Jackson Creek	273	Fair/Good	Good
Little Summit Prairie Creek	269	Fair/Good	Fair/Good
Lower Deep Creek	964	Fair/Good	Good
Overall/Total	**1507**	**Fair/Good**	**Good**
Status/Condition - All variables meeting standards = good; Some variables meeting standards = fair; Most or all variables not meeting standards = poor; No Data Collected (ND)			

Jackson Creek Subwatershed

Jackson Creek Subwatershed flows into the Lower Deep Creek Subwatershed and includes Cabbage Creek, Derr Creek, Dicer Creek, Double Corral Creek, Happy Camp Creek, Haypress Creek, Hypress Creek, Jackson Creek, Toggle Creek, and other unnamed stream channels. Perennial fish-bearing streams include Jackson Creek, Double Corral Creek, Toggle Creek, Dicer Meadow Creek, Derr Creek, and an unnamed tributary to Jackson Creek. Cabbage Creek is the only perennial non-fish-bearing stream in the Jackson Creek Subwatershed. Hypress Creek, Haypress Creek, and multiple unnamed tributaries to Jackson Creek are intermittent, non-fish-bearing streams.

ODFW fish density data are available for Jackson Creek and Double Corral Creek. Figure 8 below shows population estimates for redband trout in Jackson Creek; Figure 9 shows population estimates for redband trout in Happy Camp Creek; and Figure 10 and Figure 11 shows population estimates for redband trout in lower and upper Double Corral Creek, respectively.

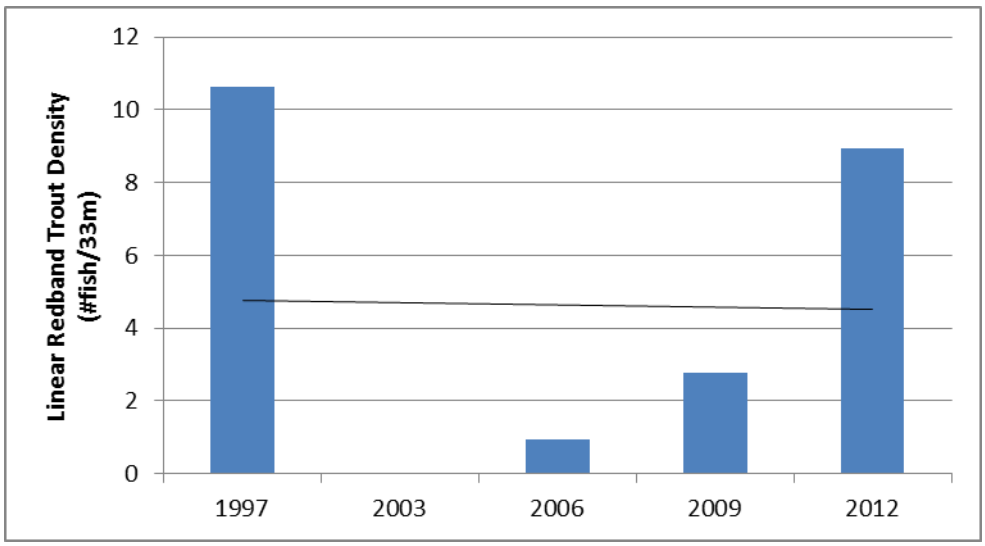


Figure 8. Linear fish densities (fish/33m) for Jackson Creek, 1997, 2003, 2006, 2009 and 2012(ODFW 2014). Trendline for data is included.

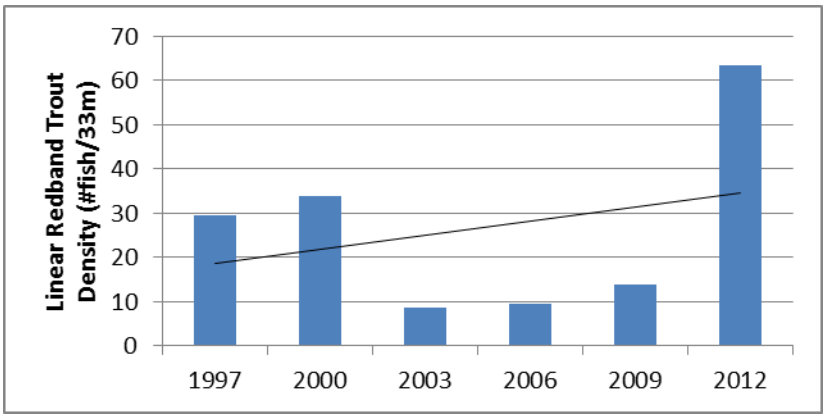


Figure 9. Linear fish densities (fish/33m) for Happy Camp Creek, 1997, 2000, 2003, 2006, 2009 and 2012 (ODFW 2014). Trendline for data is included.

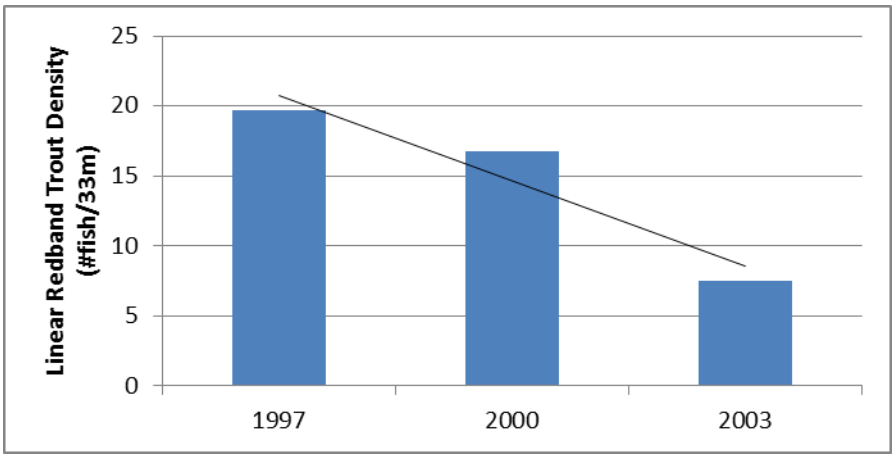


Figure 10. Linear fish densities (fish/33m) for lower Double Corral Creek, 1997, 2000, and 2003 (ODFW 2014). Trendline for data is included.

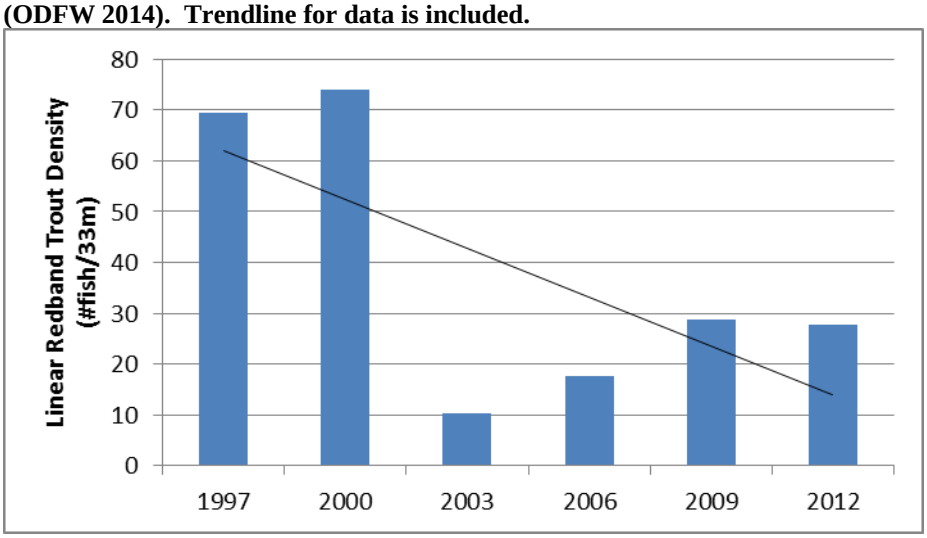


Figure 11. Linear fish densities (fish/33m) for upper Double Corral Creek, 1997, 2000, 2003, 2006, 2009, and 2012 (ODFW 2014). Trendline for data is included.

ODFW data for Jackson Creek shows linear fish densities between 0 and 10 fish/33 meters and linear fish densities between 5 and 65 fish/33 meters in Happy Camp Creek. ODFW data for Double Corral Creek shows linear fish densities between 7 and 20 fish/33 meters in the lower watershed and between 10 and 80 fish/33 meters in the upper watershed. In general, trendlines show a steady trend in fish densities in Jackson Creek, an increasing trend in Happy Camp Creek, and a decreasing trend in fish densities in both the upper and lower sections surveyed in Double Corral Creek. However, this cannot be taken as an indicator of overall declining populations of fish in Double Corral Creek or increasing trends in Happy Camp Creek, because population fluctuations can be due to a number of factors that influence fish presence in a particular area, including water temperatures and water levels that are dependent on the type of climate conditions experienced during the year.

Table 91 below shows habitat survey reaches for streams in the Jackson Creek Subwatershed, and overall condition rating for each habitat parameter. Shaded boxes indicate that forest plan standards were not met or conditions were rated as "poor" at surveyed locations.

Table 91. Habitat indicator condition rating by surveyed reach in the Jackson Creek Subwatershed.

Stream Name & Survey Type	Survey Reach & Year	Shade (FP Standard)	Water Temperature	Bank Stability (FP Stanard)	Fine Sediment	Physical Barriers	Large Woody Debris	Pool Frequency	Pool Quality	Width/Depth Ratios
Jackson Creek – BLS	1 – 1992	23% DNM	SEE TABLE 31 BELOW RATING = POOR	79% DNM		POOR	59 POOR			
	1 – 1994	29% DNM		94% MET			58 POOR	47 POOR		
	2 – 1992	17% DNM		85% MET			24 POOR			
	2 – 1994	34% DNM		86% MET			58 POOR	21 POOR		
	3 – 1992	23% DNM		67% DNM			70 GOOD			
	3 – 1994	29% DNM		88% MET			53 POOR	100 GOOD		
	4 – 1992	22% DNM		57% DNM			34 POOR			
	4 – 1994	21% DNM		84% MET			74 GOOD	137 GOOD		
	5 – 1992	24% DNM		68% DNM			75 GOOD			
	5 – 1994	41% DNM		86% MET			63 POOR	32 POOR		
	6 – 1992	28% DNM		94% MET			59 POOR			
	6 – 1994	36% DNM		90% MET			42 POOR	0 POOR		
	7 – 1992	23% DNM		93% MET			28 POOR			
	8 – 1992	15% DNM		31% DNM			34 POOR			
	9 – 1992	16% DNM		37% DNM			24 POOR			
Jackson Creek – LII	1A – 1999			100% MET			10 POOR	7 POOR	0 POOR	15 GOOD
	1B – 1999			100% MET			5 POOR	12 POOR	0 POOR	15 GOOD
	1 – 2010			94% MET	22% POOR		25 POOR	14 POOR	0 POOR	14 GOOD
	2 – 1999			100% MET			9 POOR	6 POOR	0 POOR	15 GOOD

	2 – 2010			89% MET	19% FAIR		9 POOR	17 POOR	0 POOR	12 GOOD
	3 – 1999			96% MET			5 POOR	16 POOR	0 POOR	7 POOR
	3 – 2010			90% MET			17 POOR	71 POOR	0 POOR	7 POOR
	4 – 1999			98% MET			12 POOR	11 POOR	1 FAIR	5 POOR
	4 – 2010			94% MET			6 POOR	31 POOR	3 FAIR	5 POOR
Happy Camp Creek – BLS	1 – 1994	50% DNM		98% MET	0% GOOD		37 POOR	74 POOR		11 GOOD
	1 – 1998	53% DNM		100% MET			20 POOR	74 POOR		
	2 – 1994	48% DNM		98% MET	0% GOOD		16 POOR	90 POOR		12 GOOD
	2 – 1998	39% DNM		98% MET			12 POOR	69 POOR		
	3 – 1994	33% DNM		89% MET	61% POOR		5 POOR	90 POOR		9 GOOD
	3 – 1998	18% DNM		96% MET			2 POOR	63 POOR		
	4 – 1994	13% DNM		89% MET	85% POOR		5 POOR	90 POOR		10 GOOD
	4 – 1998	32% DNM		92% MET			14 POOR	90 POOR		
	5 – 1994	23% POOR		90% MET	18% FAIR		26 POOR	127 GOOD		10 GOOD
	5 – 1998	45% DNM		90% MET			12 POOR	74 POOR		
	6 – 1994	24% DNM		85% MET	63% POOR		48 POOR	127 GOOD		18 POOR
	7 – 1994	26% DNM		73% DNM	42% POOR		26 POOR	79 POOR		10 POOR
	8 – 1994	33% DNM		81% MET	21% POOR		32 POOR	85 POOR		11 FAIR
	9 – 1994	33% DNM		80% DNM	3% GOOD		21 POOR	37 POOR		10 GOOD
Happy Camp Creek – LII	1 – 1992						52 POOR	14 POOR	1 FAIR	12 GOOD
	2 – 1992						23 POOR	25 POOR	0 POOR	12 GOOD
	3 – 1992						53 POOR	25 POOR	1 FAIR	12 GOOD
Toggle Creek – BLS	1 – 1998	31% DNM		97% MET	15% FAIR		0 POOR	58 POOR		14 GOOD
	2 – 1998	19% DNM		91% MET	29 POOR		1 POOR	74 POOR		11 FAIR
	3 – 1998	22% DNM		96% MET	52 POOR		2 POOR	74 POOR		10 POOR
	4 – 1998	18% DNM		93% MET	58 POOR		7 POOR	63 POOR		21 GOOD
Chamberlain Creek – BLS	1 – 1994	53% DNM		84% MET	36 POOR		42 POOR	21 POOR		15 GOOD
Double Corral Creek –BLS	1 – 1992	29% DNM		65% DNM			14 POOR			
	1 – 1994	33% DNM		79% DNM	2% GOOD		63 POOR	185 GOOD		10 POOR
	2 – 1992	19% DNM		78% DNM			30 POOR			
	2 – 1994	17% DNM		84% MET	46% POOR		11 POOR	85 POOR		9 GOOD
	3 – 1992	29% DNM		50% DNM			104 GOOD			
	4 – 1992	28% DNM		47% DNM			24 POOR			

Table 92. Stream temperature rating by location and year in the Jackson Creek Subwatershed.

Site Name	Start Date	Stop Date	7-Day Average Maximum Temperature				Condition Rating
			#7-Day Averages Calculated	# <13.8°C	# 13.8°C – 17.8°C	# > 17.8 °C	
Derr Creek, at confluence with Jackson Creek	6/16/1998	9/29/1998	100	0	19	81	Poor
	6/16/1999	9/11/1999	82	0	15	67	Poor
	6/02/2001	10/01/2001	116	54	57	5	Fair
Double Corral Creek, at confluence with Jackson Creek	6/15/1999	9/10/1999	82	0	12	60	Poor
Happy Camp Creek, at confluence with Jackson Creek	6/02/1994	8/30/1994	84	0	14	70	Poor
	6/08/2000	10/17/2000	126	29	19	78	Poor
	5/26/2004	9/19/2004	111	12	32	67	Poor
	5/17/2005	9/07/2005	108	11	25	72	Poor
Happy Camp Creek, at Road #30 stream crossing	6/12/2003	9/16/2003	91	0	13	78	Poor
Happy Camp Creek, near Road #2630-745	6/16/1998	9/29/1998	100	9	27	64	Poor
	6/15/1999	9/11/1999	83	11	47	25	Fair
Jackson Creek, at confluence with Deep Creek	6/09/2000	10/17/2000	125	23	18	84	Poor
	5/20/2005	9/07/2005	105	9	60	36	Fair
Jackson Creek, at Road #4250 crossing	6/16/1999	9/11/1999	82	0	12	70	Poor
Jackson Creek, upstream of Derr Creek confluence	6/16/1998	9/29/1998	100	14	44	42	Fair
	6/16/1999	9/11/1999	82	9	53	20	Fair
Toggle Creek, at confluence with Jackson Creek	6/02/1998	9/28/1998	113	11	64	38	Fair
	6/15/1999	9/11/1999	83	13	28	42	Poor

Generally, aquatic habitat in the Jackson Creek Subwatershed at surveyed locations is rated as being in poor condition. This is especially true for shade, fine sediment, large woody debris, pool frequency and pool quality. Bank stability met forest plan standards at 70% surveyed locations, and fine sediment was considered "good" at almost ¾ of surveyed locations. Shade did not meet forest plan standards at any of the surveyed locations and is clearly increasing temperatures in Jackson Creek and its tributaries. However, it is also important to note that in much of the surveys it was noted that surveyed reaches ran through meadow-dominated systems without good hardwood vegetation, which accounts for the overall lack of shade.

When looking at trends for BLS and Level II data collected in the Jackson Creek Subwatershed, the general trend shows that all habitat parameters are improving across surveyed locations. Jackson Creek saw more improvement in large woody debris and pool quantity than tributary streams. Caution should be used, however, when discussing trends because this is only a shapshot of the entire system and surveys were only repeated twice. In general, all habitat parameter are not functioning properly in the Jackson Creek Subwatershed with the exception of bank stability and width to depth ratios. Temperatures are considered mostly poor in the Jackson Creek and its tributaries.

Table 93 summarizes the existing condition of streams for the two hydrologic issues identified for analysis within the Jackson Creek Subwatershed. Based on stream surveys and existing Forest Service data layers, the Jackson Creek Subwatershed was found to have fair slope erosion hazard

conditions and fair road density conditions within 300 feet of perennial and intermittent streams. In addition, this subwatershed was found to have low road densities within identified wetland and the associated RHCAs. Based on the channel type derived from stream survey field measurements, both streams are expected to have very high channel sensitivity to disturbance and good recovery potential. In addition, this subwatershed has good stream crossing density, fair road density, and good drainage density existing conditions relative to potential effects to peak flows from connectivity of roads and streams.

Table 93. Summary of stream condition and impairments in Jackson Creek Subwatershed.

Stream	Sediment/Turbidity				Flow/Sediment Regime		
	Slope Erosion Hazard	Road Density w/in 300' of Streams	Channel Sensitivity/ Recovery Potential	Wetland	Road Density	Drainage Density	Stream Crossing Density
Happy Camp	Fair	Moderate	Fair	Low	Moderate	Low	Low
Jackson			Fair				
Overall	**Fair**	**Fair**	**Fair**	**Good**	**Fair**	**Good**	**Good**

Little Summit Prairie Creek Subwatershed

Little Summit Prairie Creek Subwatershed flows in a westerly direction into the Lower Deep Creek Subwatershed and includes Little Summit Creek, Thornton Creek, West Fork Thornton Creek, and other unnamed stream channels. Little Summit Prairie Creek is the only perennial fish-bearing stream in the Little Summit Prairie Creek Subwatershed. There are no perennial non-fish-bearing streams in the Little Summit Prairie Creek Subwatershed. Thornton Creek, West Fork Thornton Creek, and an unnamed tributary to Little Summit Creek are intermittent, fish-bearing streams in the subwatershed. Multiple unnamed tributaries to Little Summit Prairie Creek consist of intermittent, non-fish-bearing streams.

ODFW fish density data is available for Little Summit Prairie Creek. Figure 12, Figure 13 and Figure 14 show population estimates for redband trout in the upper, middle, and lower sections of Little Summit Prairie Creek, respectively.

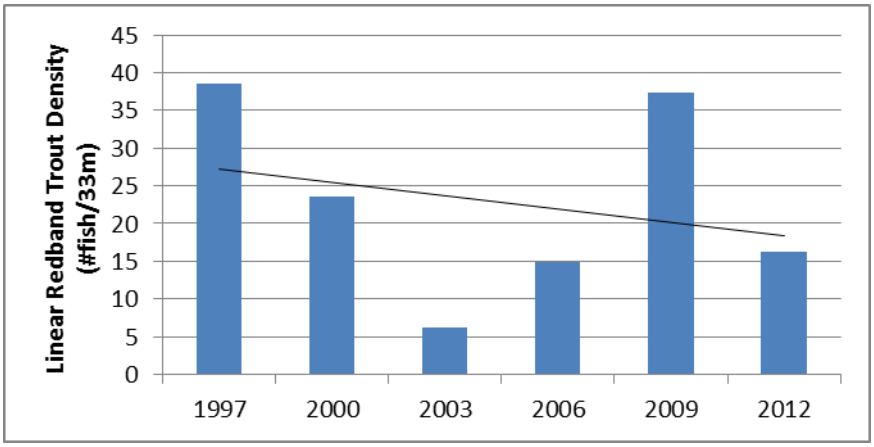


Figure 12. Linear fish densities (fish/33m) for upper Little Summit Prairie Creek, 1997, 2000, 2003, 2006, 2009, and 2012 (ODFW 2014). Trendline for data is included.

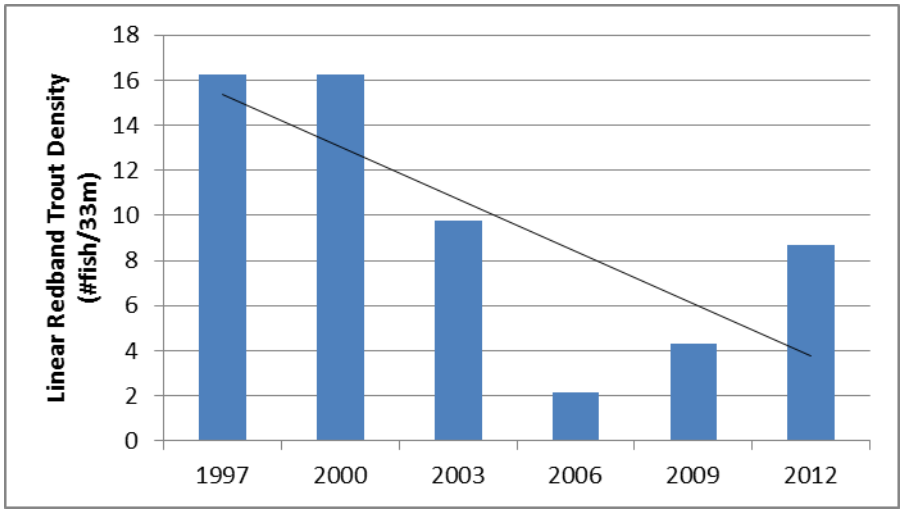


Figure 13. Linear fish densities (fish/33m) for middle Little Summit Prairie Creek, 1997, 2000, 2003, 2006, 2009, and 2012 (ODFW 2014). Trendline for data is included.

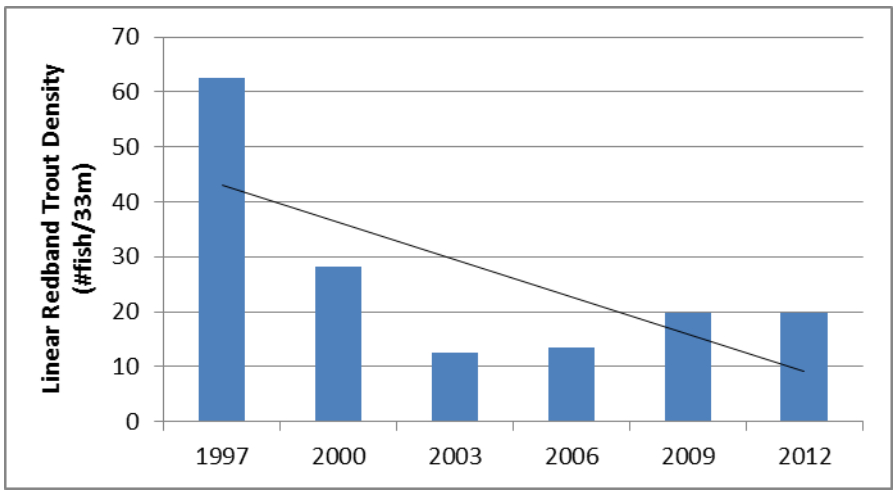


Figure 14. Linear fish densities (fish/33m) for lower Little Summit Prairie Creek, 1997, 2000, 2003, 2006, 2009, and 2012 (ODFW 2014). Trendline for data is included.

ODFW data for Little Summit Prairie Creek show linear fish densities between 5 and 40 fish/33 meters in the upper reach, linear fish densities between 2 and 16 fish/33 meters in the middle reach, and linear fish densities between 10 and 70 in the lower reach of Little Summit Prairie Creek. In general, trendlines show a decreasing trend in fish densities in all three sections of Little Summit Prairie Creek sampled. However, this cannot be taken as an indicator of overall declining populations of fish in Little Summit Prairie Creek because population fluctuations can be due to a number of factors that influence fish presence in a particular area including water temperatures and water levels that are dependent on the type of climate conditions experienced during the year.

Table 94 below shows habitat survey reaches for streams in the Little Summit Prairie Creek Subwatershed, and overall condition rating for each habitat parameter. Shaded boxes indicate that forest plan standards were not met or conditions were rated as “poor” at surveyed locations.

Table 94. Habitat indicator condition rating by surveyed reach in the Little Summit Prairie Creek Subwatershed.

Stream Name & Survey Type	Survey Reach & Year	Shade (FP Standard)	Water Temperature	Bank Stability (FP Stanard)	Fine Sediment	Physical Barriers	Large Woody Debris	Pool Frequency	Pool Quality	Width/Depth Ratios
Little Summit Prairie Creek – LII	1 – 1992		SEE TABLE 95 RATING - POOR			POOR	100 GOOD	27 POOR	1 FAIR	12 GOOD
	1A – 1998			99% MET			11 POOR	17 POOR	0 POOR	11 FAIR
	1 – 2010			96% MET	18% FAIR		13 POOR	27 POOR	1 FAIR	9 POOR
	2 – 1992						55 POOR	15 POOR	11 GOOD	9 POOR
	2A – 1998			98% MET			6 POOR	16 POOR	0 POOR	8 POOR
	2 – 2010			92% MET	48% POOR		5 POOR	51 POOR	21 GOOD	5 POOR
	3 – 1992						3 POOR	18 POOR	13 GOOD	9 POOR
	3A – 1998			98% MET			17 POOR	30 POOR	6 GOOD	8 POOR
	4 – 1992						72 GOOD	26 POOR	1 FAIR	8 POOR
	5 – 1992						69 GOOD	22 POOR	0 POOR	9 POOR
	1 – 1994	83% MET		97% MET	0% GOOD		37 POOR	137 GOOD		27 GOOD
	2 – 1994	63% DNM		97% MET	2% GOOD		42 POOR	121 GOOD		17 GOOD
	3 – 1994	29% DNM		94% MET	20% FAIR		53 POOR	90 POOR		10 POOR
	5 – 1994	56% DNM		84% MET	0% GOOD		69 POOR	148 GOOD		22 GOOD
Little Summit Prairie Creek – BLS	5 – 1998	53% DNM		92% MET	26% POOR		21 POOR	74 POOR		12 GOOD
	6 – 1994	74% DNM		96% MET	0% GOOD		79 GOOD	227 GOOD		23 GOOD
	6 – 1998	61% DNM		96% MET	54% POOR		11 POOR	74 POOR		8 POOR
	7 – 1994	55% DNM		82% MET	2% GOOD		74 GOOD	79 POOR		10 GOOD
	7 – 1998	56% DNM		97% MET	31% POOR		0 POOR	69 POOR		13 GOOD
	8 – 1994	57% DNM		93% MET	2% GOOD		16 POOR	5 POOR		8 GOOD
Little Summit Prairie Creek – PIBO	1 – 2001			84% MET			55 POOR	92 POOR		58 GOOD
	1 – 2006			100% MET	7% GOOD		124 GOOD	50 POOR		53 GOOD
	1 – 2011			94% MET	7% GOOD		63 POOR	35 POOR		23 GOOD
	2 – 2006			95% MET			62 POOR	0 POOR		5 POOR
	2 – 2011			97% MET	20% FAIR		132 GOOD	105 GOOD		24 GOOD

Table 95. Stream temperature rating by location and year in the Little Summit Prairie Creek Subwatershed.

Site Name	Start Date	Stop Date	7-Day Average Maximum Temperature				Condition Rating
			#7-Day Averages Calculated	# <13.8°C	# 13.8°C – 17.8°C	# > 17.8 °C	
Little Summit Prairie Creek, at confluence with Deep Creek	7/03/1996	9/27/1996	81	24	27	30	Fair
	5/15/1997	9/10/1997	113	3	79	31	Fair
	5/29/1998	9/22/1998	111	11	52	48	Fair
	6/07/2000	10/17/2000	127	46	30	51	Fair
	6/16/2003	9/16/2003	87	6	26	55	Poor
	5/17/2005	9/07/2005	108	15	50	43	Fair
Little Summit Prairie Creek, near 4254-400 road intersection	6/21/1995	9/17/1995	83	0	30	53	Poor
Little Summit Prairie Creek, upstream of Road 4276 crossing	6/21/1995	9/17/1995	83	0	37	46	Poor
	5/29/1998	9/24/1998	113	18	44	51	Fair
	6/09/1999	9/04/1999	82	0	11	71	Poor
Little Summit Prairie Creek, downstream of Road 4276 crossing	6/16/2003	9/16/2003	87	5	28	54	Poor
	6/03/2004	9/13/2004	97	12	25	60	Poor

Generally, aquatic habitat in the Little Summit Prairie Creek Subwatershed at surveyed locations is rated as being in poor condition. This is especially true for shade, large woody debris, pool frequency and width/depth ratios. Bank stability met forest plan standards at all surveyed locations, and fine sediment was considered “good” or “fair” at 75% of surveyed locations. Although pools are lacking in Little Summit Prairie Creek, pool quality seemed to be better compared to other streams in the project area. Shade only met forest plant standards at one surveyed location and lack of shade is clearly increasing stream temperatures. Stream temperatures rated fair or poor at every location for every year surveyed. At the PIBO sites, it should be noted that the trend was stationary for shade and percent surface fines, and there was a general downward trend in large woody debris, pools and width/depth ratios. However, width/depth ratios still rank as being in “good” condition. Pools were in “poor” condition every year surveyed, and large woody debris jumped from “good” to “poor” from 2006 to 2011. It is likely that the lack of large woody debris is leading to overall poor pool conditions. Pools, large woody debris and shade are not properly functioning in the Little Summit Prairie Creek Subwatershed, but banks are generally stable and meeting their potential. Temperatures are considered fair to poor in the Little Summit Prairie Creek Subwatershed.

Table 96 summarizes the existing condition of streams for the two hydrologic issues identified for analysis within the Little Summit Prairie Creek Subwatershed. Based on stream surveys and existing Forest Service data layers, the Little Summit Prairie Creek Subwatershed was found to have fair slope erosion hazard conditions and high road density conditions within 300 feet of perennial and intermittent streams. In addition, this subwatershed was found to have low road densities within wetlands and the associated RHCAs. Based on the channel type derived from stream survey field measurements at the proposed stream crossing location, Little Summit Creek at this location is expected to have low channel sensitivity to disturbance and excellent recovery potential. Based on the dominant stream channel type over the entire surveyed stream reaches, however, the channel sensitivity is expected to be very high with a good recovery potential. In addition, this subwatershed has fair stream crossing and road density and good drainage density, which makes this subwatershed more resilient to the potential effects of peak flows from connectivity of roads and streams.

Table 96. Summary of stream condition and impairments in Little Summit Prairie Creek Subwatershed.

Stream	Sediment/Turbidity				Flow/Sediment Regime		
	Slope Erosion Hazard	Road Density w/in 300' of Streams	Channel Sensitivity/ Recovery Potential	wetland	Road Density	Drainage Density	Stream Crossing Density
Little Summit Prairie	Fair	High	Fair/Good	Low	Moderate	Low	Moderate
Overall	**Fair**	**Poor**	**Fair/Good**	**Good**	**Fair**	**Good**	**Fair**

Lower Deep Creek Subwatershed

Lower Deep Creek is a priority subwatershed as defined by the Forest Service Watershed Condition Framework Process. Lower Deep Creek Subwatershed flows into the Lower North Fork Crooked River Subwatershed just downstream of the confluence of the North Fork Crooked River and Porter Creek. The Lower Deep Creek Subwatershed encompasses Big Spring Creek, Buck Hollow, Crazy Creek, Deep Creek, East Fork Crazy Creek, West Fork Crazy Creek, and other unnamed stream channels. Deep Creek, Crazy Creek, and Big Springs Creek are perennial fish-bearing streams in the Lower Deep Creek Subwatershed. There are two unnamed perennial non-fish-bearing streams that are tributaries to Deep Creek and Big Springs Creek in the Lower Deep Creek Subwatershed. East Fork Crazy Creek is an intermittent, fish-bearing stream and West Fork Crazy Creek, Buck Hollow and multiple unnamed tributaries to Deep Creek are intermittent, non-fish-bearing streams in the Lower Deep Creek Subwatershed.

ODFW fish density data is available for Crazy and Deep Creek. Figure 15, Figure 16 and Figure 17 show population estimates for redband trout in the upper, middle, and lower sections of Deep Creek, respectively.

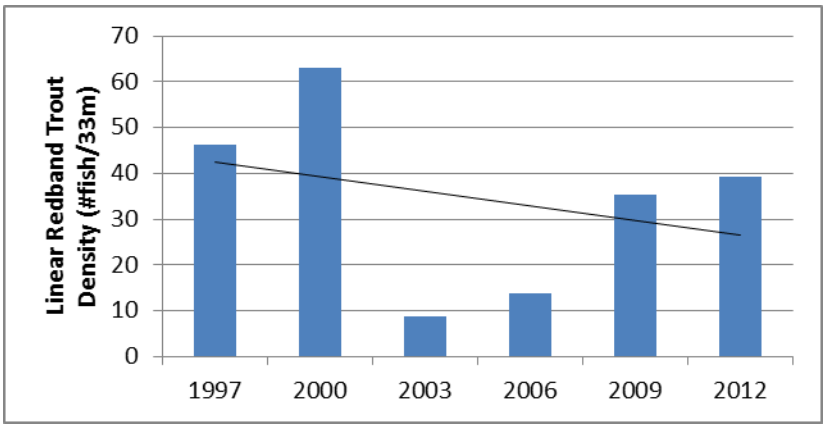


Figure 15. Linear fish densities (fish/33m) for upper Deep Creek, 1997, 2000, 2003, 2006, 2009, and 2012 (ODFW 2014). Trendline for data is included.

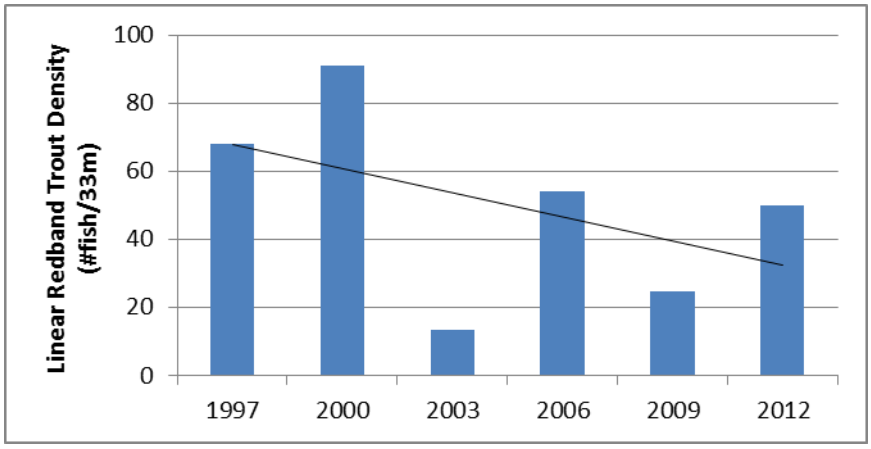


Figure 16. Linear fish densities (fish/33m) for middle Deep Creek, 1997, 2000, 2003, 2006, 2009, and 2012 (ODFW 2014). Trendline for data is included.

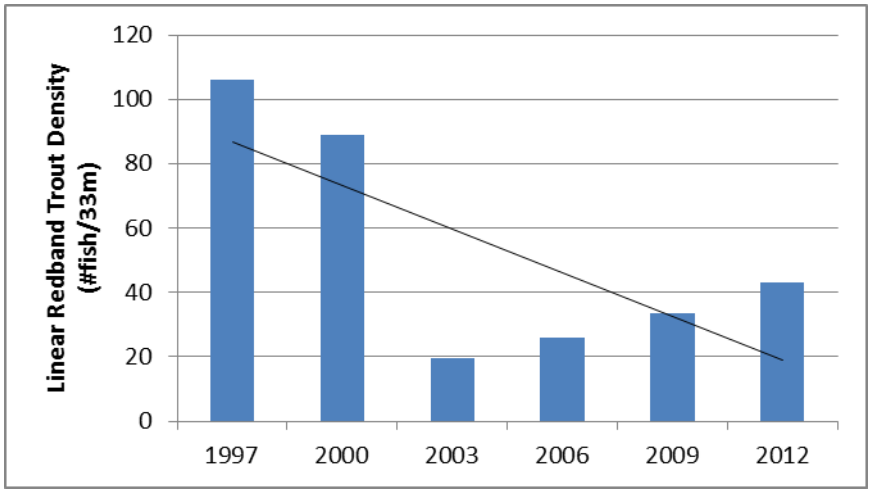


Figure 17. Linear fish densities (fish/33m) for lower Deep Creek, 1997, 2000, 2003, 2006, 2009, and 2012 (ODFW 2014). Trendline for data is included.

ODFW data for Deep Creek show linear fish densities between 5 and 65 fish/33 meters in the upper reach, linear fish densities between 10 and 100 fish/33 meters in the middle reach, and linear fish densities between 20 and 110 in the lower reach of Deep Creek. In general, trendlines show a decreasing trend in fish densities in all three sections of Deep Creek sampled. However, this cannot be taken as an indicator of overall declining populations of fish in Deep Creek because population fluctuations can be due to a number of factors that influence fish presence in a particular area including water temperatures and water levels that are dependent on the type of climate conditions experienced during the year.

Table 97 shows habitat survey reaches for streams in the Lower Deep Creek Subwatershed, and overall condition rating for each habitat parameter. Shaded boxes indicate that forest plan standards were not met or conditions were rated as “poor” at surveyed locations.

Table 97. Habitat indicator condition rating by surveyed reach in the Lower Deep Creek Subwatershed.

Stream Name & Survey Type	Survey Reach & Year	Shade (FP Standard)	Water Temperature	Bank Stability (FP Stanard)	Fine Sediment	Physical Barriers	Large Woody Debris	Pool Frequency	Pool Quality	Width/Depth Ratios
Deep Creek – LII	1 – 1999		SEE TABLE 98 RATING = POOR	98% MET			8 POOR	7 POOR	1 FAIR	14 GOOD
	2 – 1999			100% MET			2 POOR	2 POOR	1 FAIR	13 GOOD
	3 – 1999			100% MET			9 POOR	2 POOR	0 POOR	13 GOOD
Deep Creek – BLS	1 – 1994	31% DNM		92% MET	5% GOOD	POOR	48 POOR	21 POOR		24 GOOD
	2 – 1994	41% DNM		100% MET	0% GOOD		69 GOOD	26 POOR		21 GOOD
	3 – 1994	44% DNM		99% MET	0% GOOD		58 POOR	16 POOR		18 GOOD
Crazy Creek – LII	1 - 2010			98% MET	11% GOOD		20 POOR	21 POOR	1 FAIR	7 POOR
	2 – 2010			83% MET	30% POOR		11 POOR	17 POOR	0 POOR	
Crazy Creek – BLS	1 – 1993	62% DNM		100% MET			53 POOR			
	1 – 1994	48% DNM		99% MET	0% GOOD		53 POOR	111 GOOD		17 POOR
	2 – 1993	58% DNM		100% MET			16 POOR			
	2 – 1994	47% DNM		96% MET	2% GOOD		11 POOR	26 POOR		5 GOOD
	3 – 1993	55% DNM		99% MET			26 POOR			
	4 – 1993	44% DNM		93% MET			11 POOR			
West Fork Crazy Creek – BLS	1 – 1994	46% DNM		95% MET	48% POOR		53 POOR	95 GOOD		9 GOOD
	2 – 1994	37% DNM		75% DNM	88% POOR		58 POOR	5 POOR		5 GOOD
East Fork Crazy Creek – BLS	1 – 1994	59% DNM		98% MET	42% POOR		32 POOR	106 GOOD		7 GOOD
	2 – 1994	38% DNM		98% MET	100% POOR		32 POOR	0 POOR		5 GOOD
Big Spring Creek – BLS	1 – 1999	71% DNM		100% MET			44 POOR	99 GOOD		9 GOOD

Table 98. Stream temperature rating by location and year in the Lower Deep Creek Subwatershed.

Site Name	Start Date	Stop Date	7-Day Average Maximum Temperature				Condition Rating
			#7-Day Averages Calculated	# <13.8°C	# 13.8°C – 17.8°C	# > 17.8 °C	
Big Springs Creek, at confluence with Deep Creek	6/02/2001	10/01/2001	116	7	46	63	Poor
Crazy Creek, near Road 4200-420 road intersection	6/02/1994	8/29/1994	83	0	12	71	Poor
	6/15/1999	9/10/1999	82	0	41	41	Poor

Crazy Creek, at confluence with Deep Creek	6/02/1994	8/29/1994	83	0	12	71	Poor
	5/17/2005	7/21/2005	60	17	25	18	Fair
East Fork Crazy Creek, upstream of Road 30 crossing	6/02/1994	8/29/1994	83	14	69	0	Fair
	6/16/1998	9/29/1998	100	56	44	0	Fair
West Fork Crazy Creek, upstream of Road 30 crossing	6/02/1994	8/29/1994	83	1	46	36	Poor
	6/15/1999	9/10/1999	82	7	36	39	Poor
Deep Creek, at confluence with North Fork Crooked River	6/21/1995	9/17/1995	83	0	30	53	Poor
	7/07/1996	9/27/1996	77	8	19	50	Poor
	5/15/1997	9/02/1997	105	0	25	80	Poor
	6/16/1999	9/10/1999	81	0	10	71	Poor
	6/10/2000	11/01/2000	139	43	19	77	Poor
	6/20/2003	9/15/2003	82	0	7	75	Poor
	6/09/2004	9/19/2004	97	4	23	70	Poor
	5/20/2005	9/20/2005	118	7	39	72	Poor
	7/10/2013	11/01/2013	109	41	9	59	Poor
Deep Creek, at confluence with Crazy Creek	6/02/2001	10/10/2001	125	21	53	51	Poor
	7/10/2013	11/01/2013	109	43	40	26	Fair

Generally, aquatic habitat in the Crazy – Deep Creek Subwatershed at surveyed locations is rated as being in poor condition. This is especially true for shade, large woody debris, pool frequency and pool quality. Bank stability met forest plan standards at all but one surveyed location, and fine sediment was considered “good” or “fair” at over 50% of surveyed locations. Shade did not meet forest plan standards at any surveyed location and is clearly increasing stream temperatures. Stream temperatures rated fair or poor at every location for every year surveyed. Pools, large woody debris and shade are not properly functioning in the Crazy-Deep Creek Subwatershed, but banks are generally stable and meeting their potential. Temperatures are considered poor, and are generally better in Crazy Creek than in Deep Creek. Past and on-going restoration efforts in Deep and Crazy Creek will continue to help improve stream and aquatic habitat conditions into the future.

Table 99 summarizes the existing condition of streams for the two hydrologic issues identified for analysis within the Lower Deep Creek Subwatershed. Based on stream surveys and existing Forest Service data layers, the Lower Deep Creek Subwatershed was found to have fair slope erosion hazard conditions and low road density conditions within 300 feet of perennial and intermittent streams. In addition, this subwatershed was found to have high road densities within identified wetlands and the associated RHCAs. Based on the channel type derived from stream survey field measurements, Deep Creek is expected to have very high channel sensitivity to disturbance and good recovery potential, while Crazy Creek is expected to have moderate channel sensitivity and excellent recovery potential. In addition, this subwatershed has good stream crossing density, good road density, and good drainage density existing conditions relative to potential effects to peak flows from connectivity of roads and streams.

Table 99. Summary of stream condition and impairments in Lower Deep Creek Subwatershed.

Stream	Sediment/Turbidity				Flow/Sediment Regime		
	Slope Erosion Hazard	Road Density w/in 300' of Streams	Channel Sensitivity/ Recovery Potential	Wetland	Road Density	Drainage Density	Stream Crossing Density
Crazy	Fair	Low	Good	High	Low	Low	Low
Deep			Fair				
Overall	**Fair**	**Good**	**Fair/Good**	**Poor**	**Good**	**Good**	**Good**

Upper Ochoco Creek Watershed

Trails are proposed across the northeastern portion of the Upper Ochoco Creek Watershed as part of the Ochoco Summit Project. These proposed trail locations intersect portions of the Upper Marks Creek and Headwaters Ochoco Creek Subwatersheds; however, trails are not proposed within 300 feet of mapped streams within the Headwaters Ochoco Creek Subwatershed. Table 100 summarizes the existing condition within the Upper Ochoco Creek Watershed based on identified potential hydrologic effects to the sediment, turbidity and the flow and sediment regimes in and near the streams within the project area.

Based on measured bank stability, slope erosion hazard, road densities near streams, channel sensitivity and recovery potential, and the density of roads in and near wetlands, the streams within the Upper Ochoco Creek Watershed are identified as being in relatively fair condition for sediment and turbidity. Based on overall road density, drainage density, and stream crossing density in Crystal Creek and Marks Creek, the flow and sediment regime conditions are relatively poor.

Table 100. Summary of existing condition in the Upper Ochoco Creek Watershed.

Subwatershed	Sediment/Turbidity	Flow/Sediment Regime
Upper Marks Creek	Fair	Poor
Overall	Fair	Poor
Status/Condition - All variables meeting standards = good; Some variables meeting standards = fair; Most or all variables not meeting standards = poor; No Data Collected (ND)		

Upper Marks Creek Subwatershed

The Ochoco Summit Project Boundary follows along Marks Creek and divides the subwatershed into a northwest portion that is outside of the project boundary and a southeast portion that fall within the project boundary. Upper Marks Creek Subwatershed flows into the Lower Marks Creek Subwatershed just upstream of the confluence of the Marks Creek and Little Hay Creek. The Upper Marks Creek Subwatershed within the project boundary encompasses Buck Creek, Crystal Creek, Deadman Creek, Marks Creek, Long Hollow Creek, Nature Creek, Rush Creek, and other unnamed stream channels. Marks Creek, Rush Creek, Deadman Creek, Crystal Creek, and unnamed tributaries to both Marks Creek and Crystal Creek are perennial fish-bearing streams in the Upper Marks Creek wubwatershed within the project boundary. There are two unnamed perennial non-fish-bearing streams that are tributaries to Crystal Creek in the Upper Marks Creek Subwatershed. Long Hollow Creek is an intermittent, fish-bearing stream and Buck Creek and multiple unnamed tributaries to Marks Creek are intermittent, non-fish-bearing streams in the Upper Marks Creek Subwatershed. Only approximately 200 feet of stream at the mouth of Buck Creek is included within the Ochoco Summit project boundary.

Marks Creek drainage has been subjected to a variety of anthropogenic impacts including: grazing on both private and public lands, culvert placement, reservoir construction on private land, impingement of road fills on active flood plains, water diversion, channel straightening, logging (clear cut or overstory removal, intermediate cut), precommercial thinning, road construction, housing

development, and off road travel. These activities alter sediment and hydrologic inputs and outputs, creating changes in channel dimension, planform, and longitudinal profile. Marks Creek has gone through periods of adjustment to accommodate these changing water and sediment inputs and outputs.

Columbia spotted frogs have been observed in Marks Creek. While fish are present, there is no ODFW fish population data available for Marks Creek or tributaries at this time.

Table 101 shows habitat survey reaches for streams in the Lower Deep Creek Subwatershed, and overall condition rating for each habitat parameter. Shaded boxes indicate that forest plan standards were not met or conditions were rated as "poor" at surveyed locations.

Table 101. Habitat indicator condition rating by surveyed reach in the Upper Marks Creek Subwatershed.

Stream Name & Survey Type	Survey Reach & Year	Shade (FP Standard)	Water Temperature	Bank Stability (FP Stanard)	Fine Sediment	Physical Barriers	Large Woody Debris	Pool Frequency	Pool Quality	Width/Depth Ratios
Crystal Creek – LII	1 - 2003		SEE TABLE 102 RATING = POOR	95% MET	26% POOR	POOR	4 POOR	43 POOR	0 POOR	16 GOOD
	2 - 2003			92% MET	47% POOR		1 POOR	18 POOR	0 POOR	13 GOOD
Marks Creek – LII	5 – 1992	17% DNM		81% MET			4 POOR	32 POOR	1 FAIR	
	7 - 1992	18% DNM		80% MET			0 POOR	37 POOR	0 POOR	
	8 – 1992	3% DNM		93% MET			0 POOR	21 POOR	1 FAIR	
Marks Creek – BLS	9 - 1992	31% DNM		89% MET			21 POOR			
Nature Creek - BLS	1 – 1995	52% DNM		99% MET			11 POOR	53 POOR		5 GOOD
	1 (TRIB) - 1995	61% DNM		99% MET			74 GOOD	32 POOR		3 GOOD

Table 102. Stream temperature rating by location and year in the Upper Marks Creek Subwatershed.

Site Name	Start Date	Stop Date	7-Day Average Maximum Temperature				Condition Rating
			#7-Day Averages Calculated	# <13.8°C	# 13.8°C – 17.8°C	# > 17.8 °C	
Crystal Creek, near confluence with Marks Creek	6/12/1996	10/08/1996	113	31	38	44	Poor
	5/24/1997	9/19/1997	113	5	44	65	Poor
	6/15/2001	9/17/2001	89	25	46	18	Fair
	7/03/2002	10/14/2002	98	71	27	0	Fair
	6/03/2003	9/16/2003	100	78	9	13	Fair
	6/19/2004	10/07/2004	105	32	31	42	Poor
Marks Creek, near confluence with Nature Creek	5/25/1995	7/18/1995	49	26	23	0	Fair
	4/11/1997	6/17/1997	60	41	19	0	Fair

Generally, aquatic habitat in the Upper Marks Creek Subwatershed at surveyed locations is rated as being in poor condition. This is especially true for shade, large woody debris, fine sediment, pool frequency and pool quality. Bank stability met forest plan standards at all surveyed locations and width/depth ratios were rated as "good" at all surveyed locations. Shade did not meet forest plan standards at any surveyed location and is clearly increasing stream temperatures. Stream temperatures rated fair or poor at every location for every year surveyed. Pools, large woody debris and shade are not properly functioning in the Crazy-Deep Creek Subwatershed, but banks are generally stable and meeting their potential. Temperatures are considered poor for redband trout survival in the Upper Marks Creek Subwatershed.

Table 103 summarizes the existing condition of streams for the two hydrologic issues identified for analysis within the Upper Marks Creek Subwatershed. Based on stream surveys and existing Forest Service data layers, the Upper Marks Creek Subwatershed was found to have fair slope erosion hazard conditions and moderate road density conditions within 300 feet of perennial and intermittent streams. In addition, this subwatershed was found to have moderate road densities within identified wetlands and the associated RHCAs. Based on the channel type derived from stream survey field measurements, Marks Creek and Crystal Creek are expected to have very high channel sensitivity to disturbance and good recovery potential. In addition, this subwatershed has poor stream crossing density, poor road density, and fair drainage density existing conditions relative to potential effects to peak flows from connectivity of roads and streams.

Table 103. Summary of stream condition and impairments in Upper Marks Creek Subwatershed.

Stream	Sediment/Turbidity				Flow/Sediment Regime		
	Slope Erosion Hazard	Road Density w/in 300' of Streams	Channel Sensitivity/ Recovery Potential	wetland	Road Density	Drainage Density	Stream Crossing Density
Crystal	Fair	Moderate	Fair	Moderate	High	Moderate	High
Marks			Fair				
Overall	**Fair**	**Fair**	**Fair**	**Fair**	**Poor**	**Fair**	**Poor**

Direct and Indirect Effects

Effects Common to All Alternatives

Henderson Flat on the Crooked River National Grassland and the Green Mountain Trail on Lookout Mountain Ranger District are currently the only two designated OHV trails on the Ochoco National Forest. The Forest was generally open to motor vehicle use unless designated closed until the Record of Decision for the Travel Management Plan was signed in 2011.

Construction of culverts can cause increases in sedimentation in streams that may reduce overall pool volume. Reducing pool volume for fish reduces hiding cover, resting and feeding areas and increases stream temperature. Construction of trails within the 300-foot sediment delivery zone would continue to deliver sediment into streams. In Class I and II streams, increased sediment would affect fish habitat by filling pools and increasing fine sediment affecting fish and frog reproduction success. There may be a short-term effect at stream crossing and trail construction sites within 300 feet of streams where pools decrease in volume following construction, but these would be scoured out after the next large flow and would return to pre-project levels. Appropriate project design criteria and best management practices would minimize sediment delivery during construction. Construction of trails and stream crossings would have no effect on stream temperatures.

Within the project area there are several streams with assessed water quality impairments related to summer water temperature. These include Double Corral Creek, Fox Creek, Happy Camp Creek,

Howard Creek, Indian Creek, Jackson Creek, Little Summit Creek, Marks Creek, North Wolf Creek, Ochoco Creek, Peterson Creek, Porter Creek, and Toggle Creek. These streams are on Oregon's 2004/2006 Section 303(d) List of "Water Quality Limited Waterbodies." The Oregon State Water Quality Standards states that the seven-day-average maximum temperature of a stream identified as having salmon and trout rearing and migration use, including the streams within the project area, may not exceed 18.0 degrees Celsius (64.4 degrees Fahrenheit). No measurable increase in water temperature from management practices is allowed in these streams. In order to address potential stream temperature effects from trail construction in the Ochoco Summit OHV Project Area, design criteria are included that prevent the removal of shade producing trees on streams on the 303(d) list for water temperatures. Any exceptions would be reviewed on a case-by-case basis by a fisheries biologist or hydrologist (for example, if the project hydrologist or fisheries biologist found that the vegetation in question was not actually contributing shade to the stream channel). These design criteria would prevent a reduction of shade on streams in the project area, resulting in no increase in stream temperatures.

Overall, project activities would have very limited effects on large woody debris, both active and potential. In terms of active large woody debris, there may be pieces of large wood removed where stream crossings are proposed to be installed, but these pieces of active wood would be moved either upstream or downstream of the site to maintain large wood numbers in project watersheds. In terms of potential large woody debris, there may be very localized reductions in large wood where trees are removed near stream crossings or where trails closely parallel a stream channel to accommodate trail construction or reconstruction. Removal of potential large wood could be so localized and minimal that there would be no effect on recruitable large wood in these watersheds as a whole. Where opportunity exists, trees that need to be removed from stream crossing construction would be placed in the stream channel to further improve large wood numbers in project area streams.

Overall, project activities would have very limited effects on width/depth ratios in all streams within the project area. When streams are impacted by human activities, they generally respond by becoming shallower and wider. Width/depth ratios are generally altered by human activities such as installation of undersized and forded stream crossings, grazing, reduction of bank stability (usually through the removal of riparian vegetation) and large increases in sediment loads. In terms of the Ochoco Summit Project, stream crossings would be designed to meet and exceed bankfull width and include floodplain within the pipe or under the bridge, removal of bank stabilizing vegetation would be very minimal and only occur at new stream crossings sites, and sediment analysis shows that compared to natural background sedimentation, the project would contribute insignificant amounts to alter instream width/depth ratios. Appropriate project design criteria would also minimize sedimentation from stream crossing installation. Bank disturbance and vegetation removal would be so minimal that there would be no effect on instream width/depth ratios.

As with large woody debris, project activities would have very limited effects on pools. As with width to depth ratios, sediment analysis shows that compared to natural background sedimentation, the project would contribute insignificant amounts of sediment and thus pool filling is not an issue. Pool filling from bank disturbance is unlikely to occur as well because crossings would be at stable locations. Likewise, large woody debris would be unaffected by the project, so pools associated with large wood would also be maintained. Sedimentation and bank instability would be so minimal that there would be no effect to pools in these watersheds as a whole.

Project activities would have very limited effects on bank stability. The highest likelihood for impacts in terms of bank stability is at stream crossing locations, especially fords. Where bridges and fords are proposed, project design criteria were designed to appropriately size these crossings to prevent downstream bank stability issues (ie. sized for the 100-year flood). Project design criteria such as limiting stream approaches to the area of least grade and hardening stream approaches would

prevent widespread bank instability due to the Ochoco Summit Project. Bank instability due to the project would be so minimal there would be no effect to bank stability in any project area streams.

Alternative 1

The Record of Decision for the Travel Management Project was signed in September 2011 and implementation began in January 2012. The decision does the following:

- Limits motor vehicle use to designated roads, trails, and areas shown on the Motor Vehicle Use Maps;
- Designates some gravel pits open to motorized access;
- Creates new conditions for motor vehicle access off of designated roads for dispersed camping; and
- Changes some system roads to highway legal vehicle use only.

No existing open designated roads or motorized trails were closed as a result of the decision; however, changes to cross-country travel, motorized access for dispersed camping, and motorized mixed use (highway legal and non-highway legal vehicles) of some system roads were made. Cross-country travel is no longer allowed on the Ochoco National Forest. Motorized access for dispersed camping is only allowed to existing sites within 300 feet of roads shown on the Motor Vehicle Use Map and motor vehicles cannot drive closer than 30 feet to any wetland, stream, or water body at dispersed campsites. The decision makes no changes to developed campgrounds and does not apply to over-snow motorized travel or permitted activities such as firewood cutting.

Under Alternative 1, the No Action Alternative, no trails would be added for use specifically by any type of all terrain vehicles. Travel would only be allowed as designated by the Motor Vehicle Use Maps and no trails would be created for ATV, 4x4, or motorcycle trails would be added. In general, this alternative represents the continuation of existing condition; however, since the Travel Management Decision was not implemented until starting in January 2012, the effects of this decision have not been realized in the Ochoco Summit Project Area. It would be expected that with the cessation of cross-country travel by all terrain vehicles across the Ochoco National Forest that watershed health indicators would improve somewhat, though the user created trails would remain on the landscape for a period of time until they naturally revegetated or future projects are proposed and implemented to decommission these user-created, non-system roads.

Effects Common to All Watersheds

Flow and Sediment Regimes

Implementation of the no action alternative would allow for existing user-created roads by all terrain vehicles to heal, reducing the connectivity slightly between streams and roads (including user-created). System roads designated as Level 2, 3, 4 or 5, however, would remain open to use by the public and therefore the system road density and stream crossing density would remain the same as the existing condition and peak flows would not have the potential to increase as a result. The flow and sediment regime existing conditions as described in the existing conditions section of this report would continue to exist in the Ochoco Summit Project Area watersheds with slight improvements over time as the effects of implementation of the Travel Management Decision are realized.

Sediment/Turbidity

Implementation of the no action alternative would provide for the greatest improvements to streambank alteration and vegetative conditions within the shortest time frame. There would be no all terrain vehicles crossing streams, directly impacting streambanks at crossing locations. There would be no further effects to width-to-depth ratio, entrenchment, or sediment yield than what currently exists. In addition, by reducing the density of user created roads and stream crossings, peak flows

would not be affected or would slightly decrease as a result, in turn maintaining or slightly decreasing bank erosion downstream of stream crossings.

In addition to improved bank stability, Alternative 1 would maintain or slightly reduce the density of roads, in the form of user-created roads, within the vicinity of streams and wetlands. By reducing the overall road densities, less sediment would be delivered to streams and wetlands, resulting in improved water quality. Improved water quality would then improve habitat for fish and wildlife that may inhabit these areas.

Rates of recovery would be expected to vary across this project area and are very dependent on the degree of impact, soil condition, habitat type, topography, etc. Streambanks that already have a riparian vegetation component present are expected to recover more quickly than areas that are previously altered that lack a riparian vegetation component. Streambanks with vertical cutbanks would take much longer to recover due to the adjustment of bank slopes to non-vertical, even if cross-country travel is eliminated.

The channel sensitivity and recovery potential of streams in the Ochoco Summit Project Area vary from stream to stream by channel type (Rosgen 2009). Most of the surveyed stream channels within the project area are gravel dominated and consist mostly of moderately steep, moderately sinuous, moderately entrenched stream channels (B type-channels) and slightly entrenched, moderately to high sinuosity, and less step stream channels (C type-channels). Gravel-dominated B channel types have a moderate sensitivity to disturbance and an excellent recovery potential while gravel-dominated C channel types have a very high sensitivity to disturbance and a good recovery potential (Rosgen 2009). Short portions of streams in the project area are characterized as G-type channels, one such reached was identified by a stream survey in Peterson Creek. The B and C channel type streams would recover more rapidly than the G-type segments of stream. Areas that are currently entrenched (G and F-type channels) would remain as such until vertical side slopes naturally adjust and become vegetated. The return to original conditions (pre-European) on some sites would be very slow or non-existent (Laycock 1989; Winward 1991). Sediment yield from these entrenched systems would continue to exist, but would decline as streambanks adjust slope and become vegetated.

Overall, this alternative would have the least adverse impacts to streambanks across all Ochoco Summit Project Area subwatersheds. Implementation of a cessation of cross-country travel across the Ochoco National Forest would facilitate a more rapid increase than is presently occurring in bank stability and prevent loss of bank stabilizing riparian vegetation. Areas that are currently entrenched (G and F-type channels) would continue to adjust and may take several decades to become stable with vegetation. Sediment yield from these entrenched systems would continue to exist, but would decline as streambanks adjust slope and become vegetated.

Determination of Effects for Aquatic Species

There would be no impact to redband trout or Columbia spotted frogs as there are no trails proposed in Alternative 1. As the Travel Rule is enforced, off road travel will be restricted to designated routes as shown on the Motor Vehicle Use Maps (MVUM). User created routes and closed roads used by off-road travel will still exist. They will not be closed or maintained.

Existing sediment contributions from user-created trails that were not properly closed following implementation of the Travel Rule, closed roads, and decommissioned roads will continue to contribute sediment. Within the 300-feet sediment delivery zone, erosion from fording streams, springs, and ponds and using closed roads not properly maintained within RHCAs may continue to contribute sediment to streams. In particular, rutted user-created trails will also continue to contribute fine sediment to streams. Severely rutted trails through wet meadows can dewater portions of the meadow, loss of meadow vegetation, and potentially lead to weed infestations. Other sites could revegetate over time but would likely take years to reestablish, depending on the site conditions.

Success would depend on browse by ungulates in the woody vegetation areas and the ability of uplands to restore where there are ruts used by OHVs.

Alternative 2

Alternative 2, the Proposed Action, focuses on designating motorized trails and supporting areas, in conjunction with opportunities that would remain on mixed use roads identified in the forest-level Travel Management EIS. Alternative 2 proposes a total of 69 miles of Class I vehicle (ATV) trails or roads, 48 miles of Class II vehicle (jeep, small truck and buggy) trail/roads, and 52 miles of Class III vehicle (motorcycle) trail/roads. These projects would result in more effects to the streams and watersheds within the Ochoco Summit Project Area as compared to Alternative 1, the no action alternative. In the short-term with the implementation of Alternative 2, sediment delivery would increase; however, in the long-term, once user-created trails have revegetated or are rehabilitated/restored (as prioritized), sediment delivery to streams should decrease to levels below the existing condition. This is because Alternative 2 was designed to avoid sensitive areas where existing unauthorized trails may be located, and the rehabilitation of these user-created trails would have greater reductions in sediment delivery compared to Alternative 1. Additionally, the trail system proposed under Alternative 2 would have appropriate drainage and maintenance applied, which would help reduce overall sediment delivery from the trail system.

Alternative 2 addresses the Purpose and Need as outlined in Chapter 1 by proposing develop a trail network that includes 124 miles of proposed OHV trail and 45 miles of open National Forest System roads that connect trail segments or contribute to the network by providing alternate “get-back” routes or other recreational experiences. The motorized trails would be open for use by specified vehicle type, seasonally between May 1 and November 1 of each year to reduce sediment delivery when trails are wet and for wildlife protection, except on Paulina Ranger District, where trails would close at the beginning of the restriction period specified for the Rager Cooperative Travel Management Area, and would remain closed until May 1 of each year. This alternative features several interconnected trails systems:

1. Of the total 69 miles in the Class I vehicle (ATV) network, 14 miles are on open roads, 25 miles are on closed or decommissioned road beds and 30 miles are not on NFS roads. This would allow for up to 55 miles of 50” wide trail through conversion of old road beds and new trail construction combined. In addition all Class II trails would be available for use by ATVs. Mixed use roads identified under the current Travel Management Plan would also remain available for use by ATVs.
2. Of the total 48 miles in the Class II vehicle (jeep, small truck and buggy) network, 28 miles are on open roads, 8 miles are on closed or decommissioned road beds and 12 miles are not on NFS roads. This would allow for up to 20 miles of 80” wide trail through conversion of old road beds and new trail construction combined. Mixed use roads identified under the current Travel Management Plan would remain available for use by non-highway-legal jeeps and buggies and highway-legal vehicles would have access to all roads identified as open in the current Travel Management Plan.
3. Of the total 52 miles of Class III vehicle (motorcycle) network, 4 miles are on open roads, 23 miles are on closed or decommissioned road beds and 26 miles are not on NFS roads. This would allow for up to 49 miles of 24” wide trail through conversion of old road beds and new trail construction combined. In addition all Class I and II trails would be available for use by motorcycles. Mixed use roads identified under the current Travel Management Plan would remain available for use by non-highway-legal motorcycles, and highway-legal vehicles would have access to all roads identified as open in the current Travel Management Plan.

In Alternative 2, similar to Alternatives 3 and 4, the OHV trail is proposed in Deep Creek, Lower Beaver Creek, Upper North Fork Crooked River, and Upper Ochoco Creek Watersheds. Alternative 2 trail has a "community support" area to develop a trail system with sufficient size and character to provide a good chance of success from the standpoint of eliminating unauthorized cross-country travel by OHV users in the project area , and while reducing impacts to the most sensitive areas and areas with the high potential for social conflicts.

Project design criteria were developed for stream crossings and stream approaches to reduce trail surface erosion during high precipitation months of May and October (USDA 2006). The trail would be open seasonally between May 1st and November 1st. The trail system is proposed to be open during critical spawning dates for fish that is from March to the end of June and breeding season for frogs that varies from early March through the end of May (Wydoski and Whitney 1979). The timing of egg laying is largely a function of water temperature at the oviposition (laying and depositing eggs) site, but other factors such as photoperiod and water temeprature likely triggered movement of frogs to the oviposition site (Bull and Shepherd 2003).

Effects Common to All Watersheds

Flow and Sediment Regimes

Relative to the no action alternative, proposed trails in Alternative 2 would increase the overall road/trail density and stream crossing density. Increased road/trail densities have the potential to in effect increase drainage density, resulting in increased connectivity and peak flow magnitudes. Alternative 2 includes hydrologically stabilizing and closing unauthorized trails that are not part of the Ochoco Summit trail system, which would help decrease the amount of time for recovery and eliminate sediment and other stream impacts once implemented (as funding allows). However, this alternative, as designed, would not exacerbate existing water quality issues because of design criteria and proper management and maintenance over time.

Sediment/Turbidity

Overall, this alternative would reduce impacts relative to water quality, in particular sediment and turbidity, as compared to Alternative 1. Relative to OHV cross-country travel, sediment and turbidity related water quality would be maintained or slightly improved through an overall reduction in the number of stream and wetland crossing locations, improved stream crossing types, improved trail drainage, reduction in the miles of trail in the vicinity of perennial and intermittent streams, and anticipated decreased peak flow magnitudes.

Alternative 2 would have more impact on streambanks as compared to the no action alternative with increased stream crossings and potential disturbance during culvert or bridge installation. Areas that are currently entrenched (G and F-type channels) would continue to adjust and may take several decades to become stable with vegetation. Sediment yield from these entrenched systems would continue to exist, but would decline as streambanks adjust slope and become vegetated. However, appropriate design criteria and proper management and maintenance of the trail system proposed in Alternative 2 would not exacerbate water quality issues in the project area.

As the effects of the implementation of the Travel Management Decision that omits cross-country travel across the Ochoco National Forest are realized, impacts to Groundwater-Dependant Ecosystems (wetlands) in the form of wetlands, wet meadows, and springs would be reduced even with the designation of the trail network in Alternative 2. User created trails across wetlands would naturally revegetate over time and trails that cross wetlands would have minimal effect through the implementation of the design criteria. Design criteria state that trails would either be rereouted to "avoid meadows, seeps, and springs" or "puncheon stringers" would need to be installed that would elevate the trail above the wetland. Overall, however, Alternative 2 would have slightly more effect

on wetlands through increased road/trail densities in and within wetland RHCAs through increased disturbance levels compared to the no action alternative.

In the short-term with the implementation of Alternative 2, sediment delivery would increase. However, in the long-term, once most user-created trails have revegetated or are rehabilitated/restored (as prioritized), sediment delivery to streams should decrease to levels below the existing condition. User-created trails that have been created over time do not have proper drainage, are not maintained, and cross over a larger portion of the landscape including across streams. These unauthorized trails that are not part of the proposed system would be rehabilitated on a case-by-case basis, whether it is simply a barrier to eliminate traffic, to adding large woody material over the trail, to ripping the entire trail surface and planting. By designating the trail system in Alternative 2, erosion and sediment delivery to the stream channel is mitigated by the design criteria that require outlsloping and hardening approaches to stream crossing, installing rolling dips to disperse water from the trail, by reducing the number of locations where OHVs illegally cross intermittent and perennial streams, and by reducing the density of illegal trails within the sediment delivery zone (300 feet). Reduced peak flows also dissipate the effects of sediment delivery to streams by reducing the potential for rilling to occur along the trails or where flow is diverted off the trail onto the hillslope above the stream channel. BMPs have proven effective at limiting rilling from occurring along OHV trail systems.

Overall, this alternative would be consistent with the water goals and maintaining cutbank levels to below 20 percent as outlined in the LRMP. This alternative would be consistent with the Riparian Management Goal of maintaining bank stability greater than 80 percent outlined in INFISH and with the RMO. This alternative would protect designated beneficial uses and would be consistent with the Clean Water Act and Executive Orders 11988, 11990, and 12088. Site specific locations in the Deep Creek Watershed, however, would not be consistent with the purpose and need of the Deep Creek Restoration. A more detailed description of these locations is provided in the watershed specific section of this report.

Based on the analysis below, there would be no effect to pools in any of the project subwatersheds. Pools were identified as an indicator for redband trout. Because of the extremely small contribution in terms of fine sediment from construction and maintenance of the Ochoco Summit trail system (see Table 104) there would be no pool filling and thus pools would be maintained in all project subwatersheds.

Lower Beaver Creek Watershed

Alternative 2 proposes 9.1 miles of Class III trail within the Lower Beaver Creek watershed. Approximately, 4.1 miles of the total are proposed on existing Forest Service system roads and approximately 5.0 miles would be new trail construction. Approximately 0.2 miles of new trail and 1.0 miles of trail on existing roads in the Lower Beaver Creek watershed are located within the sediment delivery zone of 300 feet from perennial or intermittent streams. A total of three existing stream crossings are proposed for use, all of which cross intermittent streams.

North Wolf Creek Subwatershed

Within the North Wolf Creek wubwatershed, approximately 3.2 miles of existing Forest Service system road, mostly closed roads, and approximately 1.2 miles of new trail are proposed to be constructed as part of Alternative 2. The 1.2 miles of new trail are predominately along ridges and in areas not adjacent to stream channels. Approximately 0.2 mile of the proposed of trail in the North Wolf Creek Subwatershed is located within the sediment delivery zone of 300 feet from perennial or intermittent streams and, therefore, analyzed relative to hydrology and water quality. A total of three existing stream crossings are proposed for use, all of which cross intermittent streams.

Flow and Sediment Regimes

Designating Class III trails in the Alternative 2 proposed locations in the North Wolf Creek Subwatershed would have the effect of improving flow and sediment regime conditions in the long-term, relative to past cross-country travel, and would essentially maintain flow and sediment conditions, relative to the no action alternative. By adding approximately 1.2 miles of trail to the overall subwatershed road/trail network, the road/trail densities would increase somewhat 3.0 to 3.3 miles per square mile. However, relative to the overall range in existing road densities across the Ochoco Summit project area, the rating for road/trail densities would remain moderate. Drainage densities are relatively high (2.9 miles per square mile). However, by not adding any new intermittent or perennial stream crossings in the North Wolf Creek Subwatershed, the overall stream crossing density would remain the same at 3.3 crossings per square mile with a moderate rating. In addition, all of the trails proposed within this subwatershed as part of Alternative 2 are Class III trails, designed for 24-inch wide motorcycle clearance, which would have much less disturbance and potential for capture of drainage as compared to the wider Class I and Class II trails. Since the majority of the trails proposed in the North Wolf Subwatershed are located on existing roads and the new trails do not cross intermittent or perennial stream channels, this minor increase in road/trail densities across the subwatershed is not likely to increase the flow and sediment regime relative to the existing condition.

Sediment/Turbidity

Designating Class III trails in the Alternative 2 proposed locations in the North Wolf Creek Subwatershed would have the effect of improving water quality conditions in the long-term, relative to past cross-country travel, and would essentially maintain water quality conditions, relative to the no action alternative. Approximately 0.2 miles of trail would be added within 300 feet of an intermittent stream, no new stream crossings would be added, and no new trail is proposed that crosses known wetlands within the forest boundary portion of the subwatershed.

By adding approximately 0.2 miles of trail to the road/trail network within the sediment delivery zone of streams in the North Wolf Creek Subwatershed, the road/trail densities would increase slightly from 6.3 to 6.4 miles per square mile within 300 feet of streams. However, relative to the overall range in existing road densities across the Ochoco Summit project area, the rating for road/trail densities within 300 feet of streams would remain moderate. Slope Erosion Hazard Ratings are relatively high. However, by not adding any new intermittent or perennial stream crossings and only minimal trail length near streams in the North Wolf Creek Subwatershed, the additional erosion potential from the 0.2 additional miles of trail is not expected to measurably increase sediment delivery to the streams or stream turbidity in the North Wolf Creek Subwatershed.

Table 104 displays estimated sediment contribution from road/trail crossings and road/trail segments within 300 feet of streams in project area subwatersheds, and compares these contributions to estimated natural background hillslope sediment production. Table 104 also displays estimates of existing road sediment contributions and compares these contributions, along with those estimated for actions in Alternative 2, to natural background hillslope sediment production. In the North Wolf Creek Subwatershed, natural background sedimentation is estimated at 215 tons/year. The total estimated contribution from all road/trail crossings and all adjacent road/trail segments is approximately 0.1 tons/year. This equates to a 0% increase over natural background sediment in the North Wolf Creek Subwatershed. The existing road system along with actions proposed under Alternative 2 is estimated to produce approximately 4% of natural background sediment.

Effects to Aquatic Species

Based on the 0% increase in sediment over natural background levels (see Table 104), there would be no effect on stream aggradation in the North Wolf Creek Subwatershed from project activities (C

channels experience an increase in stream channel aggradation when sediment increases are over 35% of natural background [Stowell et al. 1983]). Sediment-habitat response curves in Stowell et al. (1983) also indicate that fine sediment depth does not increase appreciably when sediment yield increases 50% over natural background. In terms of habitat-fish response, percent fine sediment by depth is estimated to have no impact on fry emergence if percent fine sediment is under 20%. The proposed activities in the North Wolf Creek Subwatershed would not increase instream fine sediment to the point of adversely affecting fry emergence over existing condition levels (0% increase in sediment over natural background conditions compared to 50% increase in natural background referenced in Stowell et al. 1983).

Based on this information, redband trout and Columbia spotted frog would be unaffected long-term in the North Wolf Creek Subwatershed under actions proposed in Alternative 2. There would also be no effect on aquatic habitat, especially since the majority of the trails proposed are located on existing roads and the new trails do not cross intermittent or perennial streams channels.

Upper North Fork Crooked River Watershed

Alternative 2 proposes approximately 44 miles of OHV trail on closed roads, decommissioned roads, and new routes. Approximately 34 miles of designated trail system would be on existing open roads. A total of 24 new and 40 existing intermittent and perennial stream crossings are proposed for use. Alternative 2 proposes approximately 25 miles of Class I trail, approximately 45 miles of Class II trail, and approximately 8.6 miles of Class III trail within the Upper North Fork Crooked River watershed. Approximately 12 miles of Class I trail, 33 miles of Class II trail, and 4.2 miles of Class III trail are proposed on existing Forest Service system roads.

Approximately 13 miles of Class I trail, 12 miles of Class II trail, and 4.4 miles of Class III trail would be added to the existing Forest Service system road network. Approximately 6.8 miles of new trail and 16.8 miles of trail on existing roads in the Upper North Fork Crooked River watershed are located within the sediment delivery zone of 300 feet from perennial or intermittent streams. There are 3 stream crossings on Class I streams, 9 crossings on Class II streams, 2 stream crossings on Class III streams, and 50 stream crossings on Class IV streams.

Elliott Creek Subwatershed

Within the Elliott Creek Subwatershed, approximately eight miles of trail are proposed on closed roads, decommissioned roads and new routes. Approximately six miles of trail are proposed on existing open roads. Approximately 7.7 miles of Class I trail and 2.5 Class III trail are located on existing Forest Service system road and approximately 2.5 miles of Class I trail and 2.2 miles of Class III new trail are proposed to be constructed as part of Alternative 2. Alternative 2 proposes for Class I trails to cross perennial and intermittent streams at 12 locations at existing stream crossings on existing roads and to cross perennial and intermittent streams with new trails at five locations. In addition, Class III trails are proposed to cross perennial and intermittent streams at one location at an existing stream crossing on an existing road and to cross perennial and intermittent streams with new trails at four locations.

The Maxwell Fire BAER rehabilitation road treatments included rehabilitation work on segments of two roads within the Elliot Creek Subwatershed, FS 2200-505 and FS 2200-500, for purposes of reducing sedimentation into streams due to the effects of vegetation removed in the Maxwell Fire in the Allen Creek watershed. These roads were closed. Crrently this closure has been breached and Allen Creek has been forded by unauthorized OHV use. Under Alternative 2, an appropriate crossing (bridge or culvert) would be installed to protect stream resources.

Approximately 0.04 miles of Class I trail overlap FS 2200-500 where water bars were recommended for installation to enable roads to better handle expected surface runoff increases. Approximately 0.24 miles of Class I trail overlap FS 2200-505, which crosses one intermittent and one perennial

tributary to Elliott Creek and parallels the stream within the RHCA for almost the entire segment length. The crossing over the perennial tributary to Elliott Creek was undersized and was removed and replaced with rock ford as part of the Maxwell Fire BAER rehabilitation. Based on design criteria, implementation of the Alternative 2 trail system would require installation of a culvert or bridge at this stream crossing location. Based on the BAER report for the Maxwell Fire, the vegetative recovery period was seven years, which would indicate hydrologic recovery should have occured by the end of the summer of 2013. Vegetation would need to be recovered from Maxwell Fire before trail construction begins.

Flow and Sediment Regimes

Constructing new Class I and III trails and stream crossings at the locations proposed in Alternative 2 in the Elliott Creek Subwatershed may improve somewhat the flow and sediment regime conditions in the long-term relative to past cross-country travel. However, compared to the no action alternative, it could increase the effects of flow and sediment regime on the subwatershed by increasing road/trail densities and stream crossing densities overall. By adding approximately 4.7 miles of trail to the overall subwatershed road/trail network, the road/trail densities increase somewhat from 3.3 to 3.6 miles per square mile, increasing trail/road density conditions from low to moderate relative to the overall range in existing road densities across the Ochoco Summit Project Area. Drainage densities are relatively high (2.8 miles per square mile), and by adding nine new intermittent or perennial stream crossings to the existing number of stream crossings by roads in the Elliott Creek Subwatershed, the overall stream crossing density increases from 3.4 to 4.0 crossings per square mile, bringing the overall rating up from moderate to high relative to the other Ochoco Summit Project Area subwatersheds analyzed. Overall, slope erosion hazard conditions are high in the vicinity of streams in the Elliott Creek Subwatershed, which can make interconnectivity of roads and streams more likely potentially resulting in increased peak flows in streams. Increases in the road/trail and stream crossing densities across the Elliott Creek Subwatershed, in combination with poor slope erosion hazard conditions, potentially increases the flow and sediment regime relative to the existing condition. Project design criteria would help mitigate these effects.

Sediment/Turbidity

Designating Class I and III trails and constructing new trails and stream crossings at the locations proposed in Alternative 2 in the Elliott Creek Subwatershed may improve somewhat the bank stability and sediment delivery conditions in the long-term relative to past cross-country travel. However, compared to the no action alternative, it could increase the sediment delivery to streams and exacerbate bank stability conditions at some site-specific locations in the subwatershed. In the short-term with the implementation of Alternative 2 in this subwatershed, sediment delivery would increase. However, in the long-term, once most user-created trails have revegetated or are rehabilitated/restored (as prioritized), sediment delivery to streams should decrease to levels below the existing condition.

Approximately 2.0 miles of trail would be added within 300 feet of an intermittent stream, nine new stream crossings would be added, and 0.2 miles of trail are proposed that intersect wetlands or their RHCAs within the forest boundary portion of the subwatershed. By adding approximately 2.0 miles of trail to the road/trail network within the sediment delivery zone of streams in the Elliott Creek subwatershed, the road/trail densities increase from 4.3 to 4.6 miles per square mile within 300 feet of streams. However, relative to the overall range in existing road densities across the Ochoco Summit project area, the rating for road/trail densities within 300 feet of streams would remain as low. The addition of 0.2 miles of trail within wetlands and associated RHCAs would raise road densities in wetlands from approximately 2.8 to 3.0 miles per square mile, maintaining a low rating relative to other project subwatersheds. Slope Erosion Hazard Ratings are relatively high, making erosion and potentially sediment delivery more likely in the subwatershed.

Existing bank stability in Fox Creek, the only stream in the Elliott Creek Subwatershed with a Level II stream survey conducted, is relatively good and met LRMP standards as of 2002. In addition, the dominant channel type of Fox Creek has moderate channel sensitivity and recovery potential. Other reaches of Fox Creek are classified as A4 and C4 channel types. A4 channel types generally have extreme channel sensitivity and very poor recovery potential, while C4 channel types generally have very high channel sensitivity and good recovery potential. No new trails are proposed to cross or parallel Fox Creek. Assuming that other streams in the Elliott Creek Subwatershed exhibit similar dominant channel type conditions and the implementation of design criteria that require the installation of a culvert or bridge installation that meets the 100-year flow event as well as armored approaches, bank stability is likely to be maintained, unless increased peak flows result from increases in road/trails and stream networks.

Based on high Slope Erosion Hazard conditions, increases in both road/trail densities within the sediment delivery zone, and increases in stream crossing densities, Alternative 2 proposed new trails have the potential to increase sediment delivery to streams; however, bank stability is likely to be maintained.

Table 104 displays estimated sediment contribution from road/trail crossings and road/trail segments within 300 feet of streams in project area subwatersheds and compares these contributions to estimated natural background hillslope sediment production. Table 104 also displays estimates of existing road sediment contributions and compares these contributions, along with those estimated for actions in Alternative 2, to natural background hillslope sediment production. In the Elliott Creek Subwatershed, natural background sedimentation is estimated at 421 tons/year. The total estimated contribution from road/trail crossings and adjacent road/trail segments is approximately 16.2 tons/year. This equates to a 4% increase over natural background sediment in the Elliott Creek Subwatershed from the proposed action.

Effects to Aquatic Species

Based on the 4% increase in sediment over natural background levels (see Table 104), there would be no effect on stream aggradation in the Elliott Creek Subwatershed from project activities (C channels would experience an increase in stream channel aggradation when sediment increases are over 35% of natural background; Stowell et al 1983). Sediment-habitat response curves in Stowell et al. (1983) also indicate that fine sediment depth does not increase appreciably when sediment yield increases 50% over natural background. In terms of habitat-fish response, the percentage of fine sediment by depth is estimated to have no impact on fry emergence, if it is under 20%. The proposed activities in the Elliott Creek Subwatershed would not increase instream fine sediment to the point of adversely affecting fry emergence over existing condition levels (4% increase in sediment over natural background conditions from project activities compared to 50% increase in natural background referenced in Stowell et al 1983).

Based on this information, redband trout and Columbia spotted frog would be unaffected long-term in the Elliott Creek Subwatershed under actions in Alternative 2. Short-term sediment inputs from trail construction, especially at stream crossings, may have negative effects during construction when turbidity is high. These negative effects may include fish displacement during times of high turbidity, limited feeding, and possible mortality.

Howard Creek Subwatershed

Within the Howard Creek Subwatershed, approximately 10 miles of trail are located on closed and new routes. Approximately 1 mile of trail is proposed on existing open roads. Approximately 1.5 miles of Class I trail and 1.8 miles of Class III trail are located on existing Forest Service System Road and approximately 5.5 miles of Class I trail and 2.1 miles of Class III new trail are proposed to be constructed as part of Alternative 2. Alternative 2 proposes for Class I trails to cross perennial and

intermittent streams with new trails (new stream crossings) at four locations. In addition, Class III trails are proposed to cross perennial and intermittent streams at one location at an existing stream crossing on an existing road.

Flow and Sediment Regimes

Designating Class I and III trails and constructing new trails and stream crossings at the locations proposed in Alternative 2 in the Howard Creek Subwatershed may improve somewhat the flow and sediment regime conditions in the long-term relative to past cross-country travel. However, compared to the no action alternative, it could increase the effects of flow and sediment regime in the subwatershed by increasing road/trail densities and stream crossing densities overall. By adding approximately 7.6 miles of trail to the overall subwatershed road/trail network, the road/trail densities increase from 4.6 to 5.1 miles per square mile, both of which are high relative to the overall range in existing road densities across the Ochoco Summit project area. Drainage densities are relatively moderate (2.2 miles per square mile) and by adding four new intermittent or perennial stream crossings to the existing number of stream crossings by roads in the Howard Creek Subwatershed, the overall stream crossing density would increase from 4.1 to 4.4 crossings per square mile; both of these densities are high relative to the other Ochoco Summit project area subwatersheds analyzed. Overall, slope erosion hazard conditions are moderate in the vicinity of streams in the Howard Creek Subwatershed. Increases to the already high road/trail and stream crossing densities across the Howard Creek Subwatershed have the potential to increase peak flows and shorten response times relative to the existing condition.

Sediment/Turbidity

Designating Class I and III trails and constructing new trails and stream crossings at the locations proposed in Alternative 2 in the Howard Creek Subwatershed may improve somewhat the bank stability and sediment delivery conditions in the long-term relative to past cross-country travel. However, compared to the no action alternative, it could increase the sediment delivery to streams. In the short-term with the implementation of Alternative 2 in this subwatershed, sediment delivery would increase. However, in the long-term, once most user-created trails have revegetated or are rehabilitated/restored (as prioritized), sediment delivery to streams should decrease to levels below the existing condition.

Approximately 1.4 miles of trail would be added within 300 feet of an intermittent stream, four new stream crossings would be added, and 1.1 miles of trail are proposed that intersect wetlands or their RHCAs within the forest boundary portion of the subwatershed. By adding approximately 1.4 miles of trail to the road/trail network within the sediment delivery zone of streams in the Howard Creek Subwatershed, the road/trail densities would increase from 8.2 to 8.6 miles per square mile within 300 feet of streams; both of these densities are high relative to the other Ochoco Summit project area subwatersheds analyzed. The addition of 1.1 miles of trail within wetlands and associated RHCAs raises road densities in wetlands from approximately 6.9 to 7.4 miles per square mile, bringing the overall rating up from moderate to high relative to the other subwatersheds.

Existing bank stability in surveyed streams in the Howard Creek Subwatershed is relatively good and met LRMP standards between 1994 and 2001; it likely meets standards currently, too. In addition, the dominant channel types of streams in the subwatershed are B4 channel types, which have moderate channel sensitivity and excellent recovery potential. At the location of the new Class I trail stream crossing on Howard Creek, the channel type indicates that the channel should have low streambank erosion potential. No channel type information was gathered for the remaining three new stream crossings in the Howared Creek Subwatershed. Dominant channel types in Howard Creek, South Fork Howard Creek, and West Fork Howard Creek indicate moderate channel sensitivity and excellent recovery potential, whereas dominant channel type in East Fork Howard Creek indicate very high channel sensitivity and good recovery potential of the stream. Assuming that other streams

in the Howard Creek Subwatershed exhibit similar dominant conditions to Howard Creek and the implementation of design criteria that require the installation of a culvert or bridge installation that meets the 100-year flow event as well as armored approaches, bank stability is likely to be maintained.

Based on increases in both road/trail densities within the sediment delivery zone and within and near wetlands, Alternative 2 proposed new trails have the potential to increase sediment delivery to streams. However, bank stability is likely to be maintained.

Table 104 displays estimated sediment contribution from road/trail crossings and road/trail segments within 300 feet of streams in project area subwatersheds, and compares these contributions to estimated natural background hillslope sediment production. Table 104 also displays estimates of existing road sediment contributions and compares these contributions, along with those estimated for actions in Alternative 2, to natural background hillslope sediment production. In the Howard Creek Subwatershed, natural background sedimentation is estimated at 404 tons/year. The total estimated contribution from road/trail crossings and adjacent road/trail segments is approximately 1.8 tons/year. This equates to a 0.4% increase over natural background hillslope sediment delivered to streams in the Howard Creek Subwatershed.

Effects to Aquatic Species

Based on the less than 1% increase in sediment over natural background levels (see Table 104), there would be no effect on stream aggradation in the Howard Creek Subwatershed from project activities (C channels experience an increase in stream channel aggradation when sediment increases are over 35% of natural background; Stowell et al 1983). Sediment-habitat response curves in Stowell et al. (1983) also indicate that fine sediment depth does not increase appreciably when sediment yield increases 50% over natural background. In terms of habitat-fish response, percent fine sediment by depth is estimated to have no impact on fry emergence, if percent fine sediment is under 20%. The proposed activities in the Howard Creek Subwatershed would not increase instream fine sediment to the point of adversely affecting fry emergence over existing condition levels (<1% increase in sediment over natural background conditions compared to 50% increase in natural background referenced in Stowell et al 1983).

Based on this information, redband trout and Columbia spotted frog would be unaffected long-term in the Howard Creek Subwatershed under actions in Alternative 2. Short-term sediment inputs from trail construction, especially at stream crossings, may have negative effects during construction when turbidity is high. These negative effects may include fish displacement during times of high turbidity, limited feeding, and possible mortality. Fish removal and the use of filtering at these sites would help mitigate potential mortality from stream crossing construction.

Peterson Creek Subwatershed

Within the Peterson Creek Subwatershed, approximately 11 miles of trail are proposed to be located on closed roads and new routes, and 14 miles of trail proposed on open existing roads. Approximately 2.4 miles of Class I trail and 15.2 Class II trail are located on existing Forest Service System Road and approximately 2.9 miles of Class I trail and 4.4 miles of Class II new trail are proposed to be constructed as part of Alternative 2. Alternative 2 proposes for Class I trails to cross perennial and intermittent streams with new trails at three locations, and to cross perennial and intermittent streams on existing roads at two locations. Class II trails are proposed to cross perennial and intermittent streams at one new location and to cross perennial and intermittent streams at eight locations at existing stream crossings on existing roads. In addition, a two mile switch-back section of new Class II trail (“jeep crawl”) would be located approximately 100 feet upslope and East of Peterson Creek, a fish-bearing perennial stream, on a slope with a High Slope Erosion Hazard and crosses five ephemeral streams.

The Maxwell Fire BAER rehabilitation road treatments included rehabilitation work on segments of one road within the Peterson Creek Subwatershed, FS 2200-550. Approximately 0.18 miles of Class I trail overlap FS 2200-550, which crosses Allen Creek, a fish-bearing perennial stream. The crossing structure was removed and banks were laid back as part of the Maxwell Fire BAER rehabilitation. Based on design criteria, implementation of the Alternative 2 trail system would require installation of a culvert or bridge at this stream crossing location. The operational maintenance level of this road is Level I (Closed). However, the objective maintenance of this road is decommissioned, likely attributed to the potential for sedimentation into a high quality, fish-bearing perennial stream. Based on the BAER report for the Maxwell Fire, the vegetative recovery period was seven years, which would indicate hydrologic recovery should have occurred by the end of the summer of 2013. Field trips to the site during the summer of 2011 indicated that Allen Creek, in the vicinity of this stream crossing, was still in an unstable state and was still in the process of recovering from impacts from the Maxwell Fire.

The proposed jeep boulder crawl area is located on two tributaries to Peterson Creek and traverses down steep terrain. There are two Class IV streams with five fords (three fords on one tributary and two on the other tributary). A boulder crawl creates loosened soil that flow downstream to Peterson Creek (Class I stream) during rain and snow melt events. During the wet season from mid-October to mid-June and during storm events through the summer, existence of the jeep trail and use of the jeep crawl is likely to deliver sediment to the two tributaries, which would then convey additional sediment into Peterson Creek. Appropriate drainage installed and maintained on the jeep boulder crawl area trails would help reduce sediment delivery to area streams.

Flow and Sediment Regimes

Designating Class I and II trails and constructing new trails and stream crossings at the locations proposed in Alternative 2 in the Peterson Creek Subwatershed may improve somewhat the flow and sediment regime conditions in the long-term relative to past cross-country travel. However, compared to the no action alternative, it could slightly increase the effects of flow and sediment regime in the subwatershed by increasing road/trail densities and reopening roads slated for decommissioning. By adding approximately 7.3 miles of trail to the overall subwatershed road/trail network, the road/trail densities increase from 3.2 to 3.6 miles per square mile, increasing the rating from low to moderate relative to the overall range in existing road densities across the Ochoco Summit project area. Drainage densities are relatively high (2.7 miles per square mile) and by adding four new intermittent or perennial stream crossings to the existing number of stream crossings by roads in the Peterson Creek Subwatershed, the overall stream crossing density increases from 2.7 to 2.9 crossings per square mile; both of these densities are moderate relative to the other Ochoco Summit project area subwatersheds analyzed. Overall, slope erosion hazard conditions are moderate in the vicinity of streams in the Peterson Creek Subwatershed. Increases to the already high road/trail density across the Peterson Creek Subwatershed have the potential to slightly increase peak flows and shorten response times relative to the no action alternative.

By constructing two miles of new trail east of Peterson Creek on a slope with High Slope Erosion Hazard, there is a potential for connectivity between the intermittent streams and the trail surface. Since the drainage area of the streams is small, they are not likely to substantially increase peakflows. However, erosion and sediment delivery to Peterson Creek has a much higher potential.

Sediment/Turbidity

Designating Class I and II trails and constructing new trails and stream crossings at the locations proposed in Alternative 2 in the Peterson Creek Subwatershed may improve somewhat the bank stability conditions in the long-term relative to past cross-country travel. However, compared to the no action alternative, it could increase the sediment delivery to streams at site specific locations.

Approximately 1.3 miles of trail would be added within 300 feet of an intermittent or perennial stream, four new stream crossings would be added, and virtually no miles of trail are proposed that intersect wetlands or their RHCAs within the forest boundary portion of the subwatershed. By adding approximately 1.3 miles of trail to the road/trail network within the sediment delivery zone of streams in the Peterson Creek Subwatershed, the road/trail densities would increase from 4.3 to 4.5 miles per square mile within 300 feet of streams; both of these densities are low relative to the other Ochoco Summit project area subwatersheds analyzed. The addition of virtually no new miles of trail within wetlands and associated RHCAs maintains road densities in wetlands at approximately 5.5 miles per square mile, which is low relative to the other subwatersheds.

Existing bank stability in surveyed streams in the Peterson Creek Subwatershed is relatively good and met LRMP standards in 2001 in the East Fork of Allen Creek. However, bank stability is predominately in fair condition and not meeting LRMP standards in Allen Creek and Peterson Creek, based on stream surveys in 2002 and 2006-2007, respectively. The 2007 Level II stream survey in Peterson Creek, however, found unstable bank conditions with cutbanks on approximately 36 percent of the length of Reach 6 where a Class II trail overlaps the FS 2630 road and crosses the stream. In addition, the dominant channel types of streams in the subwatershed are C4 channel types, which have very high channel sensitivity and good recovery potential. At the location of the new Class I trail stream crossing on the East Fork of Allen Creek as well as through the stream reaches that were surveyed, the channel type indicates that the channel should have very high streambank erosion potential. Since peakflow increases are expected to be minor, and design criteria require the installation of a culvert or bridge installation that meets the 100-year flow event as well as armored approaches, overall bank stability is likely to be maintained. At site specific locations, however, by converting a closed road with an objective maintenance of decommissioned to Class I trail that crosses Allen Creek in an unstable portion of the stream and by adding two miles of Class II trail on a High Slope Erosion Hazard slope near Peterson Creek, site specific locations may experience higher incidents of unstable banks and sediment delivery. Appropriate project design criteria, such as appropriate drainage and continual maintenance, would help mitigate unstable banks and sediment delivery.

Based on site specific sediment delivery and bank stability concerns, Alternative 2 proposed trails have the potential to increases sediment delivery to streams and unstable banks at site specific locations, which would delay recovery to LRMP standards of bank stability in Allen Creek and potentially add to sediment and turbidity increases in Peterson Creek.

Table 104 displays estimated sediment contribution from road/trail crossings and road/trail segments within 300 feet of streams in project area subwatersheds and compares these contributions to estimated natural background sediment production. Table 104 also displays estimates of existing road sediment contributions and compares these contributions, along with those estimated for actions in Alternative 2, to natural background hillslope sediment production. In the Peterson Creek Subwatershed, natural background sedimentation is estimated at 1,051 tons/year. The total estimated contribution from road/trail crossings and adjacent road/trail segments is approximately 13.7 tons/year. This equates to a 1% increase over natural background hillslope sediment in the Peterson Creek Subwatershed.

Effects to Aquatic Species

Based on the 1% increase in sediment over natural background levels (see Table 104), there would be no effect on stream aggradation in the Peterson Creek Subwatershed from project activities (C channels experience an increase in stream channel aggradation when sediment increases are over 35% of natural background; Stowell et al. 1983). Sediment-habitat response curves in Stowell et al. (1983) also indicate that fine sediment depth does not increase appreciably when sediment yield increases 50% over natural background. In terms of habitat-fish response, percent fine sediment by depth is

estimated to have no impact on fry emergence, if percent fine sediment is under 20%. The proposed activities in the Peterson Creek Subwatershed would not increase instream fine sediment to the point of adversely affecting fry emergence over existing condition levels (1% increase in sediment over natural background conditions compared to 50% increase in natural background referenced in Stowell et al. 1983).

Based on this information, redband trout and Columbia spotted frog would be unaffected long-term in the Peterson Creek Subwatershed under actions in Alternative 2. Short-term sediment inputs from trail construction, especially at stream crossings, may have negative effects during construction when turbidity is high. These negative effects may include fish displacement during times of high turbidity, limited feeding, and possible mortality.

Recovery of filtering vegetation that was removed during the Maxwell Fire in 2006, especially in headwaters, was estimated to take approximately 7 years post-fire (BAER 2006 Hydrology Report). Based on that information, it was anticipated that filtering vegetation in the Peterson Creek Subwatershed would be recovered at the end of the 2013 growing period. Alternative 2 would not be implemented until at least the spring/summer of 2016; therefore, post-fire recovery in terms of filtering vegetation should have already been met.

Porter Creek Subwatershed

Within the Porter Creek Subwatershed, approximately 15 miles of trail is proposed on closed roads, decommissioned roads, and new routes. Approximately 12 miles of trail is proposed on existing open roads. Within the Porter Creek Subwatershed, approximately 0.26 miles of Class I trail and 17.7 miles of Class II trail located on existing Forest Service System Road. Approximately 2.1 miles of Class I trail, 7.3 miles of Class II trail, and 0.04 miles of Class III new trail are proposed to be constructed as part of Alternative 2. No Class I trails are proposed to cross intermittent or perennial stream channels in Alternative 2. Class II trails are proposed to cross perennial and intermittent streams at 16 locations at an existing stream crossing on an existing road and at 7 new locations. No new trails are proposed that intersect wetlands or associated RHCAs.

A proposed jeep trail lies along East Porter Creek along FR3000-550 in the RHCA. East Porter Creek is a Class II stream. The roads analysis for the Howard Elliot Johnson EIS (2010) recommended that FR3000-550 be changed to a trail for protection of aquatic species. Mile 0 to 2.3 of the FR3000-550 road crosses a Class II stream and is proposed to convert to trail above FR3300-553. Mile 2.3 to 4.8 of FR3300-550 crosses Class III and IV streams. Part of the road is proposed to convert to a trail in the southern half. The rating was *High* for aquatic species, indicating a high impact on aquatic species. The proposal to make FR 3000-500 a jeep trail does not meet the intent of protecting aquatic species as identified in the roads analysis.

Flow and Sediment Regimes

Designating Class I and II trails and constructing new trails and stream crossings at the locations proposed in Alternative 2 in the Porter Creek Subwatershed may improve somewhat the flow and sediment regime conditions in the long-term relative to past cross-country travel because trails would have appropriate drainage and maintenance applied. However, compared to the no action alternative, it could slightly increase the effects of flow and sediment regime in the subwatershed by increasing road/trail densities and stream crossing densities overall. By adding approximately 9.4 miles of trail to the overall subwatershed road/trail network, the road/trail densities increase from 3.7 to 4.4 miles per square mile, raising the rating from moderate to high relative to the overall range in existing road densities across the Ochoco Summit project area. Drainage densities are relatively high (2.8 miles per square mile) and by adding seven new intermittent or perennial stream crossings to the existing number of stream crossings by roads in the Porter Creek Subwatershed, the overall stream crossing density would increase from 4.0 to 4.4 crossings per square mile, both of these densities are high

relative to the other Ochoco Summit project area subwatersheds analyzed. Overall, slope erosion hazard conditions are low in the vicinity of streams in the Porter Creek Subwatershed. Increases to the road/trail and already high stream crossing densities across the Porter Creek Subwatershed have the potential to increase peak flows and shorten response times relative to the existing condition.

Sediment/Turbidity

Designating Class I and II trails and constructing new trails and stream crossings at the locations proposed in Alternative 2 in the Porter Creek Subwatershed may improve somewhat the bank stability and sediment delivery conditions in the long-term, relative to past cross-country travel. However, compared to the no action alternative, it could increase the sediment delivery to streams. In the short-term with the implementation of Alternative 2 in this subwatershed, sediment delivery would increase. However, in the long-term, once most user-created trails have revegetated or are rehabilitated/restored (as prioritized), sediment delivery to streams should decrease to levels below the existing condition.

Approximately 2.1 miles of trail would be added within 300 feet of an intermittent stream, seven new stream crossings would be added, and essentially no miles of trail are proposed that intersect wetlands or their RHCAs within the forest boundary portion of the subwatershed. By adding approximately 2.1 miles of trail to the road/trail network within the sediment delivery zone of streams in the Porter Creek Subwatershed, the road/trail densities increase from 7.4 to 7.8 miles per square mile within 300 feet of streams, both of these densities are high relative to the other Ochoco Summit project area subwatersheds analyzed. Slope Erosion Hazard conditions for the Porter Creek Subwatershed are low overall, reducing the risk and magnitude of potential sediment delivery increases for the proposed trail network in Alternative 2.

Existing bank stability in surveyed streams in the Porter Creek Subwatershed was relatively good and met LRMP standards in Easter Porter Creek in 1995 and in the top and bottom reaches of Porter Creek in 2006-2007. Bank stability in the middle reach of Porter Creek in 2007 slightly exceeded LRMP standards with approximately 23 percent of the stream length unstable. No trails are proposed to cross Porter Creek on the reach of stream that is not meeting LRMP standards of no more than 20 percent unstable banks. Dominant channel types in Porter Creek indicate moderate channel sensitivity and excellent recovery potential. Assuming that other streams in the Porter Creek Subwatershed exhibit similar dominant conditions to Porter Creek and implementation of design criteria that require the installation of a culvert or bridge installation that meets the 100-year flow event as well as armored approaches, bank stability is likely to be maintained.

Based on increases in both stream crossing and road/trail densities within the sediment delivery zone, Alternative 2 proposed new trails have the potential to increases sediment delivery to streams as reflected in the fisheries reports calcuations. However, banks stability is likely to be maintained.

Table 104 displays estimated sediment contribution from road/trail crossings and road/trail segments within 300 feet of streams in project area subwatersheds, and compares these contributions to estimated natural background hillslope sediment production. Table 104 also estimates existing road sediment contributions and compares these contributions, along with those estimated for actions in Alternative 2, to natural background hillslope sediment production. In the Porter Creek Subwatershed, natural background sedimentation is estimated at 562 tons/year. The total estimated contribution from road/trail crossings and adjacent road/trail segments is approximately 15.4 tons/year. This equates to a 3% increase over natural background hillslope sediment in the Porter Creek Subwatershed.

Effects to Aquatic Species

Based on the 3% increase in sediment over natural background levels (see Table 104), there would be no effect on stream aggradation in the Porter Creek Subwatershed from project activities (C channels

experience an increase in stream channel aggradation when sediment increases are over 35% of natural background; Stowell et al 1983). Sediment-habitat response curves in Stowell et al. (1983) also indicate that fine sediment depth does not increase appreciably when sediment yield increases 50% over natural background. In terms of habitat-fish response, percent fine sediment by depth is estimated to have no impact on fry emergence, if percent fine sediment is under 20%. The proposed activities in the Porter Creek Subwatershed would not increase instream fine sediment to the point of adversely affecting fry emergence over existing condition levels (3% increase in sediment over natural background conditions compared to 50% increase in natural background, referenced in Stowell et al. 1983).

Based on this information, redband trout and Columbia spotted frog would be unaffected long-term in the Porter Creek Subwatershed under actions in Alternative 2. Short-term sediment inputs from trail construction, especially at stream crossings, may have negative effects during construction when turbidity is high. These negative effects may include fish displacement during times of high turbidity, limited feeding, and possible mortality.

Deep Creek Watershed

Alternative 2 proposes approximately 58 miles of trail on closed roads, decommissioned roads, and new routes. Approximately eight miles of trail is proposed for existing open roads. Alternative 2 proposes approximately 31 miles of Class I trail, approximately 2.7 miles of Class II trail, and approximately 32 miles of Class III trail within the Deep Creek Watershed. Approximately 20 miles of Class I trail, 2.4 miles of Class II trail, and 18 miles of Class III trail are proposed on existing Forest Service System Roads. Approximately 11 miles of Class I trail, 0.32 miles of Class II trail, and 14 miles of Class III trail would be new trails and not already part of the existing Forest Service System road network. Approximately 3.7 miles of new trail and 12.7 miles of trail on existing roads in the Deep Creek Watershed are located within the sediment delivery zone of 300 feet from perennial or intermittent streams. A total of 14 new and 22 existing intermittent and perennial stream crossings are proposed for use.

Some of the perennial streams that have been identified by Forest fish biologists and the Oregon Department of Fish and Wildlife to be critical refuges for redband trout in the Deep Creek Watershed are Deep Creek, Little Summit Creek, Happy Camp Creek and Double Corral Creek. However, many of these systems have been impacted by past management and are not as effective as they once were in sustaining redband trout. ODFW estimates that these systems are occupied at approximately 10% of historic levels. In addition to redband trout, Columbia spotted frogs are present throughout the area.

Jackson Creek Subwatershed

Within the Jackson Creek Subwatershed, approximately 30 miles of trail are proposed on closed roads, decommissioned roads, and new routes. Approximately seven miles of trail are proposed on open roads. Within the Jackson Creek Subwatershed, approximately 9.3 miles of Class I trail, 2.4 miles of Class II trail, and 14.3 miles of Class III trail are proposed on existing Forest Service System Road. Approximately 5.4 miles of Class I trail, 0.32 miles of Class II trail, and 5.6 miles of Class III new trail are proposed to be constructed as part of Alternative 2. Alternative 2 proposes for Class I trails to cross perennial and intermittent streams with new trails at seven locations and to cross perennial and intermittent streams on existing roads at three locations. Class II trails are proposed to cross perennial and intermittent streams at no new locations and to cross perennial and intermittent streams at one location at an existing stream crossing on an existing Level II, high clearance road. Class III trails are proposed to cross perennial and intermittent streams at two new locations and to cross perennial and intermittent streams at ten locations at existing stream crossings on existing roads.

Flow and Sediment Regimes

Designating Class I, II, and III trails and constructing new trails and stream crossings at the locations proposed in Alternative 2 in the Jackson Creek Subwatershed may improve somewhat the flow and sediment regime conditions in the long-term relative to past cross-country travel. However, compared to the no action alternative, it could slightly increase the effects of flow and sediment regime on the subwatershed by increasing overall road/trail and stream crossing densities. By adding approximately 11 miles of new trail to the overall subwatershed road/trail network, the road/trail densities increase from 3.7 to 4.0 miles per square mile, both ratings are moderate relative to the overall range in existing road densities across the Ochoco Summit project area. Drainage densities are relatively low (1.8 miles per square mile), and by adding nine new intermittent or perennial stream crossings to the existing number of stream crossings by roads in the Jackson Creek Subwatershed, the overall stream crossing density increases from 1.8 to 2.1 crossings per square mile; both of these densities are low, relative to the other Ochoco Summit project area subwatersheds analyzed. Overall, slope erosion hazard conditions are moderate in the vicinity of streams in the Jackson Creek Subwatershed. Based on relatively low drainage and stream crossing densities, increases to the road/trail density and stream crossings density across the Jackson Creek Subwatershed are likely to have little effect on peak flows, with the potential for an immeasurable increase relative to the no action alternative.

Sediment/Turbidity

Designating Class I, II, and III trails and constructing new trails and stream crossings at the locations proposed in Alternative 2 in the Jackson Creek Subwatershed may somewhat improve the bank stability conditions in the long-term relative to past cross-country travel. However, compared to the no action alternative, it could increase the sediment delivery to streams. In the short-term with the implementation of Alternative 2 in this subwatershed, sediment delivery would increase. However, in the long-term, once most user-created trails have revegetated or are rehabilitated/restored (as prioritized), sediment delivery to streams should decrease to levels below the existing condition.

Approximately 1.6 miles of trail would be added within 300 feet of an intermittent or perennial stream, nine new stream crossings would be added, and 0.7 miles of trail are proposed that intersect wetlands or their RHCAs within the forest boundary portion of the subwatershed. By adding approximately 1.6 miles of trail to the road/trail network within the sediment delivery zone of streams in the Jackson Creek Subwatershed, the road/trail densities increase from 6.1 to 6.3 miles per square mile within 300 feet of streams, both of these densities are moderate relative to the other Ochoco Summit project area subwatersheds analyzed. The addition of 0.7 miles of trail within wetlands and associated RHCAs would increase the road densities in wetlands from 5.6 to 5.8 miles per square mile, which are low relative to the other subwatersheds. Overall, slope erosion hazard conditions are moderate in the vicinity of streams in the Jackson Creek Subwatershed.

Existing bank stability in surveyed streams in the Jackson Creek Subwatershed is relatively good and met LRMP standards in Happy Camp Creek and Jackson Creek from 1998 and 2010. Based on Level II stream surveys, the dominant channel types of streams in Happy Camp Creek are E4 channel types and in Jackson Creek are C4 channel types, which have very high channel sensitivity and good recovery potential. At the location of the two new Class I trail stream crossings on Happy Camp Creek, the channel types indicate that the channel should have moderate and high streambank erosion potential. At the new Class I stream crossing location on Jackson Creek, the channel type indicates a moderate streambank erosion potential. Since peakflow increases are expected to be minor and design criteria require the installation of a culvert or bridge installation that meets the 100-year flow event as well as armored approaches, overall bank stability is likely to be maintained.

Based on slight increases in both road/trail densities within the sediment delivery zone and in wetlands, as well as overall moderate Slope Erosion Hazard Conditions, Alternative 2 proposed new

trails have the potential to slightly increase sediment delivery to streams and wetlands. However, banks stability is likely to be maintained.

Table 104 displays estimated sediment contribution from road/trail crossings and road/trail segments within 300 feet of streams in project area subwatersheds, and compares these contributions to estimated natural background sediment production. Table 104 also estimates existing road sediment contributions and compares these contributions, along with those estimated for actions in Alternative 2, to natural background hillslope sediment production. In the Jackson Creek Subwatershed, natural background sedimentation is estimated at 252 tons/year. The total estimated contribution from road/trail crossings and adjacent road/trail segments is approximately 11.9 tons/year. This equates to a 5% increase over natural background sediment in the Jackson Creek Subwatershed.

Effects to Aquatic Species

Based on the 5% increase in sediment over natural background levels (see Table 104), there would be no effect on stream aggradation in the Jackson Creek Subwatershed from project activities (C channels experience an increase in stream channel aggradation when sediment increases are over 35% of natural background; Stowell et al. 1983). Sediment-habitat response curves in Stowell et al. (1983) also indicate that fine sediment depth does not increase appreciably when sediment yield increases 50% over natural background. In terms of habitat-fish response, percent fine sediment by depth is estimated to have no impact on fry emergence, if percent fine sediment is under 20%. The proposed activities in the Jackson Creek Subwatershed would not increase instream fine sediment to the point of adversely affecting fry emergence over existing condition levels (5% increase in sediment over natural background conditions compared to 50% increase in natural background referenced in Stowell et al 1983).

Based on this information, redband trout and Columbia spotted frog would be unaffected long-term in the Jackson Creek Subwatershed under actions in Alternative 2. Short-term sediment inputs from trail construction, especially at stream crossings, may have negative effects during construction when turbidity is high. These effects may include fish displacement during times of high turbidity, limited feeding, and possible mortality.

Little Summit Prairie Creek Subwatershed

Within the Little Summit Prairie Creek Subwatershed, approximately 14 miles of trail are proposed on closed roads, decommissioned roads, and new routes. Approximately 1 mile of trail is proposed on existing open roads. Within the Little Summit Prairie Creek Subwatershed, approximately 4.1 miles of Class I trail and 3.6 miles of Class III trail are proposed on existing Forest Service System Road. Approximately 1.2 miles of Class I trail and 5.8 miles of Class III new trail are proposed to be constructed as part of Alternative 2. Alternative 2 proposes for Class I trails to cross perennial and intermittent streams with new trail at one location and to cross a perennial or intermittent stream on an existing road at one location. Class III trails are proposed to cross perennial and intermittent streams at no new locations and to cross perennial and intermittent streams at two locations at existing stream crossings on existing roads.

Flow and Sediment Regimes

Designating Class I and Class III trails and constructing new trails and stream crossings at the locations proposed in Alternative 2 in the Little Summit Prairie Creek Subwatershed may improve somewhat the flow and sediment regime conditions in the long-term, relative to past cross-country travel. However, compared to the no action alternative, it could slightly increase the effects of flow and sediment regime in the subwatershed by increasing overall road/trail and stream crossing densities. By adding approximately seven miles of new trail to the overall subwatershed road/trail network, the road/trail densities would increase from 3.8 to 4.1 miles per square mile, bringing the rating from moderate to high relative to the overall range in existing road densities across the Ochoco

Summit project area. Drainage densities are relatively low (2.2 miles per square mile) and by adding one new intermittent or perennial stream crossings to the existing number of stream crossings by roads in the Little Summit Prairie Creek Subwatershed, the overall stream crossing density would increase from 2.5 to 2.6 crossings per square mile; both of these densities are moderate, relative to the other Ochoco Summit project area subwatersheds analyzed. Overall, slope erosion hazard conditions are moderate in the vicinity of streams in the Little Summit Prairie Creek Subwatershed. Based on relatively low drainage densities, increases to the road/trail density and stream crossings density across the Little Summit Prairie Creek Subwatershed are likely to have little effect on peak flows, with the potential for an immeasurable increase relative to the no action alternative.

Sediment/Turbidity

Designating Class I and III trails and constructing new trails and stream crossings at the locations proposed in Alternative 2 in the Little Summit Prairie Creek Subwatershed may improve somewhat the bank stability conditions in the long-term relative to past cross-country travel. However, compared to the no action alternative, it could slightly increase the sediment delivery to streams. In the short-term with the implementation of Alternative 2 in this subwatershed, sediment delivery would increase. However, in the long-term, once most user-created trails have revegetated or are rehabilitated/restored (as prioritized) sediment delivery to streams should decrease to levels below the existing condition.

Approximately 0.6 miles of trail would be added within 300 feet of an intermittent or perennial stream, one new stream crossing would be added, and 0.4 miles of trail are proposed that would intersect wetlands or their RHCAs, within the forest boundary portion of the subwatershed. By adding approximately 0.6 miles of trail to the road/trail network within the sediment delivery zone of streams in the Little Summit Prairie Creek Subwatershed, the road/trail densities would increase from 7.4 to 7.5 miles per square mile within 300 feet of streams, both of these densities are high relative to the other Ochoco Summit project area subwatersheds analyzed. The addition of 0.4 miles of trail within wetlands and associated RHCAs would increase the road densities in wetlands from 5.1 to 5.4 miles per square mile, which are low relative to the other subwatersheds. Overall, slope erosion hazard conditions are moderate in the vicinity of streams in the Little Summit Prairie Creek Subwatershed.

Existing bank stability in surveyed streams in the Little Summit Prairie Creek Subwatershed is relatively good and met LRMP standards in surveyed reaches of Little Summit Creek and an unnamed tributary in 1998 and 2010. Based on Level II stream surveys, the dominant channel types of streams in the Little Summit Prairie Creek Subwatershed are C4 channel types, which have very high channel sensitivity and good recovery potential. At the location of the new Class I trail stream crossings on Little Summit Creek, the channel type is a B3 channel type, which indicates that the channel should have low streambank erosion potential. Since peakflow increases are expected to be minor, streambank erosion based on channel type at the stream crossing is low, and design criteria require the installation of a culvert or bridge installation that meets the 100-year flow event as well as armored approaches, overall bank stability is likely to be maintained.

Based on slight increases in both road/trail densities within the sediment delivery zone and in wetlands, as well as overall moderate Slope Erosion Hazard Conditions, Alternative 2 proposed new trails have the potential to slightly increase sediment delivery to streams and wetlands. However, banks stability would likely be maintained.

Table 104 displays estimated sediment contribution from road/trail crossings and road/trail segments within 300 feet of streams in project area Subwatersheds, and compares these contributions to estimated natural background hillslope sediment production. Table 104 also displays the estimates of existing road sediment contributions and compares these contributions, along with those estimated for actions in Alternative 2, to natural background hillslope sediment production. In the Little Summit

Prairie Creek Subwatershed, natural background sedimentation is estimated at 255 tons/year. The total estimated contribution from Alternative 2 road/trail crossings and adjacent road/trail segments is approximately 1.7 tons/year. This equates to a 0.7% increase over natural background sediment in the Little Summit Prairie Creek Subwatershed.

Effects to Aquatic Species

Based on the less than 1% increase in sediment over natural background levels (see Table 104), there would be no effect on stream aggradation in the Little Summit Prairie Creek Subwatershed from project activities (C channels experience an increase in stream channel aggradation when sediment increases are over 35% of natural background; Stowell et al 1983). Sediment-habitat response curves in Stowell et al. (1983) also indicate that fine sediment depth does not increase appreciably when sediment yield increases 50% over natural background. In terms of habitat-fish response, percent fine sediment by depth is estimated to have no impact on fry emergence, if percent fine sediment is under 20%. The proposed activities in the Little Summit Prairie Creek Subwatershed would not increase instream fine sediment to the point of adversely affecting fry emergence over existing condition levels (<1% increase in sediment over natural background conditions compared to 50% increase in natural background referenced in Stowell et al 1983).

Based on this information, redband trout and Columbia spotted frog would be unaffected long-term in the Little Summit Prairie Creek Subwatershed under actions in Alternative 2. Short-term sediment inputs from trail construction, especially at stream crossings, may have negative effects during construction when turbidity is high. These effects may include fish displacement during times of high turbidity, limited feeding, and possible mortality.

Lower Deep Creek Subwatershed

Within the Lower Deep Creek Subwatershed, approximately 14 miles of trail are proposed on closed roads, decommissioned roads, and new routes. Approximately 7.0 miles of Class I trail are proposed on existing Forest Service System Road, and approximately 4.1 miles of Class I trail and 2.9 miles of Class III new trail are proposed to be constructed as part of Alternative 2. Alternative 2 proposes for Class I trails to cross perennial and intermittent streams with new trails at three locations and to cross perennial and intermittent streams on existing roads at five locations. Class III trails are proposed to cross perennial and intermittent streams at one new location.

Proposed restoration projects were identified in the Deep Creek Restoration Plan, some of which have already been implemented. Of the 2.8 miles of road within the sediment delivery zone of streams that were decommissioned in the Lower Deep Creek Subwatershed as part of the Deep Creek Restoration Plan, 0.7 miles of the FS 4200-600 and 0.4 miles of the FS 4200-603 decommissioned roads are planned to be converted to Class I trails in Alternative 2. The FS 4200-600 road parallels Big Spring Creek, a fish-bearing perennial stream, for approximately 0.3 miles and parallels and intermittent tributary to Big Spring Creek for approximately 0.4 miles. The FS 4200-603 road parallels Buck Hollow, a perennial stream, for approximately 0.4 miles. The reopened portion of the FS 4200-603 road is located on high slope erosion hazard. Approximately a third of the reopened portion of the FS 4200-600 road is located on high slope erosion hazard, a third is located on moderate slope erosion hazard, and a third is located on low slope erosion hazard. Stream crossings would be installed with both of these road segments. Based on design criteria, implementation of the Alternative 2 trail system would require installation of a culvert or bridge at these stream crossing locations. Other roads that are proposed to be decommissioned are FR1200-504 (0.4 miles), FR3000-802 (0.9 miles), FR3000-930 (2.0 miles), FR4250-608 (1.0 miles) (Jackson), FR4270-508 (0.5 miles) (Little Summit Prairie), for a total of 4.8 miles. These roads are proposed to be converted to OHV trail and are discussed in more detail in the Cumulative Effects Section of this report.

Flow and Sediment Regimes

Designating Class I and III trails and constructing new trails and stream crossings at the locations proposed in Alternative 2 in the Lower Deep Creek Subwatershed may somewhat improve the flow and sediment regime conditions in the long-term relative to past cross-country travel. However, compared to the no action alternative, it could slightly increase the effects of flow and sediment regime on the subwatershed by increasing road/trail densities and reopening decommissioned roads. By adding approximately 7.0 miles of trail to the overall subwatershed road/trail network, the road/trail densities increase from 3.0 to 3.3 miles per square mile, both densities are low. Drainage densities are relatively low (2.0 miles per square mile) and by adding four new intermittent or perennial stream crossings to the existing number of stream crossings by roads in the Lower Deep Creek Subwatershed, the overall stream crossing density increases from 1.8 to 2.0 crossings per square mile; both of these densities are low, relative to the other Ochoco Summit project area subwatersheds analyzed. Overall, slope erosion hazard conditions are moderate in the vicinity of streams in the Lower Deep Creek Subwatershed. Based on relatively low drainage densities, slight increases to the road/trail density and stream crossings density across the Lower Deep Creek Subwatershed are likely to have little effect on peak flows, with the potential for an immeasurable increase relative to the no action alternative.

Sediment/Turbidity

Designating Class I and III trails and constructing new trails and stream crossings at the locations proposed in Alternative 2 in the Lower Deep Creek Subwatershed may improve somewhat the bank stability conditions in the long-term relative to past cross-country travel. However, compared to the no action alternative, it could increase the sediment delivery to streams at site specific locations.

Approximately 1.5 miles of trail would be added within 300 feet of an intermittent or perennial stream, four new stream crossings would be added, and 0.5 miles of trail are proposed that intersect wetlands or their RHCAs, within the forest boundary portion of the subwatershed. In addition, approximately 1.1 miles of decommissioned roads within 300 feet of streams are proposed to be reopened as Class I trails as part of Alternative 2. By adding approximately 1.5 miles of trail to the road/trail network within the sediment delivery zone of streams in the Lower Deep Creek Subwatershed, the road/trail densities would increase from 5.5 to 5.8 miles per square mile within 300 feet of streams; both of these densities are low, relative to the other Ochoco Summit project area subwatersheds analyzed. The addition of virtually 0.5 new miles of trail within wetlands and associated RHCAs would increase road densities in wetlands from 7.6 to 8.1 miles per square mile, both of which are high.

Existing bank stability in surveyed streams in the Lower Deep Creek Subwatershed is relatively good and met LRMP standards in the Crazy Creek in 2010 and in Deep Creek in 1999. The dominant channel types of streams in Crazy Creek are B4 channel types, which have moderate channel sensitivity and excellent recovery potential. The dominant channel types of streams in Deep Creek are C4 channel types, which have very high channel sensitivity and good recovery potential. At the location of the new Class I trail stream crossing on Deep Creek, the channel type indicates that the channel should have very high streambank erosion potential. Since peakflow increases are expected to be within the historic range of variability and design criteria require the installation of a culvert or bridge installation that meets the 100-year flow event as well as armored approaches, overall bank stability is likely to be maintained. At site specific locations bank stability and increased sediment delivery may be of concern by reopening decommissioned roads that cross and parallel Big Springs Creek and Buck Hollow, a portion of which are on a High Slope Erosion Hazard slope.

Table 104 displays estimated sediment contribution from road/trail crossings and road/trail segments within 300 feet of streams in project area subwatersheds, and compares these contributions to estimated natural background hillslope sediment production. Table 104 also displays estimatesof

existing road sediment contributions and compares these contributions, along with those estimated for actions in Alternative 2, to natural background hillslope sediment production. In the Lower Deep Creek Subwatershed, natural background sedimentation is estimated at 952 tons/year. The total estimated contribution from road/trail crossings and adjacent road/trail segments is approximately 2.3 tons/year. This equates to a 0.2% increase over natural background sediment in the Lower Deep Creek Subwatershed.

Effects to Aquatic Species

Based on the less than 1% increase in sediment over natural background levels (see Table 104), there would be no effect on stream aggradation in the Lower Deep Creek Subwatershed from project activities (C channels will experience an increase in stream channel aggradation when sediment increases are over 35% of natural background; Stowell et al. 1983). Sediment-habitat response curves in Stowell et al. (1983) also indicate that fine sediment depth does not increase appreciably when sediment yield increases 50% over natural background. In terms of habitat-fish response, percent fine sediment by depth is estimated to have no impact on fry emergence, if percent fine sediment is under 20%. The proposed activities in the Lower Deep Creek Subwatershed would not increase instream fine sediment to the point of adversely affecting fry emergence over existing condition levels (less than 1% increase in sediment over natural background conditions compared to 50% increase in natural background referenced in Stowell et al. 1983).

Based on this information, redband trout and Columbia spotted frog would be unaffected long-term in the Lower Deep Creek Subwatershed under actions in Alternative 2. Short-term sediment inputs from trail construction, especially at stream crossings, may have negative effects during construction when turbidity is high. These negative effects may include fish displacement during times of high turbidity, limited feeding, and possible mortality.

Upper Ochoco Creek Watershed

Alternative 2 proposes approximately 3 miles of trail on closed roads, 0.1 mile on decommissioned road, and 8 miles on new routes. Approximately 1 mile of trail is proposed on existing open roads. Alternative 2 proposes approximately 12 miles of Class I trail and approximately 1.0 miles of Class III trail within the Upper Ochoco Creek watershed. Approximately 5.0 miles of Class I trail are proposed on existing Forest Service System Roads. Approximately 6.9 miles of Class I trail and 1.0 mile of Class III trail would be new trails and not already part of the existing Forest Service System road network. Approximately 0.1 miles of new trail and 0.9 miles of trail on existing roads in the Upper Ochoco Creek watershed are located within the sediment delivery zone of 300 feet from perennial or intermittent streams. A total of four existing intermittent and perennial stream crossings are proposed for use.

Upper Marks Creek Subwatershed

Within the Upper Marks Creek Subwatershed, approximately 8 miles of trail are proposed on closed roads, decommissioned, and open roads. Approximately 1 mile of trail is proposed on existing open roads. Alternative 2 proposes 4.5 miles of Class I trail to be located on existing Forest Service system road. Approximately 5.0 miles of Class I trail and 0.3 miles of Class III new trail are proposed to be constructed as part of Alternative 2. Alternative 2 proposes for Class I trails to cross perennial and intermittent streams on existing roads at four locations. Class III trails are not proposed to cross perennial and intermittent streams at new or existing locations.

Flow and Sediment Regimes

Designating Class I and Class III trails and constructing new trails and stream crossings at the locations proposed in Alternative 2 in the Upper Marks Creek Subwatershed wouldsomewhat improve the flow and sediment regime conditions in the long-term, relative to past cross-country

travel. However, compared to the no action alternative, it could slightly increase the effects of flow and sediment regime in the subwatershed by increasing overall road/trail densities. By adding approximately 5.3 miles of new trail to the overall subwatershed road/trail network, the road/trail densities would increase from 4.1 to 4.4 miles per square mile, both of which are high relative to the overall range in existing road densities across the Ochoco Summit project area. Drainage densities are relatively moderate (2.4 miles per square mile). However, no new stream crossings are proposed in the Upper Marks Creek Subwatershed, effectively maintaining the relatively high stream crossing density of 5.0 crossings per square mile. Overall, slope erosion hazard conditions are moderate in the vicinity of streams in the Upper Marks Creek Subwatershed. Moderate drainage densities, the addition of no new stream crossings, and increases to the road/trail densities across the Upper Marks Creek Subwatershed are likely to have little effect on peak flows, with the potential for an immeasurable increase relative to the no action alternative.

Sediment/Turbidity

Designating Class I and III trails and constructing new trails and stream crossings at the locations proposed in Alternative 2 in the Upper Marks Creek Subwatershed may improve somewhat the bank stability conditions in the long-term relative to past cross-country travel. However, compared to the no action alternative, it could slightly increase the sediment delivery to streams. In the short-term with the implementation of Alternative 2 in this subwatershed, sediment delivery would increase. However, in the long-term, once most user-created trails have revegetated or are rehabilitated/restored (as prioritized), sediment delivery to streams should decrease to levels below the existing condition.

Approximately 0.1 miles of trail would be added within 300 feet of an intermittent or perennial stream, no new stream crossings would be added, and 0.4 miles of trail are proposed that intersect wetlands or their RHCAs, within the forest boundary portion of the subwatershed. By adding approximately 0.1 miles of trail to the road/trail network within the sediment delivery zone of streams in the Upper Marks Creek Subwatershed, the road/trail densities would be maintained at 6.2 miles per square mile with 300’ of streams, which are moderate relative to the other Ochoco Summit project area subwatersheds analyzed. The addition of 0.4 miles of trail within wetlands and associated RHCAs would increase the road densities slightly in wetlands from 6.6 to 6.7 miles per square mile, which are moderate. Overall, slope erosion hazard conditions are moderate in the vicinity of streams in the Upper Marks Creek Subwatershed. Based on only slight increases in road densities in wetlands and near streams and no new stream crossings, sediment delivery effects are expected to be negligible based on Alternative 2.

Existing bank stability in surveyed stream reaches in the Upper Marks Creek Subwatershed within the project boundary is relatively good and met LRMP standards in surveyed reaches of Crystal Creek in 2003 and in the only stream reach of Marks Creek within the project boundary with bank stability data from 2010. Based on Level II stream surveys, the dominant channel type of Crystal Creek is E4 and the reach surveyed in Marks Creek in 2010 is a C4 channel type, both of which have very high channel sensitivity and good recovery potential. Since peakflow increases are expected to be minor and no new stream crossings are proposed, overall bank stability is likely to be maintained.

Based on a negligible increase in the road/trail density within the sediment delivery zone, a slight increase in the road density in wetlands, no new stream crossings, as well as overall moderate Slope Erosion Hazard Conditions, the proposed new trails under Alternative 2 are not likely to measurably increase sediment delivery to streams and wetlands or decrease bank instability.

Table 104 displays estimated sediment contribution from road/trail crossings and road/trail segments within 300 feet of streams in project area subwatersheds and compares these contributions to estimated natural background hillslope sediment production. Table 104 also displays estimates of existing road sediment contributions and compares these contributions, along with those estimated for actions in Alternative 2, to natural background sediment production. In the Upper Marks Creek

Subwatershed, natural background sedimentation is estimated at 77 tons/year. The total estimated contribution from road/trail crossings and adjacent road/trail segments is approximately 0.7 tons/year. This equates to a 0.8% increase over natural background sediment in the Upper Marks Creek Subwatershed.

Effects to Aquatic Species

Based on the less than 1% increase in sediment over natural background levels (see Table 104), there would be no effect on stream aggradation in the Upper Marks Creek Subwatershed from project activities (C channels experience an increase in stream channel aggradation when sediment increases are over 35% of natural background; Stowell et al. 1983). Sediment-habitat response curves in Stowell et al. (1983) also indicate that fine sediment depth does not increase appreciably when sediment yield increases 50% over natural background. In terms of habitat-fish response, percent fine sediment by depth is estimated to have no impact on fry emergence, if percent fine sediment is under 20%. The proposed activities in the Upper Marks Creek Subwatershed would not increase instream fine sediment to the point of adversely affecting fry emergence over existing condition levels (<1% increase in sediment over natural background conditions compared to 50% increase in natural background referenced in Stowell et al. 1983).

Based on this information, redband trout and Columbia spotted frog would be unaffected long-term in the Upper Marks Creek Subwatershed under actions in Alternative 2. Estimated sediment production from all existing roads in the subwatershed is likely having adverse effects on instream aquatic habitat and species. Short-term sediment inputs from trail construction, especially at stream crossings, may have negative effects during construction when turbidity is high. These negative effects may include fish displacement during times of high turbidity, limited feeding, and possible mortality.

Table 104. Sediment contribution from road/trail crossing and adjacent road/trail segments (tons/year) compared to estimated natural background hillslope sediment (tons/year) by subwatershed for Alternative 2.

Subwatershed	Total Natural Background Sediment (tons/year)	Estimated Contribution from Existing Roads (tons/year)	Total Contribution from Alt 2 Road/Trail Crossings (tons/year)	Total Contribution from Alt 2 Adjacent Road/Trail Segments (tons/year)	Alternative 2 – Percent of Natural Background	Alternative 2 + Existing Roads – Percent of Natural Background
Elliott Creek	421	10.6	15.5	0.7	4%	6%
Howard Creek	404	16.1	1.7	0.1	0.4%	4%
Jackson Creek	252	21.1	11.3	0.6	5%	13%
Little Summit Prairie Creek	255	14.4	1.6	0.1	0.7%	6%
Lower Deep Creek	952	12.2	2.0	0.3	0.2%	2%
North Wolf Creek	215	9.4	0.1	0.01	0%	4%
Peterson Creek – North Fork Crooked River	1051	29.4	13.2	0.5	1%	4%
Porter Creek	265	20.9	14.6	1.8	3%	7%
Upper Marks Creek	77	40.8	0.6	0.05	0.8%	54%

Table 105. A summary of information related to Alternative 2 stream crossings by subwatershed.

Sub-watershed	Number of Crossings		Crossings on Fish-Bearing Streams	Crossings on Non-Fish Bearing Streams	Crossings on Perennial Streams	Crossings on Intermittent Streams	Crossings on Ephemeral Streams	Crossing Type		
	New	Existing						Ford	CMP (Culvert)	Bridge
Elliott Creek	15	10	4	21	4	21	4	7	13	4
Howard Creek	7	1	3	5	3	5	3	1	6	1
Jackson Creek	9	13	9	13	9	13	9	7	8	7
Little Summit Prairie Creek	1	2	1	2	1	2	1	0	2	1
Lower Deep Creek	4	5	3	6	3	6	3	1	4	4
North Wolf Creek	0	3	2	1	2	1	2	0	3	0
Peterson Creek – North Fork Crooked River	17	23	4	36	4	36	4	17	22	1
Porter Creek	9	25	1	33	1	33	1	7	27	0
Upper Marks Creek	0	4	1	3	2	2	0	0	3	1

Alternative 3

Alternative 3 was developed in response to potential issues related to how the trail system could impact water quality, big game habitat, and fish habitat, as well as potential conflict between motorized and non-motorized recreation. This alternative is intended to provide motorized trails and areas at a lesser scale to reduce potential for impacts to water quality, fish and wildlife, and to reduce conflict between motorized and non-motorized recreational use. Alternative 3 proposes a total of 38 miles of Class I vehicle (ATV) trails or roads and 62 miles of Class III vehicle (motorcycle) trail/roads. These projects would result in more effects to the streams and watersheds within the Ochoco Summit project area as compared to Alternative 1, the no action alternative, but would have less effect compared to Alternative 3. In the short-term with the implementation of Alternative 3, sediment delivery would increase. However, in the long-term, once user-created trails have revegetated or are rehabilitated/restored (as prioritized), sediment delivery to streams should decrease to levels below the existing condition. Overall, Alternative 3 would result in less effect to stream and wetland water quality across the Ochoco Summit project area.

In Alternative 3, the OHV trail is proposed in Deep Creek, Lower Beaver Creek, Upper North Fork Crooked River, and Upper Ochoco Creek watersheds. The two watersheds with the majority of the trail (approximately 65%) include the area within the Deep Creek Watershed and the Upper North Fork Crooked River. Approximately 101 miles of trail is proposed that includes approximately 6 miles of trail in Class I, II, and III RHCAs and 1 mile of trail in Class IV RHCAs. Of the 101 miles of trail, approximately 88 miles of trail are on closed roads, those that have been decommissioned, or new routes. Approximately 13 miles of trail would be on existing open roads. There are 21 crossings on Class I, II and III streams, and 34 crossings on Class IV streams. Alternative 3 has fewer crossings than Alternatives 2 and 4.

Alternative 3 addresses the Purpose and Need, as outlined in Chapter 1, by proposing to develop a trail network that includes approximately 88 miles of proposed OHV trail and 13 miles of open National Forest System roads that connect trail segments or contribute to the network by connecting trail segments or by enhancing loop opportunities/options for trail users. The motorized trails would be open for use by specified vehicle type, seasonally between June 1 and September 30 of each year – except on Paulina Ranger District, where trails would close at the beginning of the restriction period specified for the Rager Cooperative Travel Management Area – and would remain closed until June 1 of each year. This alternative features several interconnected trails systems:

1. Of the total 62 miles of Class III vehicle (motorcycle) network, 9 miles are on open roads, 25 miles are on closed or decommissioned road beds and 28 miles are not on NFS roads. This would allow for up to 53 miles of 24" wide trail through conversion of old road beds and new trail construction combined. In addition, all Class I and II trails would be available for use by motorcycles. Mixed use roads identified under the current Travel Management Plan would remain available for use by non-highway-legal motorcycles and highway-legal vehicles would have access to all roads identified as open in the current Travel Management Plan.
2. Of the total 38 miles in the Class I vehicle (ATV) network, 4 miles are on open roads, 12 miles are on closed or decommissioned road beds and 22 miles are not on NFS roads. This would allow for up to 35 miles of 50" wide trail through conversion of old road beds and new trail construction combined. In addition all Class II trails would be available for use by ATVs. Mixed use roads identified under the current Travel Management Plan would also remain available for use by ATVs.

Differences in Alternative 3 from Alternative 2:

- Allen Creek staging area is dropped
- Aspen Pit staging area is dropped in response to the Deep Creek Restoration Plan
- The route from Allen Creek to Indian Butte and trailheads on FR2200-350 and 550 is dropped (reduces approximately 10 miles of trail in the Elliott and Peterson Creek Subwatersheds)
- No trails on FR2200-220 (1.7 miles route in the Howard Creek Subwatershed)
- There are a reduced number of crossings and restoration sites in Deep Creek and Crazy Creek drainages; 36 in Alternative 2 and 24 in Alternative 3
- Staging and play areas and associated trails on FR3000-800, Aspen Pit/Happy Camp Creek are eliminated (0.5 miles in the Jackson Creek Subwatershed)
- Use of north of Big Summit Prairie restricted to June 1 and September 30
- Limited motorized use to open roads on Rager TMA during closure period
- No jeep and buggy trails (Class II vehicles); does not include the side loop in Derr and upper Jackson area as proposed in Alternative 2 or associated trails at FR4200-600, or staging and play areas associated trails at and around Aspen Pit. No staging area at Peterson Lava or the trailheads at and south of Jones Lava; no central tie-through trails between Paulina Butte and Jackson Creek. Cottonwood Pit and Six Corners Mineral Source staging areas retained
- Includes a series of interconnected loops and 50-inch-wide trails between Ochoco Divide Snopark, Walton Snopark and FR2200-350.
- No staging or parking areas at Ahalt Pit or trailhead at FR2200-350.
- No singular route between Indian Butte (FR2200-350) and Scott's camp
- Additional loops on the west end included within a more compact area, multiple decision points and alternate loop options (not included in Alternative 2)

Summary of Effects of Alternative 3, as compared to the Proposed Action

Flow and Sediment Regimes

In the short-term with the implementation of Alternative 3, impacts of the addition of trails on the flow and sediment regimes would increase. However, in the long-term, once most user-created trails have revegetated or are rehabilitated/restored (as prioritized), impacts to watersheds flow and sediment regimes should decrease to levels below the existing condition. Proposed trails in Alternative 3 would increase the overall road/trail density and stream crossing density over the existing condition. Increased road/trail densities have the potential to in effect increase drainage density, resulting in increased connectivity and peak flow magnitudes. However, the trail system, as designed in Alternative 3, would not exacerbate existing water quality issues because of appropriate design criteria and proper management and maintenance.

Road/Trail Density

Table 106 summarizes the differences in road and trail densities between Alternative 2 and Alternative 3. Compared to Alternative 2, Alternative 3 would reduce road/trail densities in all project area subwatersheds except for Upper Marks Creek, where densities would be increased by 0.2 miles/square mile over Alternative 2. There would be no change in Little Summit Prairie and North Wolf Creek.

Table 106. Comparison of Alternative 2 and Alternative 3 road plus new trail densities by subwatershed.

Subwatershed	Alternative 2		Alternative 3		Difference between Miles Alt 3 vs Alt 2
	Density	Rating	Density	Rating	
Elliott Creek	2.7	Low	2.6	Low	-2.1 miles
Howard Creek	4.2	High	4.1	High	-1.4 miles
Jackson Creek	4.1	High	3.9	Moderate	-7.1 miles
Little Summit Prairie Creek	4.1	High	4.1	High	No change
Lower Deep Creek	3.4	Low	3.3	Low	-1.2 miles
North Wolf Creek	3.0	Low	3.0	Low	No change
Peterson Creek	3.0	Low	2.8	Low	-7.4 miles
Porter Creek	4.4	High	4.0	Moderate	-7.6 miles
Upper Marks Creek	3.6	Moderate	3.8	Moderate	+6.3 miles

Stream Crossing Density

Compared to Alternative 2, Alternative 3 would reduce stream crossings and stream crossing densities in all project subwatersheds except for Lower Deep Creek and Upper Marks Creek (see Table 107). There would be one additional crossing in Lower Deep Creek under Alternative 3, but it would not appreciably increase stream crossing density in that watershed. In Upper Marks Creek, there would be two new stream crossings compared to Alternative 2, which would increase stream crossing density by 0.1. There would be no change in Little Summit Prairie and North Wolf Creek.

Table 107. Comparison of Alternative 2 and Alternative 3 road plus trail stream crossing densities by subwatershed.

Subwatershed	Alternative 2			Alternative 3			Difference between Crossings Alt 3 vs. Alt 2
	# X-ings	Density	Rating	# X-ings	Density	Rating	
Elliott Creek	80	3.5	High	73	3.2	Moderate	-7 crossings
Howard Creek	81	4.4	High	80	4.4	High	-1 crossing
Jackson Creek	81	2.1	Low	76	2.0	Low	-5 crossings
Little Summit Prairie Creek	64	2.5	Moderate	64	2.5	Moderate	No change

Lower Deep Creek	47	2.0	Low	48	2.1	Low	+1 crossing
North Wolf Creek	45	2.3	Low	45	2.3	Low	No change
Peterson Creek	113	2.2	Low	100	2.0	Low	-13 crossings
Porter Creek	98	6.3	High	94	6.1	High	-4 crossings
Upper Marks Creek	91	2.8	Moderate	93	2.9	Moderate	+2 crossings
Grand Total	700			673			-27 crossings

Sediment/Turbidity

Overall, this alternative would reduce impacts relative to water quality, in particular sediment and turbidity compared to Alternative 2. In the long-term, relative to OHV cross-country travel, sediment and turbidity related water quality would be maintained or slightly improved through an overall reduction in the number of stream and wetland crossing locations, improved stream crossing types, improved trail drainage, reduction in the miles of trail in the vicinity of perennial and intermittent streams, and anticipated decreased peak flow magnitudes.

As compared to historic OHV cross-country travel impacts, streambank conditions are expected to maintain or slightly improve over time with the implementation of Alternative 3. Relative to OHV cross-country travel, fewer stream crossings would occur within all subwatersheds and culverts or bridges would be installed at all new perennial and intermittent stream crossings. By reducing the number of crossing locations relative to cross-country travel and by not allowing fords, direct streambank impacts would be reduced. Alternative 3 would have more impact on streambanks as compared to the no action alternative with increased stream crossings and potential disturbance during culvert or bridge installation. Alternative 3 would have less of an impact to streambanks as compared to Alternative 2 with fewer stream crossings, less changes to the sediment and flow regimes, and with the absence of Class II trails. Areas that are currently entrenched (G and F-type channels) would continue to adjust and may take decades to become stable with vegetation. Sediment yield from these entrenched systems would continue to exist, but would decline as streambanks adjust slope and become vegetated.

As the effects of the implementation of the Travel Management Decision are realized, impacts to Groundwater-Dependant Ecosystems (wetlands) in the form of wetlands, wet meadows, and springs would be reduced even with the designation of the trail network in Alternative 3. User created trails across wetlands would naturally revegetate over time and trails that cross wetlands would have minimal effect through the implementation of the design criteria. Design criteria state that trails would either be rereouted to “avoid meadows, seeps, and springs” or “puncheon stringers” would need to be installed that would elevate the trail above the wetland. Overall, however, Alternative 3 would have slightly more effect on wetlands through increased road/trail densities in and within wetland RHCAs through increased disturbance levels compared to the no action alternative.

Overall, Alternative 3 would result in reduced sediment delivery to streams through improved trail drainage, periodic trail maintenance, reduced trail densities near streams, and reduced peak flows as compared to historic OHV cross-country uses in the Ochoco Summit project area. User-created trails that have been created over time do not have proper drainage, are not maintained, and cross over a larger portion of the landscape including across streams. By designating the trail system in Alternative 3, erosion and sediment delivery to the stream channel is mitigated by the design criteria that require outlsloping and hardening approaches to stream crossing, installing rolling dips to disperse water from the trail, by reducing the number of locations where OHVs can cross intermittent and perennial streams, and by reducing the density of trails within the sediment delivery zone (300 feet). Reduced peak flows also dissipate the effects of sediment delivery to streams by reducing the

potential for rilling to occur along the trails or where flow is diverted off the trail onto the hillslope above the stream channel.

This alternative would be consistent with the water goals and maintaining cutbank levels to below 20 percent, as outlined in the LRMP. This alternative would be consistent with the Riparian Management Goal of maintaining bank stability greater than 80 percent outlined in INFISH, and with the RMO, as well as RMOs for surface fines/substrate embeddedness. This alternative would protect designated beneficial uses and would be consistent with the Clean Water Act and Executive Orders 11988, 11990, and 12088. Site specific locations in the Deep Creek Watershed, however, would not be consistent with the purpose and need of the Deep Creek Restoration and would potentially result in turbidity increases in Deep Creek.

Based on the analysis below, there would be no effect to pools in any of the project subwatersheds. Pools were identified as an indicator for redband trout. Because of the extremely small contribution in terms of fine sediment from construction and maintenance of the Ochoco Summit trail system (see Table 110), there would be no reduction in pool volume and thus pools would be maintained in all project subwatersheds.

Roads/Trails

Alternative 3 proposes 6.8 miles less new trail within 300’ of streams compared to Alternative 2, resulting in 9.1 total miles of new trail within 300 feet of streams. A comparison of ratings based on total road/trail densities within the sediment delivery zone of streams identifies little to no difference in effect (Table 108). Total road/trail densities would, however, slightly decline between Alternative 2 and Alternative 3 for Elliott, Jackson, Lower Deep, Peterson & Porter Creek, but increase in Upper Marks Creek. North Wolf and Little Summit Prairie Creek remain unchanged between Alternative 2 and 3.

Table 108. Miles of existing roads and proposed trail miles within 300' of streams, comparison between Alternative 2 and Alternative 3.

Subwatershed	Alternative 2				Alternative 3				Difference between new trail within 300’ Alt 3 vs Alt 2
	New Trail Miles	Road + Trail Total	Road/ Trail Density	Rating	New Trail Miles	Road + Trail Total	Road/ Trail Density	Rating	
Elliott Creek	2.5	26.8	3.4	Good	1.0	25.3	3.2	Good	-1.0 miles
Howard Creek	1.8	32.0	5.5	Fair	1.6	31.8	5.5	Fair	-0.2 miles
Jackson Creek	1.8	44.0	4.4	Good	0.9	43.1	4.3	Good	-0.9 miles
Little Summit Prairie Creek	0.6	42.9	6.0	Poor	0.6	42.9	6.0	Poor	No change
Lower Deep Creek	2.3	30.8	5.6	Fair	2.0	30.5	5.5	Fair	-0.3 miles
North Wolf Creek	0.2	29.3	5.9	Fair	0.2	29.3	5.9	Fair	No change
Peterson Creek	3.1	65.6	3.6	Good	0.0	62.5	3.4	Good	-3.1 miles
Porter Creek	3.6	41.1	5.2	Fair	1.2	38.7	4.9	Good	-2.4 miles
Upper Marks Creek	0.5	33.8	4.0	Good	1.6	34.9	4.1	Good	+1.1 miles

Alternative 3 proposes 76 fewer trail stream crossings compared to Alternative 2 (Table 109). There would be 42 fewer existing crossings used and 32 fewer new crossings used in Alternative 3 as compared to Alternative 2.

Table 109. Comparison of trail and intermittent and perennial stream crossings between Alternative 2 and Alternative 3.

Subwatershed	Alternative 2			Alternative 3		
	Existing Route	New Trail	Total	Existing Route	New Trail	Total
Elliott Creek	10	15	25	1	4	5
Howard Creek	1	7	8	1	6	7
Jackson Creek	13	9	24	3	6	9
Little Summit Prairie Creek	2	1	3	2	1	3
Lower Deep Creek	5	4	9	5	4	9
North Wolf Creek	3	0	3	3	0	3
Peterson Creek	23	17	40	0	0	0
Porter Creek	25	9	34	25	9	34
Upper Marks Creek	4	0	4	4	0	4
Grand Total	86	62	150	44	30	74

Sediment Loading

Table 110 displays estimated sediment contribution from road/trail crossings and road/trail segments within 300 feet of streams in project area subwatersheds for Alternative 3. The final column in the table compares the difference in sediment that would be produced in tons/year between Alternative 2 and Alternative 3.

Table 110. Sediment contribution from road/trail crossing and adjacent road/trail segments (tons/year) compared to estimated natural background sediment (tons/year) by subwatershed for Alternative 3.

Subwatershed	Total Natural Background Sediment (tons/year)	Estimated Contribution from Existing Roads (tons/year)	Total Contribution from Road/Trail Crossings (tons/year)	Total Contribution from Adjacent Road/Trail Segments (tons/year)	Alternative 3 – Percent of Natural Background	Alternative 3 + Existing Roads – Percent of Natural Background	Difference between Alternative 2 and Alternative 3 (tons/year)
Elliott Creek	421	10.6	4.1	0.2	1%	4%	-11.9 tons
Howard Creek	404	16.1	1.7	0.1	0.4%	4%	No change
Jackson Creek	252	21.1	7.5	0.3	3%	11%	-4.1 tons
Little Summit Prairie Creek	255	14.4	0.7	0.05	0.3%	6%	-1.0 tons
Lower Deep Creek	952	12.2	2.0	0.3	0.2%	2%	No change
North Wolf Creek	215	9.4	0.1	0.01	0%	4%	No change
Peterson Creek – North Fork Crooked River	1051	29.4	0	0	0%	3%	-13.7 tons
Porter Creek	562	20.9	2.5	0.4	0.5%	4%	-13.5 tons
Upper Marks Creek	77	40.8	4.1	0.2	6%	59%	+3.7 tons

In terms of sediment loading, there would be no change between Alternative 2 and Alternative 3 in the Howard, Lower Creek and North Wolf Creek Subwatersheds. There would be reductions in

sediment in all other subwatersheds except for Upper Marks Creek, which is estimated to have a slight increase in sediment (+3.7 tons) due to a new separate trail system being proposed.

Conclusion

Overall, reductions in miles of trail within the sediment delivery zone, as well as across project area subwatersheds, reductions in stream crossings, and overall estimated sediment production would result in Alternative 3 having less effect on aquatic & hydrologic resources as compared to Alternative 2. These changes address some specific hydrologic concerns and are beneficial from a hydrologic perspective when compared to Alternative 2.

Based on the generally small changes in estimated sediment contributions between Alternative 2 and Alternative 3, the effects would essentially be the same for aquatic species as described for each subwatershed under Alternative 2. From a sediment loading standpoint, Alternative 3 is estimated to produce less sediment in all project subwatersheds except Upper Marks Creek, which would be more beneficial to aquatic species as compared to Alternative 2. The effects to aquatic species are less than what is displayed in Alternative 2, but greater than those displayed for the No Action Alternative. Alternative 3 would have no effect on redband trout and Columbia spotted frog long-term in all project subwatersheds. Short-term sediment inputs from trail construction, especially at stream crossings, may have negative effects during construction when turbidity is high. These negative effects may include fish displacement during times of high turbidity, limited feeding, and possible mortality. Overall, Alternative 3 "May impact individuals or habitat, but would not likely contribute to a trend towards federal listing or loss of viability to the population or species." From an aquatic species standpoint, Alternative 3 addresses some key hydrologic concerns that were brought up in comments and should, overall, have less impact to aquatic species than Alternative 1 and 2.

Table 111. A summary of information related to Alternative 3 stream crossings by subwatershed.

Sub-watershed	Number of Crossings		Crossings on Fish-Bearing Streams	Crossings on Non-Fish Bearing Streams	Crossings on Perennial Streams	Crossings on Intermittent Streams	Crossings on Ephemeral Streams	Crossing Type		
	New	Existing						Ford	CMP (Culvert)	Bridge
Elliott Creek	4	1	2	3	3	2	0	2	1	2
Howard Creek	6	1	2	5	1	3	3	1	6	0
Jackson Creek	6	3	4	5	4	5	0	3	3	3
Little Summit Prairie Creek	1	2	1	2	1	2	0	0	2	1
Lower Deep Creek	4	5	3	6	2	7	0	1	4	4
North Wolf Creek	0	3	2	1	0	3	0	0	3	0
Peterson Creek – North Fork Crooked River	0	0	0	0	0	0	0	0	0	0
Porter Creek	9	25	1	33	0	10	24	7	27	0
Upper Marks Creek	0	4	1	3	2	2	0	0	3	1

Alternative 4

Alternative 4 was developed in response to an issue identified during scoping that the proposed action trail system is too small and lacks quality. Alternative 4 includes trails for class I, II and III vehicles over more area and with more miles than the Proposed Action. Alternative 4 proposes a total of 95 miles of Class I vehicle (ATV) trails or roads, 19 miles of Class II vehicle (4x4), and 45 miles of Class III vehicle (motorcycle) trail/roads. In the short-term with the implementation of Alternative 4, sediment delivery would increase. However, in the long-term, even though some user-created trails have revegetated or are rehabilitated/restored (as prioritized), due to the extensive network of OHV trails added in this alternative, impacts to the flow and sediment regime and sediment/turbidity levels in the streams would likely remain at or in excess of the existing condition. Alternative 4 would result in the largest impact to streams and watersheds within the Ochoco Summit project area as compared to all of the other three alternatives.

In Alternative 4, the OHV trail is proposed in Deep Creek, Lower Beaver Creek, Upper North Fork Crooked River, and Upper Ochoco Creek Watersheds. Alternative 4 addresses the Purpose and Need as outlined in Chapter 1 by proposing to develop a trail network that includes approximately 158 miles of proposed OHV trail and 53 miles of open National Forest System roads that connect trail segments or contribute to the network by connecting trail segments or by enhancing loop opportunities/options for trail users. The motorized trails would be open for use by specified vehicle type, seasonally between May 1 and November 1 of each year, except on Paulina Ranger District, where trails would close at the beginning of the restriction period specified for the Rager Cooperative Travel Management Area, and would remain closed until May 1 of each year. This alternative features several interconnected trails systems:

1. Of the total 129 miles in the Class I vehicle (ATV) network, 34 miles are on open roads, 47 miles are on closed or decommissioned road beds and 48 miles are not on NFS roads. This would allow for up to 95 miles of 50” wide trail through conversion of old road beds and new trail construction combined. In addition all Class II trails would be available for use by ATVs. Mixed use roads identified under the current Travel Management Plan would also remain available for use by ATVs.
2. Of the total 30 miles in the Class II vehicle (jeep, small truck and buggy) network, 11 miles are on open roads, 7 miles are on closed or decommissioned road beds, and 11 miles are not on NFS roads. This would allow for up to 18 miles of 80” wide trail, through conversion of old road beds and new trail construction combined. Mixed use roads identified under the current Travel Management Plan would remain available for use by non-highway-legal jeeps and buggies, and highway-legal vehicles would have access to all roads identified as open in the current Travel Management Plan.
3. Of the total 52 miles of Class III vehicle (motorcycle) network, 8 miles are on open roads, 22 miles are on closed or decommissioned road beds, and 22 miles are not on NFS roads. This would allow for up to 44 miles of 24” wide trail through conversion of old road beds and new trail construction combined. In addition all Class I and II trails would be available for use by motorcycles. Class III vehicles could use the entire system of trails if they choose to do so. However, they could also travel from the west end to the east end without having to travel on a class II trails by travelling on mixed use roads instead. Mixed use roads identified under the current Travel Management Plan would remain available for use by non-highway-legal motorcycles, and highway-legal vehicles would have access to all roads identified as open in the current Travel Management Plan.

The trail would be open from May 1 to November 1. Crossings and stream approaches would be in accordance with the Project Design Criteria to reduce movement of the trail’s surface during high precipitation months of May and October (USDA 2006). The trail would be open during critical

spawning dates for fish, which is from March to the end of June (Wydoski and Whitney 1979), and breeding season for frogs, which is early March through the end of May. Roads were closed and culverts pulled (BAER) for purposes of reducing sedimentation into streams due to the effects of vegetation removed in the Maxwell Fire in the Elliot Creek Subwatershed.

Differences from Alternative 2 to Alternative 4:

- Allen Creek Horse Camp would become an OHV staging area and add trail to access system
- The trailhead proposed in Alternative 2 at Allen Creek would be moved upslope to connect between Allen Camp and the main trail in Alternative 4
- More existing disturbance (user-created routes, COMAC routes, and ski trails) would be utilized
- Added connector trail from Cottonwood Staging Area and mixed use FR 1200-196
- No staging and play areas and associated trails in FR3000-800 area (Aspen Pit/Happy Camp Creek)
- Dropped new construction Class III crossing above Crazy Creek tributary; keep OHV route to jeep zone
- Keep jeep trail and boulder crawl trail; jeep crawl relocated and avoids crossing class IVs in Peterson Creek
- Drop campground loop road that crosses Peterson tributary twice in north ½ of Section 32

Summary of Effects of Alternative 4, as compared to the Proposed Action

Flow and Sediment Regimes

In the short-term with the implementation of Alternative 4, impacts of the addition of trails on the flow and sediment regimes would increase. However, in the long-term, once most user-created trails have revegetated or are rehabilitated/restored (as prioritized), impacts to watersheds flow and sediment regimes should decrease to levels below the existing condition. Proposed trails in Alternative 4 would increase the overall road/trail density and stream crossing density. Increased road/trail densities have the potential to in effect increase drainage density, resulting in increased connectivity and peak flow magnitudes. However, the trail system, as designed in Alternative 4, would not exacerbate existing water quality issues because of appropriate design criteria and proper management and maintenance.

Road/Trail Density

Compared to Alternative 2, Alternative 4 would reduce road/trail densities in all project subwatersheds except for Upper Marks and Jackson Creek, where densities were increased from Alternative 2 by 0.2 miles/square mile and 0.1 miles/square mile, respectively. There was no change in North Wolf Creek.

Table 112. Comparison of Alternative 2 and Alternative 4 road plus new trail densities by subwatershed.

Subwatershed	Alternative 2		Alternative 4		Difference between Miles Alt 4 vs Alt 2
	Density	Rating	Density	Rating	
Elliott Creek	2.7	Low	2.7	Low	-0.7 miles
Howard Creek	4.2	High	4.2	High	-0.1 miles
Jackson Creek	4.1	High	4.2	High	+1.2 miles
Little Summit Prairie Creek	4.1	High	3.9	Moderate	-4.7 miles
Lower Deep Creek	3.4	Low	2.9	Low	-2.6 miles
North Wolf Creek	3.0	Low	3.0	Low	No change
Peterson Creek	3.0	Low	2.9	Low	-0.9 miles

Porter Creek	4.4	High	4.3	High	-2.5 miles
Upper Marks Creek	3.6	Moderate	3.8	Moderate	+6.5 miles

Stream Crossing Density

Compared to Alternative 2, Alternative 4 increases stream crossings and stream crossing densities in Little Summit Prairie, Peterson and Upper Marks Creek. There would be one additional crossing in Little Summit Prairie Creek, but it would not appreciably increase stream crossing density in that watershed. In Upper Marks Creek, there would be nine new stream crossings and in Peterson Creek there would be three new crossings compared to Alternative 2, which would increase stream crossing density by 0.3 and 0.1, respectively. There would be no change in Howard, Lower Deep, and North Wolf Creek compared to Alternative 2.

Table 113. Comparison of Alternative 2 and Alternative 4 road plus trail stream crossing densities by subwatershed.

Subwatershed	Alternative 2			Alternative 4			Difference between Crossings Alt 4 vs. Alt 2
	# X-ings	Density	Rating	# X-ings	Density	Rating	
Elliott Creek	80	3.5	High	79	3.5	High	-1 crossing
Howard Creek	81	4.4	High	81	4.4	High	No change
Jackson Creek	81	2.1	Low	80	2.1	Low	-1 crossing
Little Summit Prairie Creek	64	2.5	Moderate	65	2.5	Moderate	+1 crossing
Lower Deep Creek	47	2.0	Low	47	2.0	Low	No change
North Wolf Creek	45	2.3	Low	45	2.3	Low	No change
Peterson Creek	113	2.2	Low	116	2.3	Low	+3 crossings
Porter Creek	98	6.3	High	97	6.3	High	-1 crossing
Upper Marks Creek	91	2.8	Moderate	100	3.1	Moderate	+9 crossings
Grand Total	700			710			+10 crossings

Sediment/Turbidity

Overall, this alternative would reduce impacts relative to water quality, in particular sediment and turbidity. In the long-term, relative to OHV cross-country travel, sediment and turbidity related water quality would be maintained or slightly improved through an overall reduction in the number of stream and wetland crossing locations, improved stream crossing types, improved trail drainage, reduction in the miles of trail in the vicinity of perennial and intermittent streams, and anticipated decreased peak flow magnitudes.

As compared to historic OHV cross-country travel impacts, streambank conditions are expected to maintain or slightly improve over time with the implementation of Alternative 4. Relative to OHV cross-country travel, fewer stream crossings would occur within all subwatersheds, and culverts or bridges would be installed at all new perennial and intermittent stream crossings. By reducing the number of crossing locations relative to cross-country travel and by not allowing fords, direct streambank impacts would be reduced. Alternative 4 would have more impact on streambanks as compared to the no action alternative, with increased stream crossings and potential disturbance during culvert or bridge installation. Alternative 4 would have more of an impact to streambanks as compared to Alternative 2, with more stream crossings. Areas that are currently entrenched (G and F-type channels) would continue to adjust and may take several decades to become stable with vegetation. Sediment yield from these entrenched systems would continue to exist, but would decline as streambanks adjust slope and become vegetated.

As the effects of the implementation of the Travel Management Decision are realized, impacts to Groundwater-Dependant Ecosystems (wetlands) in the form of wetlands, wet meadows, and springs would be reduced even with the designation of the trail network in Alternative 4. User created trails across wetlands would naturally revegetate over time and trails that cross wetlands would have minimal effect through the implementation of the design criteria. Design criteria state that trails would either be rereouted to "avoid meadows, seeps, and springs" or "puncheon stringers" would need to be installed that would elevate the trail above the wetland. Overall, however, Alternative 4 would have slightly more effect on wetlands through increased road/trail densities in and within wetland RHCAs through increased disturbance levels compared to the no action alternative.

Overall, Alternative 4 would result in reduced sediment delivery to streams through improved trail drainage, periodic trail maintenance, reduced trail densities near streams, and reduced peak flows as compared to historic OHV cross-country uses in the Ochoco Summit project area. User-created trails that have been created over time do not have proper drainage, are not maintained, and cross over a larger portion of the landscape including across streams. By designating the trail system in Alternative 4, the potential for erosion and sediment delivery to the stream channel is reduced by the design criteria that require outlsloping and hardening approaches to stream crossing, by installing rolling dips to disperse water from the trail (although pertinent to all action alternatives), by reducing the number of locations where OHVs can cross intermittent and perennial streams, and by reducing the density of trails within the sediment delivery zone (300 feet). Reduced peak flows would also dissipate the effects of sediment delivery to streams by reducing the potential for rilling to occur along the trails or where flow is diverted off the trail onto the hillslope above the stream channel.

This alternative would be consistent with the water goals and maintaining cutbank levels to below 20 percent, as outlined in the LRMP. This alternative would be consistent with the Riparian Management Goal of maintaining bank stability greater than 80 percent outlined in INFISH and with the RMO. This alternative would protect designated beneficial uses and would be consistent with the Clean Water Act and Executive Orders 11988, 11990, and 12088. Site specific locations in the Deep Creek Watershed, however, would not be consistent with the Deep Creek Restoration, potentially resulting in turbidity increases and potential impacts on fluvial processes and site recovery in Deep Creek. Cumulative turbidity increases of ten percent or more do not meet LRMP water quality standards and guidelines.

Based on the analysis below, there would be no effect to pools in any of the project subwatersheds. Pools were identified as an indicator for redband trout. Because of the extremely small contribution, in terms of fine sediment from construction and maintenance of the Ochoco Summit trail system (see Table 116), there would be no reduction in pool volume and thus pools would be maintained in all project subwatersheds.

Roads/Trails

Alternative 4 proposes 0.7 more miles of trail within 300' of streams compared to Alternative 2, resulting in 17.1 total miles of new trail within 300 feet of streams. A comparison of ratings based on total road/trail densities within the sediment delivery zone of streams identifies little to no difference in effect (Table 114). Total road/trail densities within 300' of streams do, however, slightly decline between Alternative 2 and Alternative 4 for Elliott, Jackson, Lower Deep and Porter Creek. Total road densities within 300' of streams slightly increase in Howard, Little Summit Prairie, Peterson and Upper Marks Creek. North Wolf Creek remains unchanged between Alternative 2 and 4.

Table 114. Miles of Existing Roads and proposed trail miles within 300' of streams, comparison between Alternative 2 and Alternative 4.

Subwatershed	Alternative 2	Alternative 4	

	New Trail Miles	Road + Trail Total	Road/ Trail Density	Rating	New Trail Miles	Road + Trail Total	Road/ Trail Density	Rating	Difference between new trail within 300' Alt 4 vs Alt 2
Elliott Creek	2.5	26.8	3.4	Good	2.1	26.4	3.4	Good	-0.4 miles
Howard Creek	1.8	32.0	5.5	Fair	2.1	32.3	5.6	Fair	+0.3 miles
Jackson Creek	1.8	44.0	4.4	Good	1.7	43.9	4.3	Good	-0.1 miles
Little Summit Prairie Creek	0.6	42.9	6.0	Poor	0.8	43.1	6.1	Poor	+0.2 miles
Lower Deep Creek	2.3	30.8	5.6	Fair	2.0	30.5	5.5	Fair	-0.3 miles
North Wolf Creek	0.2	29.3	5.9	Fair	0.2	29.3	5.9	Fair	No change
Peterson Creek	3.1	65.6	3.6	Good	3.3	65.8	3.6	Good	+0.2 miles
Porter Creek	3.6	41.1	5.2	Fair	3.1	40.6	5.1	Fair	-0.5 miles
Upper Marks Creek	0.5	33.8	4.0	Good	1.8	35.1	4.2	Good	+1.3 miles

Alternative 4 proposes 18 more trail stream crossings compared to Alternative 2 (Table 115). There are 13 more existing crossings used and 7 more new crossings used in Alternative 4 as compared to Alternative 2.

Table 115. Comparison of Trail and Intermittent and Perennial Stream Crossings between Alternative 2 and Alternative 4.

Subwatershed	Alternative 2			Alternative 4		
	Existing Route	New Trail	Total	Existing Route	New Trail	Total
Elliott Creek	10	15	25	10	14	24
Howard Creek	1	7	8	2	7	9
Jackson Creek	13	9	24	16	8	24
Little Summit Prairie Creek	2	1	3	2	2	4
Lower Deep Creek	5	4	9	8	4	12
North Wolf Creek	3	0	3	3	0	3
Peterson Creek	23	17	40	21	17	38
Porter Creek	25	9	34	22	8	30
Upper Marks Creek	4	0	4	15	9	24
Grand Total	86	62	150	99	69	168

Sediment Loading

Table 116 displays estimated sediment contribution from road/trail crossings and road/trail segments within 300 feet of streams in project area subwatersheds for Alternative 4. The final column in the table compares the difference in sediment produced in tons/year between Alternative 2 and Alternative 4.

Table 116. Sediment contribution from road/trail crossing and adjacent road/trail segments (tons/year) compared to estimated natural background hillslope sediment (tons/year) by subwatershed for Alternative 4.

Subwatershed	Total Natural Background Sediment (tons/year)	Estimated Contribution from Existing Roads (tons/year)	Total Contribution from Road/Trail Crossings (tons/year)	Total Contribution from Adjacent Road/Trail	Alternative 4 – Percent of Natural Background	Alternative 4 + Existing Roads – Percent of Natural Background	Difference Between Alternative 2 and 4 (tons/ year)

				Segments (tons/year)			
Elliott Creek	421	10.6	11.4	0.7	3%	7%	-4.1 tons
Howard Creek	404	16.1	2.4	0.2	0.6%	5%	+0.8 tons
Jackson Creek	252	21.1	11.4	0.8	5%	13%	-0.3 tons
Little Summit Prairie Creek	255	14.4	1.7	0.1	0.7%	6%	+0.1 tons
Lower Deep Creek	952	12.2	2.7	0.7	0.3%	2%	+1.1 tons
North Wolf Creek	215	9.4	0.1	0.01	0%	4%	No change
Peterson Creek – North Fork Crooked River	1051	29.4	8.3	0.6	0.8%	4%	-4.8 tons
Porter Creek	562	20.9	12.8	1.7	3%	6%	-1.9 tons
Upper Marks Creek	77	40.8	5.1	0.4	7%	60%	+4.9 tons

In terms of sediment loading, there was no change between Alternative 2 and Alternative 4 in the North Wolf Creek. There were reductions in sediment in all other subwatersheds except for Howard, Little Summit Prairie, Lower Deep and Upper Marks Creek. Overall, Alternative 4 is predicted to have an overall increase in fine sediment of 4.2 tons between all project subwatersheds.

Conclusion

Overall, increases in miles of trail within the sediment delivery zone in some project area subwatersheds, as well as increases in stream crossings and overall estimated sediment production, would result in Alternative 4 having more effect on aquatic & hydrologic resources, as compared to Alternative 2.

Based on the generally small changes in estimated sediment contributions between Alternative 2 and Alternative 4, the effects would essentially be the same for aquatic species as described in each subwatershed under Alternative 2. From a sediment loading standpoint, Alternative 4 is estimated to produce less sediment in all project subwatersheds except Upper Marks Creek, Little Summit, Lower Deep and Howard, which would be more beneficial to aquatic species as compared to Alternative 2. The effects to aquatic species are less than what is displayed in Alternative 2, but greater than those displayed for the No Action Alternative, except in the watersheds that are listed above, where the effects would be greater than those displayed in Alternative 2, based on increases in roads within 300' of stream and increased numbers of stream crossings. Alternative 4 would have no effect on redband trout and Columbia spotted frog long-term in all project subwatersheds. Short-term sediment inputs from trail construction, especially at stream crossings, may have negative effects during construction when turbidity is high. These negative effects may include fish displacement during times of high turbidity, limited feeding, and possible mortality. Overall, Alternative 4 "May impact individuals or habitat, but would not likely contribute to a trend towards federal listing or loss of viability to the population or species."

Table 117. A summary of information related to Alternative 4 stream crossings by subwatershed.

Sub-watershed	Number of Crossings		Crossings on Fish-Bearing Streams	Crossings on Non-Fish Bearing Streams	Crossings on Perennial Streams	Crossings on Intermittent Streams	Crossings on Ephemeral Streams	Crossing Type		
	New	Existing						Ford	CMP (Culvert)	Bridge
Elliott Creek	14	10	4	20	6	16	1	6	13	4

Howard Creek	7	2	3	6	1	5	3	1	7	1
Jackson Creek	8	16	7	17	8	16	0	8	11	5
Little Summit Prairie Creek	2	2	1	3	1	3	0	1	2	1
Lower Deep Creek	4	8	3	9	2	10	0	1	7	4
North Wolf Creek	0	3	2	1	0	3	0	0	3	0
Peterson Creek – North Fork Crooked River	17	21	4	34	4	10	24	17	20	1
Porter Creek	8	22	1	29	0	6	24	7	23	0
Upper Marks Creek	9	15	3	21	8	16	0	6	16	2

Alternative 5

Alternative 5 was developed in response to potential issues related to how the trail system could impact water quality, big game habitat, and fish habitat, as well as potential conflict between motorized and non-motorized recreation. Alternative 5 is based on trail system proposed in Alternative 3, but modified to reduce interaction with water features, especially fish bearing and 303(d) listed streams; and to avoid Corral Flats, Crystal Springs and proximity to private lands and the Research Natural area (RNA). Modifications also reduced the number of new stream class 2 crossings within the Upper Ochoco Creek watershed at Crystal Creek, and within the Lower Beaver Creek Watershed at North Wolf Creek. This alternative would designate routes to the extent available within existing road corridors and in proximity to existing open roads in order to reduce potential disturbance to wildlife; and would avoid the Wild Horse Herd Management Area. However, this alternative has additional opportunities added in response to the key issue involving motorized recreation opportunity compared to Alternative 3. This alternative is intended to provide motorized trails and areas at a lesser scale than Alternatives 2 or 4 to reduce potential for impacts to water quality, fish and wildlife; and responds to concerns for both motorized and non-motorized recreational opportunity.

During planning of this project, an attempt was made to avoid RHCAs and stream crossings to the extent possible while still proposing a sustainable trail network that responded to the Community Support Area that was identified by the Deschutes Provincial Advisory Committee (PAC) Travel Management Sub-committee. Potential trail routes that parallel stream courses and potential routes near sensitive areas, such as seeps, springs, wet meadows and wetlands were largely avoided when locating potential OHV trail networks. A number of realignments of trails from Alterantive 3 were made to further avoid potential impacts to streams. These modifications resulted in a reduction of two new stream class 2 crossings in the Deep Creek Watershed (tributary to Happy Camp Creek and Big Springs Creek); reduction of one new stream class 2 crossing in Lower Beaver Creek watershed (North Wolf Creek); and a reduction of one new stream class 2 crossing in the Upper Ochoco Creek watershed (Crystal Creek). Within the Deep Creek watershed modifications to Alternative 3 also resulted in elimination of two stream Class 4 stream crossings and moved a route that paralleled a class 2 stream (Big Springs Creek) as well as one that paralleled a class 4 tributary to Little Summit Creek. The reroute of the 24” wide trail around the Crazy Creek exclosure (avoiding recently

authorized or implemented road decommissioning and stream restoration work) is also within the Deep Creek watershed.

The season of use for this alternative is one month less on each end of the operating season compared to Alternatives 2 and 4, opening June 1 and closing September 30, except in the Rager TMA where it closes with the Rager restriction start date and remains closed until the following June. Thus this alternative provides a better assurance of dry soil conditions during the open season of use. In addition, Project Design Criteria (PDC) are included that help to ensure that drainage is functional and measures are in place and effective in preventing erosion and sediment delivery (refer to PDCs in the FEIS, Chapter 2).

Alternative 5 proposes a total of 47 miles of Class I vehicle (ATV) trails or roads, 20 miles of Class II vehicle (jeep and buggy) trails or roads, 62 miles of Class III vehicle (motorcycle) trail/roads and six miles of Class IV vehicle (side-by-side) roads. These projects would result in more effects to the streams and watersheds within the Ochoco Summit project area as compared to Alternative 1, the no action alternative, but would have less effect compared to Alternative 2 or 4. In the short-term with the implementation of Alternative 5, sediment delivery would increase. However, in the long-term, once user-created trails have been closed and revegetated or are rehabilitated/restored (as prioritized), sediment delivery to streams should decrease to levels below the existing condition. Overall, in the long term Alternative 5 would result in less effect to stream and wetland water quality across the Ochoco Summit project area.

In Alternative 5, the OHV trail is proposed in Deep Creek, Lower Beaver Creek, Upper North Fork Crooked River, and Upper Ochoco Creek watersheds. Of the 135 miles of trail system proposed, approximately 42 miles are on closed roads, 12 miles that have been closed/decommissioned, and 51 miles of new routes. Approximately 30 miles of trail system would be on existing open roads. There are 21 crossings on Class I, II and III streams, and 34 crossings on Class IV streams. For trail miles and crossings in RHCAs by watershed and by stream class, see Appendix D. Alternative 5 has fewer crossings than Alternatives 2, 3 or 4.

Alternative 5 addresses the Purpose and Need, as outlined in Chapter 1, by proposing to develop a trail network that includes approximately 105 miles of proposed OHV trail and 30 miles of open National Forest System roads that connect trail segments or contribute to the network by connecting trail segments or by enhancing loop opportunities/options for trail users. The motorized trails would be open for use by specified vehicle type, seasonally between June 1 and September 30 of each year – except on Paulina Ranger District, where trails would close at the beginning of the restriction period specified for the Rager Cooperative Travel Management Area – and would remain closed until June 1 of each year. This alternative features several interconnected trails systems:

1. Of the total 47 miles in the Class I vehicle (ATV) network, 9 miles are on open roads, 20 miles are on closed or decommissioned road beds and 18 miles are not on NFS roads. This would allow for up to 38 miles of 50” wide trail through conversion of old road beds and new trail construction combined. In addition all Class II trails would be available for use by ATV. Mixed use roads identified under the current Travel Management Plan would also remain available for use by ATVs.
2. Of the total 20 miles in the Class II vehicle (jeep, small truck and buggy) network, 8 miles are on open roads, 4 miles are on closed or decommissioned road beds, and 8 miles are not on NFS roads. This would allow for up to 12 miles of 80” wide trail, through conversion of old road beds and new trail construction combined. Mixed use roads identified under the current Travel Management Plan would remain available for use by non-highway-legal jeeps and buggies, and highway-legal vehicles would have access to all roads identified as open in the current Travel Management Plan

3. Of the total 62 miles of Class III vehicle (motorcycle) network, 11.5 miles are on open roads, 25.5 miles are on closed or decommissioned road beds and 25 miles are not on NFS roads. This would allow for up to 50.5 miles of 24" wide trail through conversion of old road beds and new trail construction combined. In addition, all Class I and II trails would be available for use by motorcycles. Mixed use roads identified under the current Travel Management Plan would remain available for use by non-highway-legal motorcycles and highway-legal vehicles would have access to all roads identified as open in the current Travel Management Plan.
4. Of the total 6 miles in the Class IV vehicle (side-by-side UTV) network, 1 mile is on open roads and 5 miles are on closed or decommissioned road beds. This would allow for up to 5 miles of 65" wide trail, through conversion of old road beds and new trail construction combined. In addition, all Class II trails would be available for use by UTV. Mixed use roads identified under the current Travel Management Plan would remain available for use by non-highway-legal jeeps and buggies, and highway-legal vehicles would have access to all roads identified as open in the current Travel Management Plan

Differences in Alternative 5 from Alternative 2:

- Allen Creek staging area is dropped
- Aspen Pit staging area is dropped in response to the Deep Creek Restoration Plan
- The route from Allen Creek to Indian Butte and trailheads on FR2200-350 and 550 is dropped (reduces approximately 10 miles of trail in the Elliott and Peterson Creek Subwatersheds)
- No trails on FR2200-220 (1.7 miles route in the Howard Creek Subwatershed)
- There are a reduced number of crossings and restoration sites in Deep Creek and Crazy Creek drainages
- Staging and play areas and associated trails on FR3000-800, Aspen Pit/Happy Camp Creek are eliminated
- Use of motorized equipment restricted to between June 1 and September 30
- No trail connecting west to east north of Big Summit Prairie
- Limited motorized use to open roads on Rager TMA during closure period
- Does not include the side loop in Derr and upper Jackson area as proposed in Alternative 2 or associated trails at FR4200-600, or staging and play areas associated trails at and around Aspen Pit. No trailheads at and south of Jones Lava;
- No central tie-through trail between Paulina Butte and Jackson Creek more than ½ mile from an existing open road.
- Six Corners Mineral Source staging areas reduced to trailhead
- Includes a series of interconnected loops and 50-inch-wide trails between Ochoco Divide Snow Park, Walton Snow Park and FR2200-350.
- No staging or parking areas at Ahalt Pit or trailhead at FR2200-350.
- No singular route between Indian Butte (FR2200-350) and Scott's camp
- Additional loops on the west end included with multiple decision points and alternate loop options (not included in Alternative 2)

Summary of Effects of Alternative 5, as compared to Alternative 3

Flow and Sediment Regimes

In the short-term with the implementation of Alternative 5, impacts of the addition of trails on the flow and sediment regimes would increase. However, in the long-term, once most user-created trails have revegetated (or are rehabilitated/restored (as prioritized), impacts to watersheds flow and sediment regimes should decrease to levels below the existing condition. Proposed trails in

Alternative 5 would increase the overall road/trail density and stream crossing density. Increased road/trail densities have the potential to in effect increase drainage density, resulting in increased connectivity and peak flow magnitudes. However, the trail system, as designed in Alternative 5, would not exacerbate existing water quality issues, because of appropriate design criteria and proper management and maintenance.

Potential effects from an OHV trail system on the flow and sediment regimes within the project area are primarily a result of interconnection between the trail network and the stream network.

Road/Trail Density

Overall road/trail densities were reduced slightly for the Upper Marks Creek Subwatershed as compared to the Alternative 3. However, total road/trail densities would still be relatively high compared to the existing conditions within the project area (Table 118).

Table 118. Comparison of Alternative 3 and Alternative 5 road plus trail densities by subwatershed.

Subwatershed	Alternative 3		Alternative 5	
	Density	Rating	Density	Rating
Elliott Creek	3.5	Moderate	3.5	Moderate
Howard Creek	5.0	High	5.0	High
Jackson Creek	3.8	Moderate	3.8	Moderate
Little Summit Prairie Creek	4.1	High	4.1	High
Lower Deep Creek	3.3	Low	3.3	Low
North Wolf Creek	4.0	Moderate	4.0	Moderate
Peterson Creek	3.2	Low	3.2	Low
Porter Creek	3.9	Moderate	3.9	Moderate
Upper Marks Creek	4.7	High	4.6	High

Stream Crossing Density

There is a slight decrease in the stream crossing density in the Upper Marks Creek Subwatershed relative to Alternative 3 (Table 119). This slight decrease, however, does not reduce the overall rating of high for road/trail stream crossings within the Upper Marks Creek Subwatershed, which remains high relative to the existing condition in subwatersheds within the project area.

Table 119. Comparison of Alternative 3 and Alternative 5 road plus trail stream crossing densities by subwatershed.

Subwatershed	Alternative 3			Alternative 5		
	# X-ings	Density	Rating	# X-ings	Density	Rating
Elliott Creek	61	3.7	High	61	3.7	High
Howard Creek	66	4.4	High	66	4.4	High
Jackson Creek	75	2.0	Low	74	2.0	Low
Little Summit Prairie Creek	64	2.6	Moderate	64	2.6	Moderate
Lower Deep Creek	46	2.0	Low	45	2.0	Low
North Wolf Creek	45	3.3	Moderate	45	3.3	Moderate
Peterson Creek	60	2.7	Moderate	60	2.7	Moderate
Porter Creek	66	4.3	High	66	4.3	High
Upper Marks Creek	96	5.3	High	95	5.3	High
Grand Total	579			571		

Sediment/Turbidity

Overall, this alternative would reduce impacts relative to water quality, in particular sediment and turbidity. In the long-term, relative to OHV cross-country travel, sediment and turbidity related water quality would be maintained or slightly improved through an overall reduction in the number of stream and wetland crossing locations, improved stream crossing types, improved trail drainage, reduction in the miles of trail in the vicinity of perennial and intermittent streams, and anticipated decreased peak flow magnitudes.

As compared to historic OHV cross-country travel impacts, streambank conditions are expected to maintain or slightly improve over time with the implementation of Alternative 5. Relative to unmanaged OHV cross-country travel, fewer stream crossings would occur within all subwatersheds, and culverts or bridges would be installed at all new perennial and intermittent stream crossings. By reducing the number of crossing locations relative to cross-country travel and by not allowing fords, direct streambank impacts would be reduced. Alternative 5 would have more impact on streambanks, as compared to the no action alternative, with increased stream crossings and potential disturbance during culvert or bridge installation. Alternative 5 would have less of an impact to streambanks as compared to Alternatives 2, 3 and 4 with fewer stream crossings, less changes to the sediment and flow regimes, and with the absence of Class II trails. Areas that are currently entrenched (G and F-type channels) would continue to adjust, and may take several decades to become stable with vegetation. Sediment yield from these entrenched systems would continue to exist, but would decline as streambanks adjust slope and become vegetated.

As the effects of the implementation of the Travel Management Decision are realized, impacts to Groundwater-Dependant Ecosystems (wetlands) in the form of wetlands, wet meadows, and springs would be reduced even with the designation of the trail network in Alternative 5. Through the implementation of the design criteria, user created trails across wetlands would be hydrologically stabilized and would naturally revegetate over time, and trails that cross wetlands would have minimal effect. Design criteria state that trails would either be rereouted to “avoid meadows, seeps, and springs” or “puncheon stringers” would need to be installed that would elevate the trail above the wetland. Overall, however, Alternative 5 would have slightly more effect on wetlands through increased road/trail densities in and within wetland RHCAs through increased disturbance levels compared to the no action alternative.

Overall, Alternative 5 would result in reduced sediment delivery to streams through improved trail drainage, periodic trail maintenance, reduced trail densities near streams, and reduced peak flows as compared to historic OHV cross-country uses in the Ochoco Summit project area. User-created trails that have been created over time do not have proper drainage, are not maintained, and cross over a larger portion of the landscape including across streams. By designating the trail system in Alternative 5, erosion and sediment delivery to the stream channel is mitigated by the design criteria that require outlsloping and hardening approaches to stream crossing, installing rolling dips to disperse water from the trail, by reducing the number of locations where OHVs can cross intermittent and perennial streams, and by reducing the density of trails within the sediment delivery zone (300 feet). Reduced peak flows also dissipate the effects of sediment delivery to streams by reducing the potential for rilling to occur along the trails or where flow is diverted off the trail onto the hillslope above the stream channel.

Overall, this alternative would be consistent with the water goals and maintaining cutbank levels to below 20 percent, as outlined in the LRMP. This alternative would be consistent with the Riparian Management Goal of maintaining bank stability greater than 80 percent, outlined in INFISH and with the RMO. This alternative would protect designated beneficial uses and would be consistent with the Clean Water Act and Executive Orders 11988, 11990, and 12088.

Based on the analysis below, there would be no effect to pools in any of the project subwatersheds. Pools were identified as an indicator for redband trout. Because of the extremely small contribution in terms of fine sediment from construction and maintenance of the Ochoco Summit trail system (see Table 122), there would be no reduction in pool volume, and thus pools would be maintained in all project subwatersheds.

Roads/Trails

Alternative 5 proposes the same amount of trail as proposed in Alternative 3 within 300 feet, but located in different areas across the project area. A comparison of ratings based on total road/trail densities within the sediment delivery zone of streams identifies little to no difference in effect (Table 120). The ratings do not change between Alternative 3 and 5. Total Road/Trail densities do, however, slightly decline between Alternative 3 and Alternative 5 for Jackson Creek, Little Summit Prairie Creek, Lower Deep Creek, North Wolf Creek and Upper Marks Creek Subwatersheds.

In response to specific comments made on Alternative 3, changes were made to Alternative 5 in order to avoid trails being located on roads planned for decommissioning as part of the Deep Creek Environmental Assessment, as well as to avoid specific areas of hydrologic concern. Alternative 5 avoids these areas of specific concern within the sediment delivery zone, resulting in slight decreases in the overall road/trail densities within 300’ of streams in the Jackson Creek, Lower Deep Creek, and Little Summit Prairie Creek Subwatersheds.

Table 120. Miles of existing roads and proposed trail miles within 300' of streams, comparison between Alternative 3 and Alternative 5.

Subwatershed	Alternative 3				Alternative 5			
	New Trail Miles	Road + Trail Total	Road/ Trail Density	Rating	Trail Modifications Total Miles	Road + Trail Total	Road/ Trail Density	Rating
Elliott Creek	0.85	23.7	4.49	Good	0.00	23.7	4.49	Good
Howard Creek	1.42	32.4	8.56	Poor	0.00	32.4	8.56	Poor
Jackson Creek	0.94	48.1	6.19	Fair	-0.19	47.9	6.17	Fair
Little Summit Prairie Creek	0.58	45.4	7.47	Poor	-0.10	45.3	7.45	Poor
Lower Deep Creek	1.11	30.0	5.69	Good	-0.28	29.7	5.64	Good
North Wolf Creek	0.24	29.1	6.39	Fair	-0.24	28.8	6.34	Fair
Peterson Creek	0.00	29.2	4.31	Good	0.00	29.2	4.31	Good
Porter Creek	0.55	36.8	7.53	Poor	0.00	36.8	7.53	Poor
Upper Marks Creek	1.07	32.1	6.44	Fair	-0.06	32.1	6.44	Fair

Alternative 5 proposes five fewer trail stream crossings compared to Alternative 3 (Table 121). There are four additional crossings on existing roads and nine fewer new trail crossings in Alternative 5.

Table 121. Comparison of trail and intermittent and perennial stream crossings between Alternative 3 and Alternative 5.

Subwatershed	Alternative 3			Alternative 5		
	Existing Route	New Trail	Total	Existing Route	New Trail	Total
Elliott Creek	1	4	5	1	4	5
Howard Creek	1	0	1	1	0	1
Jackson Creek	6	6	12	5	5	10
Little Summit Prairie Creek	2	1	3	1	1	2

Lower Deep Creek	5	4	9	2	3	5
North Wolf Creek	1	0	1	1	0	1
Peterson Creek	0	0	0	0	0	0
Porter Creek	2	5	7	2	5	7
Upper Marks Creek	6	6	12	15	0	15
Grand Total	24	26	50	28	17	45

Sediment Loading

Table 122 displays estimated sediment contribution from road/trail crossings and road/trail segments within 300 feet of streams in project area subwatersheds for Alternative 3 and Alternative 5. The final column in the table compares the difference in sediment produced in tons/year between Alternative 3 and Alternative 5.

Table 122. Sediment contribution from road/trail crossing and adjacent road/trail segments (tons/year) for Alternative 3 and Alternative 5.

Subwatershed	Alternative 3		Alternative 5		Difference between Alternative 3 & Alternative 5 (tons/year)
	Estimated Contribution from Adjacent Road/Trail Segments (tons/year)	Estimated Contribution from Road/Trail Crossings (tons/year)	Estimated Contribution from Adjacent Road/Trail Segments (tons/year)	Estimated Contribution from Road/Trail Crossings (tons/year)	
Elliott Creek	0.2	4.1	0.2	4.1	no change
Howard Creek	0.1	1.7	0.1	1.7	no change
Jackson Creek	0.3	7.5	0.4	7.4	no change
Little Summit Prairie Creek	0.05	0.7	0.04	0.6	-0.1
Lower Deep Creek	0.3	2.0	0.2	1.5	-0.6
North Wolf Creek	0.01	0.1	0.02	0.1	+0.01
Peterson Creek – North Fork Crooked River	0	0	0	0	no change
Porter Creek	0.4	2.5	0.5	1.9	-0.5
Upper Marks Creek	0.2	4.1	0.1	2.2	-2.0

In terms of sediment loading, there was no change between Alternative 3 and Alternative 5 in the Elliott, Howard, Jackson, and Peterson Creek Subwatersheds. There were reductions in sediment in all other subwatersheds except for North Wolf Creek, which is estimated to have a very slight increase in sediment (+0.01 tons) due to new trail located in soil types that are more erodible than what was proposed under Alternative 3. Upper Marks Creek would see the largest decreases in estimated sediment loading due to the reduction in new trail crossings constructed and instead, existing road crossings being used.

Conclusion

Overall, slight reductions in miles of trail within the sediment delivery zone, as well as across project subwatersheds, reductions in stream crossings and overall estimated sediment production do not result in substantial changes in the effects of the modified Alternative 3, as compared to the draft. These changes address some specific hydrologic concerns and are beneficial from a hydrologic perspective. However, in combination with the existing road network, the overall effects are essentially the same as those described under Alternative 3.

Based on the small changes in estimated sediment contributions between Alternative 3 and Alternative 5, the effects would essentially be the same for aquatic species as described in each subwatershed under Alternative 3. From a sediment loading standpoint, Alternative 5 is estimated to produce less sediment in the Little Summit Prairie, Lower Deep, Porter and Upper Marks Creek which would be more beneficial to aquatic species as compared to Alternative 3. The effects to aquatic species are less than what is displayed in Alternative 3 but greater than those displayed for the No Action Alternative and have adequately been displayed in the EIS. Alternative 5 would have no measurable effect on redband trout and Columbia spotted frog long-term in all project subwatersheds. Short-term sediment inputs from trail construction, especially at stream crossings, may have negative effects during construction when turbidity is high. These negative effects may include fish displacement during times of high turbidity, limited feeding, and possible mortality. Overall, Alternative 5 "May impact individuals or habitat, but would not likely contribute to a trend towards federal listing or loss of viability to the population or species." From an aquatic species standpoint, Alternative 5 addresses some key hydrologic concerns that were brought up in comments and should, overall, be more beneficial to aquatic species than Alternative 3.

Table 123. A summary of information related to Alternative 5 stream crossings by subwatershed.

Sub-watershed	Number of Crossings		Crossings on Fish-Bearing Streams	Crossings on Non-Fish Bearing Streams	Crossings on Perennial Streams	Crossings on Intermittent Streams	Crossings on Ephemeral Streams	Crossing Type		
	New	Existing						Ford	CMP (Culvert)	Bridge
Elliott Creek	4	1	2	3	3	2	0	2	1	2
Howard Creek	4	3	2	5	1	3	3	1	6	0
Jackson Creek	10	2	4	8	4	8	0	7	2	3
Little Summit Prairie Creek	1	1	1	1	1	1	0	0	1	1
Lower Deep Creek	3	2	2	3	2	3	0	1	2	2
North Wolf Creek	0	3	2	1	0	3	0	0	3	0
Peterson Creek – North Fork Crooked River	0	3	0	3	0	0	3	1	2	0
Porter Creek	6	4	1	9	1	8	1	5	4	1
Upper Marks Creek	1	14	4	11	9	6	0	0	14	1

Cumulative Effects

Future and Ongoing Projects

Hash Rock Wildfire (2000): The Hash Rock Wildfire started on August 23, 2000 and encompassed about 18,275 acres. The fire burned primarily within two 5th order Hydrologic Units, Upper Ochoco Creek Watershed (HUC 1707030502) and Mill Creek Watershed (HUC 1707030503). Within the Upper Ochoco Creek Watershed, the fire effects were confined primarily to the Upper Marks Creek Subwatershed. Within the Upper Marks Creek Subwatershed, the fire covered much of the McGinnis Creek, Reilly Creek, Cornez Creek, Hamilton Creek drainages, as well as the headwaters of the Buck Creek drainage. Within the Upper Marks Creek Subwatershed, the highest burn intensities occurred

in Hamilton relative to the McGinnis, Reilly, and Cornez Creek areas. The effects of the fire may last up to 40 years or more in these areas, until forest vegetation becomes reestablished. Effective ground cover (grass, shrubs) reestablished within 2-5 years with favorable growth conditions.

Ochoco Complex Wildfires (2014): The Ochoco Complex comprised the Lava, Fox, Antelope and Broadway Fires. They were started by lightning on 07/13/2014. The Lava Fire was 190 total acres and entirely on National Forest System lands. There were previously harvested timber sale units from the Cup Timber Sale within this fire. The Lava Fire lies entirely within the Howard Creek Subwatershed. The Fox Fire was 9,960 acres in total, 2,766 acres of with are on Forest Service lands. It burned primarily in general forest winter range. The Fox Fire lies within 3 subwatersheds: Fox Canyon-North Fork Crooked River (1,701 acres), Headwaters North Fork Crooked River (69 acres) and Rough Canyon Creek-North Fork Crooked River (8,812 acres). The Antelope Springs Fire was approximately 21 acres and entirely within the Upper Mountain Creek Subwatershed. The Broadway Fire was approximately 5 acres and entirely within the Peterson Creek-North Fork Crooked River Subwatershed.

In terms of cumulative effects, the only fire within the complex that will be considered is the Fox Fire. The other three fires were small in size, had no impact on streams in the area affected, and fire intensities were generally low to moderate; there will be no additional cumulative effects from those fires. Fire suppression rehabilitation (staging area, fire line rehabilitation, etc.) has already been implemented.

The Fox Fire burned within 3 subwatersheds that drain to the North Fork Crooked River. Within the three subwatersheds, burn severity was mostly low to moderate, and when compared to the entire subwatershed area, high burn severity only makes up 0.2% of the subwatershed area at the most. This area is mostly dry and composed of scab stringer landforms with mostly intermittent stream channels. Additionally, this fire area is not within any of the subwatersheds where the OHV trail system is proposed, but does drain into the North Fork Crooked River, as do most of the subwatersheds with proposed OHV trail segments. The effects of the Fox Fire would be immeasurable in the North Fork Crooked River.

Bailey Butte Wildfire (2014): The Bailey Butte Fire started on July 14th, 2014, by lightning and was contained on July 26th, 2014 after burning just over 10,000 acres on both private (2,483 acres) and National Forest System (7,789) lands. The fire burned acres within the following subwatersheds: West Branch Bridge Creek, Middle Bear Creek, and Upper Marks Creek. The only affected subwatershed in terms of the Ochoco Summit project is the Upper Marks Creek watershed, as West Branch Bridge Creek and Middle Bear Creek Subwatersheds drain to the Deschutes River and are unaffected by the Ochoco Summit project. The Upper Marks Creek Subwatershed is approximately 20,588 acres. Within this watershed, approximately 9% of the watershed received low burn severity, 3% received moderate burn severity, and 0.2% received high burn intensity. Table 124 displays the total miles of proposed trail system by burn severisty within the Bailey Butte fire permiter by alternative. Alternative 2 and 5 have the least number of trails within the Bailey Butte fire perimeter, while Alternative 4 has the most miles. A large majority of the proposed trail system under all action alternatives is in very low to low burn severity.

Table 124. Proposed Ochoco Summit trail system within the Bailey Butte fire perimeter by burn severity.

Burn Severity	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Unchanged/Very Low	1.5	1.8	1.9	1.2
Low	2.8	4.0	4.9	3.0
Moderate	0.3	0.5	0.6	0.4
High	0.04	0.06	0.06	0.04

TOTAL MILES	4.6	6.4	7.5	4.6

In terms of fire suppression, most of the fireline within the Upper Marks Creek Subwatershed was existing open roads that were used as fuel breaks and subsequently became fireline. There is a small piece of constructed fireline within the Crystal Creek watershed, but it does not cross any perennial, intermittent or ephemeral streams.

It is expected that there will be increased hillslope erosion and subsequent instream sedimentation following the Bailey Butte fire, and this will continue until vegetation recovery has occurred on these burned areas (at least 5 years). Disturbed WEPP was used to assess sediment impacts to streams following the Bailey Butte fire in the Upper Marks Creek Subwatershed. Hillslope erosion was estimated in areas burned depending on the burn severity (low severity versus high severity) by soil type. Vegetation cover for low severity fire was estimated to be around 35% and cover after high severity fire was estimated to be around 10%. In all, sediment production from hillslope erosion in the Bailey Butte fire area was estimated to be approximately 14 tons using Disturbed WEPP. The cumulative effects of the Bailey Butte Fire in the Upper Marks Creek watershed in terms of the Ochoco Summit project are addressed below.

Bailey Butte Fire Project (2015): The purpose of the Bailey Butte Fire Salvage project is to harvest fire killed trees that have economic value; reforest desired tree species in severly burned stands to aid in accelerated evelopment of forest conditions consistent with management plan objectives; and improve public, administrative, and operational safety by abating (felling) hazard trees along public and administrative-use roads. The Bailey Butte Fire Salvage Project overlaps with the Ochoco Summit project in the Upper Marks Creek Subwatershed. The cumulative effects of the Bailey Butte Fire Salvage Project in the Upper Marks Creek Subwatershed are addressed below.

Bailey Butte Burned Area Emergency Rehabilitation (2014/2015): Following the Bailey Butte Fire, a Burned Area Emergency Response (BAER) team was identified to conduct further fire restoration efforts. The team's task was to conduct an assessment to identify imminent post wildfire threats resulting from the Bailey Butte Fire that could impact (i) human life and safety (ii) property (iii) and critical natural and cultural resources. BAER treatments that were funded in the Upper Marks Creek Subwatershed are centered on road improvements, such as culvert cleaning, installation of waterbars, and reconditioning of catch basins. Road work associated with BAER in the Upper Marks Creek Subwatershed will have beneifical effects on aquatic resources, due to long-term reductions in fine sediment from roads. The work will be accomplished sometime in 2015.

Bailey Butte Post Fire Restoration (future): In addition to BAER work, the Ochoco National Forest identified additional items that were not funded through BAER and requested funding from the regional office to implement these activities. Activities proposed for additional funding through the regional office include the removal of a culvert on the 2630-250 that crosses Crystal Creek, which is undersized, and the replacement of the culvert on the 2600-450 that crosses Marks Creek, which is undersized. Additional road improvements including drainage construction and fill slope armoring are also proposed on roads in the Marks Creek watershed. Road work associated with post fire restoration work in the Upper Marks Creek Subwatershed will have beneficial effects on aquatic resources, due to long-term reductions in fine sediment from roads.

Deep Creek Watershed Restoration (2004): Deep Creek is a focus watershed as defined by the Forest Service Region 6 Aquatic Restoration Strategy. Proposed restoration projects were identified in the Deep Creek Restoration Plan, some of which have already been implemented. The purpose of the Deep Creek Restoration Plan was to improve overall stream and riparian health and integrity within the watershed and to improve water quality and associated habitat suitable for use by redband trout and other aquatic life. The needs for the proposed action are derived from the differences between current conditions and desired conditions, as described in Forest Plan direction and management objectives. A need was identified to:

- Stabilize stream headcutting and streambanks to improve and maintain channel stability
- Remove and/or replace culverts to allow adequate access for fish
- Allow identified riparian areas to recover natural vegetation
- Provide better distribution of livestock
- Improve in stream fish habitat
- Decrease stream sedimentation

The decision was made to: 1) Replace 35 culverts and 3 culverts with rock fords to allow passage of flood flows and improve upstream access for redband trout; 2) create 7 water developments, 227 acres of grazing exclosures, 342 acres of riparian pasture, and place large wood along 3.6 miles of stream to better distribute livestock; 3) repair 37 headcut complexes and 18 exposed cutbanke; close, decommission, and reconstruct 47 miles of roads; and reconstruct 0.25 miles of channel reaches to reduce instream sedimentation; and 4) construct 6 in-stream structures to promote pool habitat for fisheries. Most proposed activities are located within RHCAs and were designed to move the watershed towards meeting interim Riparian Management Objectives (RMOs).

Of these activities, the following restoration projects have been implemented thus far:

- In 2006, 2 gates were installed on FR4272-100 and FR4272-400 in Little Summit Prairie Creek Subwatershed;
- In 2006, 2.8 miles of road were decommissioned in the Lower Deep Creek Subwatershed (FR4200-510, FR4200-600, FR4200-603, FR4200608, FR4200630, FR4260-014).
- In 2011, 1.2 miles of road were decommissioned in Little Summit Prairie Creek Subwatershed (FR4270-503, FR4270-504, FR4270-570, FR4276-030, and FR4276-070);

In 2011, 0.7 miles of road was closed (FR3000-656), 1.6 miles or road were reconstructed (FR3000-650), and 1.5 miles of road were decommissioned in the Lower Deep Subwatershed (FR3000-610, FR3000-653, FR3000-668, FR3000-669, FR3000-705).

Maxwell Fire (2006): In 2006, a wildfire called the Maxwell Fire affected approximately 2,317 acres in Allen Creek, East Fork Allen Creek, and Elliot Creek drainages. Potential sedimentation in stream reaches within and below moderate to high severity burn areas were identified as values at risk within Allen Creek, East Fork Allen Creek, and Elliot Creek (BAER 2006). Erosion during snow melt runoff during the spring of 2007 added to the loss of filtering vegetation from the wildfire in RHCAs along Allen Creek, East Fork Allen Creek, and Elliot Creek. Maxwell Fire BAER stream improvements were implemented in 2006 and 2007 to reduce sediment from upland and riparian burned areas. Roads were closed and culverts were pulled to reduce erosion and sediment delivery to streams. Specifically, culverts were removed and outlsoped drain dips were installed on FR2200-500, FR2200-550, and FR2200-505 (BAER 2006). These projects reduce sediment for a high value fishery.

Fire intensities affected the streams within the Maxwell Fire boundary including Allen Creek and East Fork Allen Creek by reducing vegetation and increasing sedimentation and bank instability. Increased sediment and ash may adversely affect redband and Columbia spotted frog populations. Downstream effects would include increased sedimentation, which would reduce available macroinvertebrates (food for fish) and reduce success of spawning for redband trout and breeding for Columbia spotted frogs.

Canyon Fuels and Vegetation Management (2010): The Canyon project area is approximately 31,500 acres and falls within the Upper Ochoco Creek Watershed. As described in the Record of Decision, there are 13,632 acres planned for treatment, 4,099 acres of which will be treated through commercial harvest, 5,862 acres to be treated through pre-commercial harvest, 1,395 acres of juniper removal, 236 acres of hardwood treatments, and 2,038 acres of underburning. Road management estimates include approximately 0.6 miles of new specific road construction, 2.0 miles of temporary

road construction, 4.4 miles of reuse of temporary roads, 4.9 miles of decommissioning of existing roads, and 2.9 miles of closure of existing roads. Implementation of all activities associated with the Canyon decision could take up to 10 years to complete.

Howard Elliot Johnson Fuels and Vegetation Management (2011): The Howard Elliot Johnson project area is approximately 44,858 acres and falls within three subwatersheds within the Upper North Fork Crooked River Watershed; the Howard Creek, Elliot Creek, and Johnson Creek subwatersheds. As described in the Record of Decision, 4,370 acres will be treated through commercial harvest (including fuel treatments), 3,007 acres are to be treated through pre-commercial harvest (including fuel treatments), and there are 608 acres of juniper removal, 611 acres of hardwood treatments, 6,247 acres of prescribed burning only, and 1,573 acres of conditional prescribed fire. Road management estimates include approximately 0.4 miles of new specific road construction, 5.1 miles of temporary road construction, 11.7 miles of use of temporary roads on existing disturbance, 1.7 miles of road reconstruction, 2.3 miles of decommissioning of existing roads, and 2.9 miles of closure of existing roads. Implementation of all activities associated with the Howard Elliot Johnson decision could take up to 10 years to complete.

Jackson Fuels and Vegetation Management (2012): The Jackson project area is approximately 54,609 acres and falls within three subwatersheds within the Upper North Fork Crooked River Watershed; Howard Creek, Elliot Creek, and Johnson Creek Subwatersheds. About 5,744 acres will be treated through commercial harvest, 14,703 acres will be treated through pre-commercial harvest, 893 acres will receive juniper cutting and associated fuel treatments, 295 acres will receive hardwood treatments, and 1,934 acres will be underburned without other associated treatments. Road management estimates include approximately 0.4 miles of new specific road construction, 10 miles of temporary road construction, 15 miles of use of temporary roads on existing disturbance, 0.3 miles of road reconstruction, and between 11 and 43 skid trail stream crossings. Implementation of all activities associated with the Jackson decision could take up to 10 years to complete.

Spears Vegetation Management (2007): The Spears project area is approximately 39,200 acres and falls within the Upper Ochoco Creek Watershed. As described in the Record of Decision, there are 4,935 acres that will be treated through commercial harvest, 10,935 acres to be treated through pre-commercial harvest, and there are 196 acres of hardwood treatments. Fuel reduction activities include approximately 15,162 acres of prescribed fire, 2,490 acres of grapple piling, and 793 acres of hand piling. Road management estimates include approximately 4.4 miles of new road construction, and 11 miles of road reconstruction.

Travel Management Project (2011): The Record of Decision for the Travel Management Project was signed in September 2011, and the Travel Management Decision implementation started as of January 2012. The decision does the following: 1) limits motor vehicle use to designated roads, trails, and areas shown on the Motor Vehicle Use Maps; 2) designates some gravel pits open to motorized access; 3) creates new conditions for motor vehicle access off of designated roads for dispersed camping; and 4) changes some system roads to highway legal vehicle use only. No existing open designated roads or motorized trails were closed as a result of the decision. However, changes to cross-country travel, motorized access for dispersed camping, and motorized mixed use (highway legal and non-highway legal vehicles) of some system roads were made. Cross-country travel is no longer allowed on the Ochoco National Forest. Motorized access for dispersed camping is only allowed to existing sites within 300 feet of roads shown on the Motor Vehicle Use Map, and motor vehicles cannot drive closer than 30 feet to any wetland, stream, or water body at dispersed campsites. The decision makes no changes to developed campgrounds and does not apply to over-snow motorized travel or permitted activities, such as firewood cutting.

Marks Creek Allotment Management Plan (2011): The Marks Creek Allotment Management Plan reauthorizes grazing in the Marks Creek, Ortman, and Wildcat Allotments; authorizes a variety of

rangeland improvements; and implements riparian restoration activities. Almost the entire Marks Creek AMP Project Area is encompassed within the Upper Ochoco Creek Watershed. However, small portions of the project area also intersect the Bridge Creek and Lower Ochoco Creek Watersheds. Five subwatersheds are intersected by the project area: Lower Marks Creek, Upper Marks Creek, Duncan Creek-Ochoco Creek, Ochoco Reservoir-Ochoco Creek, and Middle Bear Creek. Livestock may be displaced by high use on the trail system and distribution throughout the project area could also be negatively affected with the increase of off-road use in localized areas. If livestock distribution is decreased, localized areas in uplands and riparian areas may receive greater utilization.

Big Summit Allotment Management Plan (2009): The Big Summit Cluster Allotment Management Plans reauthorizes grazing in five allotments, authorizing a variety of rangeland improvement, and implementing some riparian restoration activities. This plan allows continued livestock grazing on the Big Summit, Brush Creek, Lost Horse, North Fork and Pringle Allotments. The Peterson and Porter Creek Subwatersheds are within the Big Summit Cluster AMP area and will overlap with the Ochoco Summit project. Livestock may be displaced by high use on the trail system, and distribution throughout the project area could also be negatively affected with the increase of off-road use in localized areas. If livestock distribution is decreased, localized areas in uplands and riparian areas may receive greater utilization. The selected alternative provides recovery of watershed and riparian conditions, as actions taken for better livestock management and structural improvements along with riparian and stream projects will improve riparian areas. The selected alternative is expected to result in an upward trend in watershed condition.

Fox Canyon Cluster Allotment Management Plans (2013): The Fox Canyon Cluster Allotment Management Plans reauthorizes grazing in three allotments, authorizing a variety of rangeland improvements, and implementing riparian restoration activities. This plan allows continued livestock grazing on the Fox Canyon, Gray Prairie and Antler Allotments under revised allotment management plans. None of the proposed Ochoco Summit trail system is within allotments that are part of the Fox Canyon Cluster plans. Additionally, the three allotments covered under this AMP do not directly drain into any subwatersheds that are directly affected by the Ochoco Summit project. Therefore, the Fox Canyon Cluster Allotment Management Plans will not be discussed further in this cumulative effects section.

Burn and Crystal Springs Allotment Management Plan (2008): The Burn and Crystal Springs Allotment Management Plan reauthorizes grazing in two allotments, authorizing a variety of rangeland improvements, and implementing riparian restoration activities. The AMP area overlaps approximately 10% of the Upper Marks Creek Subwatershed and 14% of the Headwaters Ochoco Creek Subwatershed. The AMP area overlaps with the Ochoco Summit proposed trail system in the Upper Marks Creek Subwatershed. Livestock may be displaced by high use on the trail system and distribution throughout the project area could also be negatively affected with the increase of off-road use in localized areas. If livestock distribution is decreased, localized areas in uplands and riparian areas may receive greater utilization. The selected alternative provides recovery of watershed and riparian conditions, as actions taken for better livestock management and structural improvements along with riparian and stream projects will improve riparian areas. The selected alternative is expected to result in an upward trend in watershed condition in both allotments.

Wolf Fuels and Vegetation Management Project (2014): The preferred alternative proposed to meet the purpose and need is to implement commercial thinning on 4706 acres, noncommercial thinning on 988 acres, juniper cutting on 481 acres, underburning on 5,000 acres, and hardwood enhancement on 90.2 acres. The total area on which activities would be implemented would be about 11,252 acres. The proposed action also includes closing 7.8 miles of roads, and decommissioning 2.7 miles of roads, as recommended though the Wolf Roads Analysis process. Actions connected to the proposed action would include stream restoration on North Fork Wolf and Wolf Creek, headcut repair

at six locations, 1.8 miles of temporary road, 18 miles of temporary roads on existing disturbance, and the expansion of Six Corners Material Source by up to 3 acres. Temporary roads would be closed and hydrologically stabilized following treatment.

Bear Creek Allotment Management Plan (Future Project): The Lookout Mountain Ranger District of the Ochoco National Forest is proposing to reauthorize term grazing permits and modify grazing management in four allotments: Bear Creek, Elkhorn, Snowshoe, and Trout Creek. The only allotment within the proposed Ochoco Summit project area is Snowshoe allotment, located in the headwaters of Marks Creek and Nature Creek. The proposed actions vary by allotment, and are specific to the resource situation within each allotment. The Proposed Action for all allotments includes reauthorizing grazing and reauthorizing existing rangeland improvements. Within the Snowshoe allotment, specific improvement proposals include conifer reduction and protection around aspen stands, construction and reconstruction of water developments, riparian restoration activities including in-stream placement of wood and/or rock structures, planting hardwoods, and creating physical barriers (such as wood, rock or fences) to protect hardwoods and improve bank stability. A Draft EIS is anticipated to be completed late in 2015.

Gap Fuels and Vegetation Management Project (Future Project): The Gap Fuels and Vegetation Management Project is approximately 38,145 acres and is located within two watersheds (Upper North Fork Crooked River and Horse Heaven Creek-Crooked River), south of Big Summit Prairie. The proposed action for this project includes commercial thinning activities on 16,665 acres, precommercial thinning on 3,340 acres, 300 acres of wet meadow restoration, 9 individual sites where riparian restoration is proposed to occur, and 30 sites where aspen stand restoration is proposed to occur. The project is currently in the analysis stage, but alternative development has not occurred. The proposed Ochoco Summit trail system is not within any of the watershed affected by the Gap Fuels and Vegetation Management Project. The cumulative effects would not occur within the North Fork Crooked River, and cumulatively, there would be no effect to aquatic resources.

Black Mountain Vegetation Management Project (Future Project): The Paulina Ranger District is proposing to implement vegetation management and hazardous fuels reduction activities in the Black Mountain Project ARea. The project area is within the Allen, Porter, and Peterson Creek – North Fork Crooked River 6th code HUCs. The objectives of the project are to reduce stand density that is within a range that is consistent with historic conditions; reduce the potential for high-intensity wildfires and maintaining conditions that support low-intensity fires; maintain and enhance hardwood communities, upland vegetation treatments within the RHCAs, and treatment opportunities that include opportunities for post and pole sales, firewood sales, and biomass. The project is in the early stages of planning, with a decision likely sometime late in 2015 into 2016. This project overlaps with three watersheds within the Ochoco Summit Project. The cumulative effects of the Black Mountain Project within the three subwatersheds in terms of the Ochoco Summit ATV project are addressed below.

Lookout Mountain Trail Project (Future Project): The Ochoco National Forest is proposing to expand the number of mult-use, non-motorized trails within the vicinity of the Lookout Mountain Recreation Area. The Lookout Mountain Trails proposal would create a 75.2 mile network of non-motorized multi-use trail on both existing and new trail miles; approximately 25 percent of the network would be new trail. The project was scoped in April 2014 but since then the project has been put on hold. None of the proposed Ochoco Summit trails overlap the proposed Lookout Mountain trail system. Additionally, the trails proposed as part of the Lookout Mountain Trail project do not drain into any subwatersheds that directly effected by the Ochoco Summit project. Therefore, the Lookout Mountain Trail Project will not be discussed further in this cumulative effects section.

Walton Lake Restoration Project: Treatments vary, including commercial harvest, precommercial thinning, and planting of thinned areas. None of the proposed Ochoco Summit trails are within the

treatment area. Additionally, the proposed restoration treatments around Walton Lake do not drain into any subwatersheds that are directly affected by the Ochoco Summit project. Therefore, the Walton Lake Restoration Project will not be discussed further in this cumulative effects section.

Alternative 1

Flow and Sediment Regime

The no action alternative proposes adding no new trail system on the Ochoco National Forest; and since the Travel Management Rule no longer allows cross-country OHV travel, there should be no cumulative effects occurring with the implementation of Alternative 1. The existing condition of the watersheds would be maintained with the addition of the future and ongoing vegetation management project effects, which were analyzed in their associated EIS documents.

Existing trails across the landscape from past OHV cross-country travel use would no longer be used, and some trails would revegetate over time. Some trails, likely those trails that have connectivity with the drainage network, would continue affecting the flow and sediment regimes until active rehabilitation is implemented.

Sediment/Turbidity

The no action alternative proposes adding no new trail system on the Ochoco National Forest; and since the Travel Management Rule no longer allows cross-country OHV travel, there should be no cumulative effects occurring with the implementation of Alternative 1. The existing condition of the watersheds would be maintained with the addition of the future and ongoing vegetation management project effects, which were analyzed in their associated EIS documents. Effects to streams from wildfire would continue to recover.

Existing trails across the landscape from past OHV cross-country travel use would no longer be used, and some trails would revegetate over time. Some trails, likely those trails that have connectivity with the drainage network, would continue delivering sediment to stream channels until active rehabilitation is implemented.

Following the Hash Rock and Maxwell Wildfires, there was likely an increased sediment load in streams due to increased surface and bank erosion. As vegetation has reestablished, surface erosion has decreased and regrowth of riparian vegetation stabilized banks at some locations. Sediment supply in affected streams will continue to adjust until sediment loads stabilize to pre-wildfire levels, once vegetation has completely reestablished.

Action Alternatives

Flow and Sediment Regime

The effects of past and present actions are described in detail under the “Direct and Indirect Effects” section. Future and ongoing portions of the preceding list of projects that overlap the Ochoco Summit project area have the potential to result in cumulative effects to streams, relative to the flow and sediment regime. According to the LRMP, harvest activities on the Ochoco National Forest should not increase the Equivalent Harvest Acres (EHA) above the thresholds listed for forest watersheds by sensitivity class (Table 125). Changes to the timing and increases in peak flows, resulting from increased connectivity of streams and proposed trails in addition to potential timing and increases in peak flows from harvest activity and associated road construction, may have the potential to increase peak flows above the threshold described in the LRMP.

Future and ongoing projects that have the potential to cumulatively impact the flow and sediment regimes in the Ochoco Summit project area include the Howard Elliot Johnson Vegetation Management Project, the Canyon Vegetation Management Project, the Spears Vegetation Management Project, the Jackson Vegetation Management Project, the Wolf Fuels and Vegetation

Management Project, and the Deep Creek Restoration Project. These projects overlap portions of the Upper North Fork Crooked River, Deep Creek, Upper Ochoco Creek, and Lower Beaver Creek Watersheds. The Howard Elliot Johnson Vegetation Management Hydrology Report estimated a peak EHA of 7.5 percent in 2013 for the selected alternative, Alternative 2 (Table 125). The Canyon Vegetation Management Hydrology Report estimated a peak EHA of 13.38 percent in 2012 for the Alternative 3, a modification of which was selected in the Record of Decision (Table 125). The peak EHA for the Deep Watershed was reported as 15.34 percent in 2014 for the proposed action as described in the Draft Hydrology Report for the Deep Project (Table 125). The peak EHA for the Wolf Fuels and Vegetation Management Project was reported as 12.6 percent in 2014 for the preferred alternative as described in the Draft Hydrology Report. Peak EHA values from vegetation management analyses are all below the LRMP EHA thresholds by approximately 10 to 22 percent.

Table 125. Alternative 2 flow and sediment regime cumulative effects summary by watershed.

Watershed	Peak Vegetation Management Project EHA (%)	EHA Threshold (%)
Upper North Fork Crooked River	13.4	30
Deep Creek	15.3	25
Upper Ochoco Creek	7.5	30
Lower Beaver Creek	12.6	25

Table 126 and Table 127 show the changes to road/trail densities and stream crossing densities with the implementation of all of the anticipated future and ongoing projects listed in this section. Road miles and stream crossings include all of the estimated temporary road miles that are planned for the future, even though these miles of road may not exist on the ground all at the same time. In addition, the miles of road planned for decommissioning by watershed were subtracted from the total miles of road, though the timing of the implementation may or may not overlap in time with other planned road construction.

Overall new temporary and specified roads planned as part of vegetation management projects range for the Upper North Fork Crooked River Watershed, Deep Creek Watershed, and the Upper Ochoco Watershed are 5.1 miles, 10.5 miles, and 1.0 mile, respectively. These new roads in addition to proposed trail miles, minus planned decommissioned roads, result in slightly reduced road densities in the Deep Creek and Upper Ochoco Creek Watersheds, since more miles of road are planned to be decommissioned than are planned for construction. A net increase of 2.8 miles of road would be constructed as part of planned projects other than the Ochoco Summit Project in the Upper North Fork Crooked River Watershed, essentially maintaing the road density for the no action alternative, increasing it by a negligible amount from 2.69 to 2.71 miles per square mile.

Vegetation management projects that are planned in the Ochoco Summit Project Area Watersheds include construction of new temporary and specified road stream crossings over perennial or intermittent streams. Approximately eight new stream crossings are anticipated in the Upper North Fork Crooked River Watershed, and approximately six are planned in the Deep Creek watershed for Alternative 2 (Table 127). Slight increases result as a cumulative effect of adding stream crossings, as part of vegetation management project, to existing road stream crossings in the Upper North Fork Crooked River and Deep Creek watersheds, increasing the stream crossing density for the no action alternative from 2.46 to 2.52 and from 2.05 to 2.12 crossings per square mile, respectively.

Table 126. Cumulative road/trail densities with implementation of future and ongoing projects.

Watershed	Existing Condition Road Density	Veg Project New Temp and Spec Roads	Future Decom Roads	Cumulative Road/Trail Density (Miles/Miles^2)				
				Alt 1	Alt 2	Alt 3	Alt 4	Alt 5

	(Miles/Miles^2)	(Miles)	(Miles)					
Upper North Fork Crooked River	2.69	5.1	2.3	3.5	3.8	3.7	3.8	3.7
Deep Creek	3.56	10.5	17.6	2.7	2.9	2.8	2.9	2.8
Upper Ochoco Creek	2.55	1.0	2.4	2.9	2.9	2.9	2.9	2.7

Table 127. Cumulative stream crossing density with implementation of future and ongoing projects.

Watershed	Existing Stream Crossing Density (Crossings/mile)	Veg Project New Temp and Spec Stream Crossings	Max Cumulative Stream Crosing Density (Crossings/mile)				
			Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Upper North Fork Crooked River	2.46	8	2.5	3.0	2.6	2.9	2.6
Deep Creek	2.05	6	2.1	2.5	2.4	2.6	2.4
Upper Ochoco Creek	3.24	0	3.2	3.3	3.3	3.4	3.0

Livestock grazing occurs across the Ochoco Summit project area within the Ochoco National Forest. Recently, improvements to grazing management were made, as described in the Marks Creek Allotment Management Plan. Implementation of this plan should improve grazing impacts to streams. However, cattle would likely use some of the user-created trails across the Ochoco National Forest. Cattle use of these user-created trails would reduce the number and miles of trail that would revegetate over time, potentially maintaining existing connectivity of streams and user-created trails. Active rehabilitation of user-created trails would make them less usable to cattle, if they are covered with slash to help with vegetation recovery.

Based on estimated EHA values from vegetation management projects and almost negligible increases in the overall road/trail and stream crossing densities in the watersheds with future and ongoing projects, cumulative effects from future and ongoing projects to the sediment and flow regimes are anticipated to be negligible. In addition, due to the large departure between EHA values and LRMP thresholds, it is unlikely that the implementation of the Ochoco Summit trail systems would increase EHA values above LRMP thresholds. Essentially, there are no measurable increased cumulative effects beyond those effects described in the "Direct and Indirect Effects" section relative to the flow and sediment regimes within the watersheds that overlap the Ochoco Summit project area.

Sediment/Turbidity

The effects of past and present actions are described in detail under the "Direct and Indirect Effects" section. Future and ongoing portions of the preceding list of projects that overlap the Ochoco Summit project area have the potential to result in cumulative effects to streams relative to sediment delivery and turbidity increases in streams and watersheds. Cumulative increases in miles of road and trail nears streams and wetlands have the potential to further increase impacts to stream and wetland habitat quality. In order to assess whether there is a cumulative impact to streams from vegetation management road construction and to account for the mitigating effect of planned road decommissioning, miles of planned road construction and road decommissioning within the sediment delivery zone of perennial and intermittent streams and within wetlands and their associated RHCAs were estimated, and an overall density was calculated (Table 128 and Table 129). Since increased peak flows are not anticipated to be cumulatively increased by planned future and ongoing projects, cumulative increases in bank erosion are also not anticipated.

Table 128 and Table 129 display the miles of new road, decommissioned roads and cumulative road/trail densities within 300 feet of streams and within wetland and spring RHCAs, respectively. Total road/trail densities in the Upper Ochoco Creek Watershed are particularly low, based on the road layer used, which did not include miles of road outside the forest boundary, as well as due to portions of the Mill Creek Wilderness roadless area overlapping this watershed. Upper North Fork Crooked River Watershed road/trail densities are also affected by the watershed encompassing the Big Summit Prairie, which is on private land and has very few roads.

Table 128. Cumulative road/trail densities within 300 feet of streams with the implementation of future and ongoing projects.

Watershed	Existing Condition Road Density in Sediment Delivery Zone (Miles/Miles^2)	Veg Project New Temp and Spec Roads in Sediment Delivery Zone (Miles)	Future Decom Roads in Sediment Delivery Zone (Miles)	Cumulative Road/Trail Density in Sediment Delivery Zone (Miles/Miles^2)				
				Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Upper North Fork Crooked River	3.44	0.81	0.43	3.5	3.7	3.5	3.6	3.5
Deep Creek	6.25	1.1	13.4	5.6	5.8	5.8	5.8	5.7
Upper Ochoco Creek	1.08	0.06	2.1	1.0	1.0	1.0	1.0	0.8

Table 129. Cumulative road/trail densities within GDE RHCAs with the implementation of future and ongoing projects.

Watershed	Existing Condition Road Density in wetland RHCA (Miles/Miles^2)	Veg Project New Temp and Spec Roads in wetland RHCA (Miles)	Future Decom Roads in wetland RHCA (Miles)	Cumulative Road/Trail Density in wetland RHCA (Miles/Miles^2)				
				Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Upper North Fork Crooked River	1.42	1.8	0.08	1.5	1.5	1.5	1.5	1.5
Deep Creek	4.98	0.52	2.14	4.7	5.0	4.9	5.0	4.9
Upper Ochoco Creek	7.20	1.3	1.0	7.3	7.3	7.5	7.5	7.5

Four roads in the Deep Creek Watershed planned for decommissioning by the Deep Creek Restoration Plan are planned for use as trails for Alternatives 2 and 4, and three of these roads are planned for use as trails in Alternative 3 (Table 130). Alternative 3 would not convert FS 1200-504 to trail. Approximately 1.5 miles of these roads are within the sediment delivery zone along intermittent or perennial streams, and approximately 0.86 miles are within wetland and spring RHCAs (Table 130). These miles of road planned for decommissioning and now proposed for trail conversion were not included in miles of road proposed for decommissioning within the sediment delivery zone of streams or within the wetland RHCAs or the associated road densities reported in Table 128 and Table 129.

Table 130. Deep Creek Restoration Plan planned decommisioned roads converted to trail.

Road	Subwatershed	Trail Class		Miles of Road Converted		
		Alt 2 & 4	Alt 3	Alt 2 & 4	Alt 3	Alt 5
FS 1200-504	Jackson	III	-	0.43	0	0

FS 3000-802	Jackson	I	III	0.92	0.92	0
FS 3000-930	Jackson	III	III	1.5	1.5	1.5
FS 4270-508	Little Summit Prairie	III	III	0.53	0.53	0

Overall, cumulative effects to road/trail densities within the sediment delivery zone of intermittent and perennial streams in the Ochoco Summit project area do not increase appreciably from the direct/indirect effect road/trail densities. The Deep Creek Restoration Plan planned road decommissioning has the cumulative effect of reducing road densities within the sediment delivery zone of streams, from an existing condition road density of 6.25 miles per square mile to 5.61 miles per square mile, for the no action alternative, Alternative 1. Alternatives 2, 3 and 4 all increase road/trail densities in the sediment delivery zone to streams relative to the no action alternative. Alternatives 2 and 4 have higher road/trail densities in the Upper North Fork Crooked River Watershed and the Deep Creek Watershed relative to Alternative 3 and the no action alternative. In the Upper Ochoco Creek Watershed, however, Alternatives 3 and 4 have higher road/trail densities within the sediment delivery zone, as compared to Alternatives 1 and 2. Alternative 5 has the least increase in road density within the sediment delivery zone in all project watersheds.

Overall, cumulative effects to road/trail densities within the wetland and spring RHCAs in the Ochoco Summit project area do not increase appreciably from the direct/indirect effect road/trail densities described above. The Deep Creek Restoration Plan planned road decommissioning has the cumulative effect of reducing road densities within wetland and spring RHCAs from an existing condition road density of 4.98 miles per square mile to 4.70 miles per square mile for the no action alternative, Alternative 1. Alternatives 2, 3 and 4 all increase road/trail densities in wetland and spring RHCAs. In the Upper Ochoco Creek Watershed, however, Alternatives 3, 4 and 5 have higher road/trail densities within the wetland RHCAs, as compared to Alternatives 1 and 2.

Livestock grazing occurs across the Ochoco Summit Project Area within the Ochoco National Forest. Recently, improvements to grazing management were made, as described in the Marks Creek Allotment Management Plan. Implementation of this plan should improve grazing impacts to streams. However, cattle would likely use some of the user-created trails across the Ochoco National Forest. Cattle use of these user-created trails would reduce the number and miles of trail that would revegetate over time without active decommissioning.

Based on estimated negligible increases in the overall road/trail densities in the sediment delivery zone of streams and in wetland RHCAs in the watersheds from future and ongoing projects, cumulative effects from future and ongoing projects to the sediment delivery and turbidity increases are anticipated to be negligible. In addition, since increased peak flows are not anticipated to be cumulatively increasesed by planned future and ongoing projects, cumulative increases in bank erosion are also not anticipated. In the Deep Creek Watershed, planned road decommissioning will decrease road/trail densities in sediment delivery zones and wetland RHCAs. However, approximately 3.4 to 4.7 miles of road planned for decommissioning in the Deep Creek Watershed are proposed to be converted to trail by the Ochoco Summit Project. Essentially, there are no measurable increased cumulative effects beyond those effects described in the “Direct and Indirect Effects” section, relative to the flow and sediment regimes within the watersheds that overlap the Ochoco Summit project area, in part as a result of the planned road decommissioning.

Cumulative Effects to Aquatic Species

The determination of “May impact individuals or habitat, but would not likely contribute to a trend towards federal listing or loss of viability to the population or species” (MIIH) to redband trout and Columbia spotted frogs is made for all action alternatives for the Ochoco Summit Project. Although the trail proposal would not likely contribute to a trend*tomorrr towards federal listing, the proposed trail would have short-term effects to fish and frogs and their habitat.

Since erosion risk from ATV/OHV trails has been shown to potentially equal that of a forest road network, it can be expected that trails have the potential to increase drainage densities and peak flows similar to forest roads (Meadows et al., 2008). Areas with high road densities, high drainage densities, and a high density of stream crossings typically result in higher connectivity of the road and stream network.

Using the Project Design Criteria and Resource Protection Measures and Best Management Practices would help reduce sediment that could enter streams as a result of establishing an OHV trail as well as having culverts or bridges for crossings instead of fords through Class I, II, III and IV streams. Approaches to stream crossings would be hardened to reduce the sediment entering streams.

When comparing estimated sediment production from the new trail system under all proposed alternatives in the Ochoco Summit project, it is apparent that estimated sediment production is a very small percentage of estimated natural background sediment produced in these subwatersheds. Stowell et al. (1983) look at changes in stream aggradation, fish habitat response, and fish response to surface fines with increases from the the forest road network. All alternatives in the Ochoco Summit project are estimated to produce a small percentage of fine sediment when compared to natural background, and therefore all alternatives are not expected to have an effect on stream aggradation, substrate embeddedness, habitat changes, or physical changes in redband egg emergence, feeding, and food web production. There are several pieces of literature (Suttle et al. 2004 and Bryce et al. 2010) that conclude any increase in fine sediment impairs steelhead (and similarly redband) growth and production or aquatic food webs. However, these pieces of literature do not state that they may significantly impact steelhead growth and production or aquatic food webs. There may be impacts to redband growth and survival, but we also put the amount of sediment produced through actions in the project in the context of the natural background and concluded that the amount of sediment produced was not significant to natural background. We believe we accounted for the increase in fine sediments from the project with the "May impact individuals or habitat" determination, but because of the relatively low levels of sediment produced, the action would not trend the species towards federal listing or loss of viability.

With the exception of the Upper Marks Subwatershed, the forest road network combined with changes in all alternatives of the Ochoco Summit Project subwatersheds would not reach thresholds that are documented in Stowell et al. (1983). Based on the large percentage increase over natural background from the existing forest road network (>50%), it appears that there are likely negative impacts in the Upper Marks Creek Subwatershed from the forest road system. However, the estimated addition of fine sediment in all alternatives is so small compared to natural background that there wouldn't be any cumulative impacts beyond what is already occurring on-the-ground. Proposed restoration work in the Upper Marks Creek Subwatershed would help further improve conditions in the subwatershed over time. It is recommended that to promote healthy fish populations in Upper Marks Creek, a thorough look at the existing road system is warranted in order to reduce high estimated fine sediment numbers in the watershed.

Short-term sediment inputs from trail construction, especially at stream crossings, may have negative effects during construction when turbidity is high. These negative effects may include fish displacement during times of high turbidity, limited feeding, and possible mortality.

Redband trout: Additional sediment from the construction and use of the trail system and installation of new crossings (culverts or bridges) and use of the trail within the 300-foot sediment delivery zone would contribute additional sediment to the streams. Fish habitat would be affected by potentially filling in pools and gravels used for spawning fish. Constructing trails in RHCAs and installing culverts increases sedimentation into stream during the life of construction until high flows can flush the sediment. Until that time, spaces in stream substrate fill, displacing macroinvertebrates and decreasing spawning habitat.

Columbia spotted frogs: There are new trails in groundwater dependent ecosystems and groundwater dependent ecosystem buffers in Deep Creek watershed for 1.6 miles; Upper North Fork Crooked River Watershed for 1.3 mile; Upper Ochoco Creek Watershed for 0.4 miles; and Lower Beaver Creek watershed for 0 miles. Project Design Criteria for building trail would prevent intersecting Columbia spotted frog habitat. However, short-term sediment increases in streams where it affects redband trout would also affect Columbia spotted frogs.

Conclusion

Flow and Sediment Regime

Increases in overall subwatershed road/trail densities and stream crossing densities have the potential to increase connectivity between roads, trails and streams resulting in higher peak flows and changes to peak flow timing. Ochoco Summit Project proposed trail systems would have the effect of increasing road/trail and stream crossing densities in most of the subwatersheds analyzed in the project area for at least one of the alternatives, with the exception of the North Wolf Creek Subwatershed. Since miles of existing user created trails by subwatershed are unknown, these are not accounted for in road/trail density estimates and likely would affect these results. Overall, it is anticipated that by designating OHV trails, the total miles of trail across the Ochoco National Forest would decrease over time as user created trails revegetate in the long-term. All action alternatives include hydrologically stabilizing and closing unauthorized trails that are not part of the Ochoco Summit trail system, which would help decrease the amount of time for recovery and eliminate sediment and other stream impacts once implemented.

Table 131 illustrates the magnitude of density increases or maintenance of current road/trail or stream crossing densities that would result from Alternatives 2, 3, 4 and 5 relative to the no action alternative. The largest increases in both road/trail and stream crossing densities across analyzed subwatersheds would exist as a result of Alternative 4, followed by Alternative 2, then Alternative 3 and Alternative 5. Alternative 1, the no action alternative, would not increase road/trail densities or stream crossing densities. Similar increases in the magnitude of both road/trail densities and stream crossing densities would result from both Alternatives 2 and 4 in all of the Upper North Fork Crooked River Watershed Subwatersheds. The Howard Creek Subwatershed has similar increases in densities for all three alternatives. The largest increases in both road/trail densities and stream crossing densities would occur as a result of Alternatives 2 and 4 in the Porter Creek Subwatershed, and as a result of Alternative 4 in the Upper Marks Creek Subwatershed. Both of these subwatersheds have poor existing conditions relative to flow/sediment regimes.

Cumulative effects from future and ongoing projects to the sediment and flow regimes are anticipated to be negligible, based on estimated EHA values from vegetation management projects, and almost negligible increases in the overall road/trail and stream crossing densities in the watersheds with future and ongoing projects. In addition, due to the large departure between EHA values and LRMP thresholds, it is unlikely that the implementation of the Ochoco Summit trail systems would increase EHA values above LRMP thresholds. Essentially, there are no measurable increased cumulative effects, beyond those effects described in the “Direct and Indirect Effects” section of this report, relative to the flow and sediment regimes within the watersheds that overlap the Ochoco Summit project area.

Increased sedimentation to project area streams will likely occur following the fires on the Ochoco National Forest in 2014. Of greatest concern are project area streams that were burned in the Bailey Butte Fire (Upper Marks Creek Subwatershed). Observations following the fires included rilling and gullying down slopes in the Upper Marks Creek watershed that eventually entered streams after a high storm event. There is acknowledgment that the Bailey Butte Fire will have cumulative negative impacts on sediment in areas affected by the fire. Project design criteria include staging the opening of the trail system in the Upper Marks Creek Subwatershed, and especially in the fire perimeter, until

there has been recovery of vegetation in areas affected by the fire. This should help alleviate the effects on aquatic species and their habitat before implementation of the Ochoco Summit project. Cumulatively, the project would still not lead toward the federal listing of redband trout and Columbia Spotted Frog.

Sediment/Turbidity

Increases in road/trail densities within the sediment delivery zone of perennial and intermittent streams and within RHCAs of wetlands and springs have the potential to increase sediment delivery and turbidity increases in streams and habitat quality in both streams and wetlands in the Ochoco Summit Project Area. Ochoco Summit Project proposed trail systems would have the effect of increasing road/trail densities in stream sediment delivery zones and wetland RHCAs in most of the subwatersheds analyzed in the project area for at least one of the alternatives, with the exception of the North Wolf Creek Subwatershed. Since miles of existing user created trails by subwatershed are unknown, these are not accounted for in road/trail density estimates, and likely would have effect on these results. Overall, it is anticipated that by designating OHV trails, the total miles of trail near streams and wetlands would decrease over time as user created trails revegetate over time. Additionally, a prioritization of unauthorized trails to rehabilitate/restore would occur with an interdisciplinary team and these unneeded trails would be stabilized or restored as funds allow, which would be beneficial to aquatic species and water resources. Some of these trails, however, will continue to affect sediment delivery and turbidity levels in streams and wetlands across the Forest, until active decommissioning is implemented.

Table 132 illustrates the magnitude of density increases or maintenance of current road/trail densities resulting from Alternatives 2, 3, 4 and 5, relative to the no action alternative. The largest increases in road/trail densities within stream sediment delivery zones and wetland RHCAs exist as a result of both Alternatives 2 and 4, followed by Alternative 3 and Alternative 5. Alternative 1, the no action alternative, would not increase road/trail densities. Similar increases in the magnitude of both road/trail densities result from both Alternatives 2 and 4 in the Howard Creek, Porter Creek, Little Summit Prairie, and Lower Deep Subwatersheds. Alternative 3 has similar increases to both Alternatives 2 and 4 in the Little Summit Prairie and Lower Deep Subwatersheds. In the Upper Marks Creek Subwatershed, increases in road/trail densities in stream sediment delivery zones and wetland RHCAs are similar for Alternatives 3 and 4, which is more than the proposed action, Alternative 2. The largest increases in both road/trail densities and stream crossing densities occur as a result of Alternatives 2 and 4 in the Howard Creek Subwatershed, which has a fair overall sediment/turbidity existing condition.

Some specific locations where decommissioned roads are proposed to be converted to trail may result in site specific sediment delivery concerns to streams in the Ochoco Summit project area. Alternatives 2, 3 and 4 propose to convert roads decommissioned in Deep Creek Watershed as part of the Deep Creek Restoration Plan to trails. However, Forest Service specialists that visited Road #3000-930 in the Jackson Creek watershed determined that it was not a high sediment concern area after walking the road, and in fact, using the road as a single-track trail would help remedy an area that is actively eroding at a plugged culvert by maintenance and potetnailly replacing the culvert. In addition, roads decommissioned in the Peterson Creek Subwatershed as a result of risks related to the Maxwell Fire, are planned to be converted to trail in Alternatives 2 and 4. In addition, Alternative 2 proposes a 2 mile jeep crawl up a steep slope with High Slope Erosion Hazard that crosses two ephemeral streams multiple times. These site specific concerns are listed in Table 133 and the associated subwatersheds, road numbers, miles within sediment delivery zones, slope erosion hazard, proposed trail class by alternative, proximity to the stream, and flow regime. Alternative 5 has the least number of site specific concerns, and all trails proposed within areas of concern are Class III trail motorcycle trails, which are expected to have the least impact of all three trail classes.

A recent study conducted by the USFS and the US Department of Transportation Federal Highway Administration assessed to what degree natural resources are being effected by all-terrain-vehicle (ATV) use (Meadows et al. 2008). This study found that "following any level of disturbance, runoff and sediment generated on the ATV trails increased by 56 percent and 625 percent, respectively, compared to the undisturbed forest floor." In addition, the study found that tight-radius curves result in the most trail disturbance condition, followed by uphill and downhill sections of trail, with straight sections of trails receiving the least disturbance and susceptibility to rutting (Meadows et al. 2008). Another study (Foltz 2006) looked at ATV trails on National Forest lands and their erodibility compared to other types of traffic or land conditions. The study demonstrated that there is a larger interrill erodibility when compared to such things as forest roads, forest skid trails, range and agricultural uses, and the study did demonstrate that there may be as much as 6 times more sediment production from ATV trails, when compared to forest roads. However, both of these studies need to be qualified with the fact that this study is for unmanaged ATV use. The Ochoco Summit Project under all action alternatives would manage the OHV system as proposed, which would implement proper drainage and other BMP measures applied to the routes, which would essentially make them function like a narrow road rather than an unmanaged ATV trail. Typically, unmanaged ATV trails are not constructed in ideal locations (steep slopes, near riparian areas, etc.), and overall, great care was taken with the Ochoco Summit OHV project to design a trail system that was properly placed in areas of lower sensitivity that could be managed in the future. Proper maintenance would also occur on these routes as needed. Additionally, unauthorized user-created ATV trails that are not part of the proposed system would be effectively closed and hydrologically stabilized, which should lead to better conditions for aquatic species in the long-term, since many of these user-created ATV trails are steep or near water.

For Table 131 and Table 132, the following applies: Arrow direction indicates magnitude of increase in density values: → indicates less than 0.2 mile per square mile increase in density; ↗ indicates an increase of 0.2 to 0.3; and ↑indicates an increase of greater than 0.3; SDZ = Sediment Delivery Zone.

Table 131. Flow and sediment regime summary of direct/indirect effects by alternatives.

Watershed	Existing Condition Flow/ Sediment Regime Rating	Sub-Watershed	Ochoco Summit Direct/Indirect Effects							
			Alternative 2		Alternative 3		Alternative 4		Alternative 5	
			Road/ Trail Density	Stream Crossing Density	Road/ Trail Density	Stream Crossing Density	Road/ Trail Density	Stream Crossing Density	Road/ Trail Density	Stream Crossing Density
Lower Beaver Creek	Fair	North Wolf	→	→	→	→	→	→	→	→
Upper North Fork Crooked River	Poor/Fair	Elliot	↗	↑	↗	↗	↗	↑	↗	↗
		Howard	↑	↗	↑	↗	↑	↗	↑	↗
		Peterson	↑	→	→	→	↑	↗	→	→
		Porter	↑	↑	↗	↗	↑	↑	↗	↗
Deep Creek	Good	Jackson	↗	↗	→	↗	↑	↗	→	↗
		Little Summit Prairie	↗	→	↗	→	↑	→	↗	→
		Lower Deep	↗	↗	↗	↗	↑	↗	↗	↗

Upper Ochoco Creek	Poor	Upper Marks	↗	→	↑	↗	↑	↑	↑	↗

Table 132. Sediment and turbidity summary of direct/indirect effects by alternative.

Watershed	Existing Condition Sediment/ Turbidity Rating	Sub-Watershed	Ochoco Summit Direct/Indirect Effects							
			Alternative 2		Alternative 3		Alternative 4		Alternative 5	
			SDZ Road/ Trail Density	GDE Road/ Trail Density	SDZ Road/ Trail Density	GDE Road/ Trail Density	SDZ Road/ Trail Density	GDE Road/ Trail Density	SDZ Road/ Trail Density	GDE Road/ Trail Density
Lower Beaver Creek	Fair	North Wolf	→	→	→	→	→	→	→	→
Upper North Fork Crooked River	Fair	Elliot	↑	↗	↗	↗	↗	↗	↗	↗
		Howard	↑	↑	↑	↗	↑	↑	↑	↗
		Peterson	↗	→	→	→	↗	↗	→	→
		Porter	↑	→	→	→	↑	→	→	→
Deep Creek	Fair/Good	Jackson	↗	↗	→	→	↗	→	→	→
		Little Summit Prairie	→	↗	→	↗	→	↗	→	↗
		Lower Deep	↗	↑	↗	↑	↗	↑	↗	↑
Upper Ochoco Creek	Fair	Upper Marks	→	→	↗	↑	↗	↑	↗	↑

Table 133. Specific locations with hydrologic concerns.

Subwatershed	Road/Trail Identifier	Miles in SDZ	Slope Erosion Hazard	Trail Class				Proximity to Stream	Flow Regime
				Alt 2	Alt 3	Alt 4	Alt 5		
Petersen Creek	New Trail (2 Mile Jeep Crawl)	0	High	II	-	-	-	5 Crossings	Ephemeral
	FS 2200-550	0.2	Moderate	I	-	I	-	1 Crossing	Fish-Bearing, Perennial
Jackson Creek	FS 1200-504	0.4	Moderate	III	-	III	-	5 – 200 ft (parallels)	Fish-Bearing, Perennial
	FS 3000-802	0.1	Moderate	I	III	I	-	1 Crossing	Perennial
		0.1					-	30 – 300 ft (parallels)	Fish-Bearing, Intermittent
	FS 3000-930	0.8	Moderate/ High	III	III	III	III	25 – 300 ft (parallels)	Fish-Bearing, Perennial
	FS 4250-608	0.1	Low/ Moderate	III	-	III	-	1 Crossing	Fish-Bearing, Perennial
Little Summit Prairie Creek	FS 4270-600	0.1	Moderate/ High	I	III	I	-	1 Crossing	Intermittent
Lower Deep Creek	FS 4200-600	0.3	Low	I	III	I	-	1 Crossing/ 15 – 100 ft (parallels)	Intermittent

	FS 4200-603	0.5	High	I	III	I	-	1 Crossing/ 30 – 120 ft (parallels)	Perennial

Viability Analysis for Aquatic Species

Fish species identified as management indicator species are listed in the FEIS for the Forest Plan. These species are rainbow trout (Oncorhynchus mykiss) and brook trout (Salvelinus fontinalis). In the past, these fish have been stocked by the Oregon Department of Fish and Wildlife. They are no longer stocked in the streams in the Ochoco Summit project area, but may naturally reproduce in many streams (Classes I and II). For purposes of this analysis, effects to redband trout will act as a surrogate for MIS fish species. No further evaluation for brook trout will be discussed in this section (Rife 2011).

Riparian ecosystems occur at the margins of standing and flowing water, including intermittent stream channels, ephemeral ponds, and wetlands. The aquatic MIS were selected to indicate healthy stream and riparian ecosystems across the landscape. Attributes of a healthy aquatic ecosystem includes: cold and clean water; clean channel substrates; stable streambanks; healthy streamside vegetation; complex channel habitat created by large wood, cobles, boulders, streamside vegetation, and undercut banks; deep pools; and waterways free of barriers. Healthy riparian areas maintain adequate temperature regulation, nutrient cycles, natural erosion rates, and provide for instream wood recruitment.

The existing condition of redband trout habitat and extent of redband trout populations in the project area is displayed in the section of this report titled “Watershed and Subwatershed Descriptions” and “Existing Condition”. Refer to this section of the report for more information on conditions for redband trout in the project area.

Redband trout populations in the Ochoco Summit OHV project area are considered depressed to less than 10% of historical numbers, but are believed to be self-sustaining and not considered to be in immediate threat of declining precipitously, according to Oregon Department of Fish & Wildlife personnel (personal communication with Brett Hodgson, ODFW District Biologist, March 2006).

Limiting factors and treats for redband trout are similar throughout their range on the Ochoco National Forest and Crooked River National Grassland (Rife 2011). The predominate threats are increases in stream temperature due to channel degradation due to riparian area management issues and population fragmentation from upstream passage issues mostly related to culverts at stream crossings.

Causal factors include legacy impacts from over grazing, logging and road building in the 20th century. In most cases, channels are currently recovering from these impacts, especially grazing and logging. However, road building issues that constricted floodplains continue to cause impacts to fish habitat. Road crossings on the Ochoco are being replaced on a yearly basis, with over 60 culverts either removed or replaced in the last 16 years. This has increased the ability of redband trout to move freely within and between watersheds.

There are no models developed to determine viability of the redband trout based on habitat. However, based on the local science from Stuart et al. (2007) and the estimated habitats from the Inter Columbia Basin Management Plan, there appears to be appropriate habitat that is well distributed and available for redband trout across the Ochoco National Forest (Rife 2011). In conclusion, the viability assessment indicates that habitat of the redband trout is still available in adequate amounts, distribution, and quality to maintain redband trout viability on the Ochoco National Forest and Crooked River National Grassland.

Given the project design and mitigations and the small scale of change in site specific locations, from the existing condition (especially relative to the scale of the Forest or overall subwatersheds included in this project), the continued viability of redband trout is expected to occur on the Ochoco National Forest. See discussion above in "Direct and Indirect Effects" section of this report. The predominate threats to redband trout on the Ochoco National Forest are increases in stream temperature and fragmentation of habitats from road culverts. The Ochoco Summit OHV project was determined to have "no effect" on stream temperature or upstream passage, and therefore the viability of redband trout would not be affected. Furthermore, sediment levels would not be increased above the thresholds described in the "Direct and Indirect Effects" section of this report, further verifying that the viability of redband trout in the project area would not be affected.

Consistency with Forest Plan Direction and Other Laws/Regulations

All action alternatives would be consistent with the Ochoco National Forest Plan. The application of all BMPs to mitigate sediment effects would be required under all action alternatives. The Adaptive Management Plan designed for this project would also ensure that harmful effects to water quality and fisheries resources would be properly and rapidly addressed.

A review of the standards and guidelines provided in INFISH found that activities in the Ochoco Summit Project are within INFISH requirements and direction. Following are INFISH standards and guidelines appropriate to this project and a brief description of how these standards and guidelines would be met.

Roads Management

RF-4 – Construct new, and improve existing, culverts, bridges, and other stream crossings to accommodate a 100-year flood, including associated bedload and debris, where those improvements would/do pose a substantial risk to riparian conditions.

Newly constructed crossings would provide and maintain fish passage. Any new stream crossings that are constructed under this project would accommodate Q-100 flows. Newly constructed crossing on Class I, II and III streams would either be culverts or bridges.

RF-5 – Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams.

Newly constructed crossings would provide and maintain fish passage

Recreation Management

RM-1 – Design, construct, and operate recreation facilities, including trails and dispersed sites, in a manner that does not retard or prevent the attainment of the Riparian Management Objectives and avoids adverse effects on inland native fish. Complete watershed analysis prior to construction of new recreation facilities in RHCAs within priority watersheds.

As discussed above in the effects analysis, all action alternatives would neither retard nor prevent attainment of the Riparian Management Objectives, as long as the appropriate Project Design Criteria are followed during construction and long-term maintenance.

RM-2 – Adjust dispersed and developed recreation practices that retard or prevent attainment of Riparian Management Objectives or adversely affect inland native fish. Where adjustment measures such as education, use limitations, traffic control devices, increased maintenance, relocation of

facilities, and/or specific site closures are not effective in meeting riparian Management Objectives and avoiding adverse effects on inland native fish, eliminate the practice or occupancy.

Appropriate project design criteria and adaptive management would be used to address natural resource impacts that could develop with the implementation of the Ochoco Summit OHV project. A level of flexibility is built into the project to allow for trail closures, use limitation, increased maintenance if there are issues with not meeting Riparian Management Objectives, and avoiding adverse effects on inland native fish. If problems cannot be resolved with these means, the flexibility to elimate the activity is also built into the project.

Wildlife

This section includes a summary of the Wildlife specialist's report and Biological Evaluation; the entire report is in the Ochoco Summit Trail System project record, located at the Ochoco National Forest, Prineville, Oregon.

General Effects to Wildlife

With all management activities, there are negative effects to some species and benefits to others that must be considered and balanced along with the need for those human activities. Negative effects of recreational OHV use on wildlife may include wildlife mortality, direct and indirect loss of habitat, displacement, and reduced connectivity. Factors that influence the vulnerability of different wildlife species include behavior and ecology. For example, animals that tend to stay closer to shelter, such as gray squirrel and woodchuck, can tolerate closer encounters with humans because they can quickly escape (Frid and Dill 2002; Gill et al. 1996). Other species may respond positively to human development and use of OHV trails and roads; potential benefits are related to habitat, mobility, and food resources. Openings, shrubs and grasses may develop alongside roads, providing additional foraging habitats. Cleared roads and trails are utilized as travel corridors for some species.

Not all species respond negatively to human development and use of OHV trails and roads. Openings, shrubs and grasses may develop alongside roads providing additional foraging habitats. Leard roads and trails are utilized as travel corridors for some species. Benefits are related to habitat, mobility and food resources.

Roads alter habitat with initial construction and thereafter alter the quality of habitat adjacent to them. This is primarily as a result of the edge habitat created, vegetation trampling, and response to sound related to people and or vehicles. Noise can be defined as any "human made sound that alters the behavior of animals or interferes with their normal functioning" (Bowles in Knight and Gutzwoulder 1995). While there is no road construction proposed, there are ongoing effects of existing roads, and the effects of existing roads and proposed OHV trails are similar.

Road widths vary from 14 to 35 feet depending on single or double lane and maintenance of right of way. For trails, effects are less than roads regarding direct alteration of habitat as the width of the footprint for motorcycle trails would be 24 inches wide; ATV trails would be 50 inches wide; side-by-side trails would be 65 inches wide and jeep trails would be 80 inches wide. Disturbance from noise on roads and trails emanates out from the vehicle and is treated the same regardless of trail width.

General effects to wildlife may include altered reproductive success, mortality, loss of habitat or habitat quality due to:

- Access for predators and people
- Fragmentation of habitat patches
- Behavioral changes in response to human use

- Impacts due to noise
- Physical alteration of habitat

Access for predators and people

Roads may act as barriers for some species but may aid in the dispersal or foraging activities of other native and non-native species. Pocket gophers have extended their ranges by traveling on roads and canals (Hey 1941 in Ouren et al. 2007). Brown-headed cowbirds are attracted to trails giving them easier access to parasitize nests near the trail or roads (Hickman 1990). Goshawk nesting areas often contain small canopy gaps such as spring areas or along old road corridors. These areas can provide habitat for prey species as well as foraging opportunities (Reynolds 1992). Studies have found predation rates increase with decreasing distance to trails by raven, domestic dogs, mice, squirrels, skunks, and coyotes (Miller and Hubbs 2000; Miller et al. 1998).

Roads and trails provide greater human access to habitats previously not accessed (Forman et al. 2003). There is increased human access to and contact with animals resulting in intentional or accidental harm or mortality. Roads and trails also increase access for falconers to remove young raptors from nests (Erdman et al. 1998 in Gaines et al. 2003). Increased contact with humans can result in increased intentional or accidental killing of wildlife, resulting in increased vulnerability of species like mink, marten, deer and elk (Cole et al. 1997; pers. comm. ODFW; Gaines et al. 2003).

Edge effect from roads and trails may also increase predation access to songbird nests. Studies found an increase in predators attracted to the corridors and the adjacent forest interior on trails and roads 7 to 26 feet (Rich et al. 1994 in Ouren et al. 2007; Hickman 1990). In addition, open areas such as junctions, play areas, campgrounds, and staging areas have perches and a clear view of surrounding areas can be a factor in higher nest predation (Ratti & Reese 1988 in Paton 1994).

Adjacent roads and trails provide travel corridors into forested habitat from nearby areas (Small and Hunter 1988; Askins 1994 in Montana TWS 1999). Predators such as great gray owls and red-tail hawks take advantage of forest edge. Roads and 4 wheel drive trails provide additional nesting habitat for these species. Indirect effects would include competition with other predators, such as Goshawk and Coopers hawk.

Fragmentation of habitat patches

Roads can contribute to forest fragmentation by dissecting large patches into smaller patches. This results in decreased interior forest habitat and increased edge habitat (Askins et al. 1987; Small and Hunter 1988; Schonewald-Cox and Buechner 1992; and Askins 1994, in Montana TWS 1999; Reed et al. 1996). OHV trails may have similar effects as roads, depending on width and zone of influence. Habitat fragmentation from corridors (roads and trails) may reduce a species capacity by disrupting continuous forest cover and reducing space needed by interior species. Hickman (1990 in Montana TWS 1999) found similar results as Hutto on trails two to three meters (7-10 feet.) wide. All trails proposed in this project are less than 7 feet in width, but there would be areas along the routes that would exceed this width such as routes on open roads, pull-outs and intersections. Patch size and distribution can determine the probability that a patch may be occupied (Laan and Verboom 1990; Fahrig 1998 in Montana TWS 1999). Hutto (1996) found that some songbirds may occur less commonly in smaller forest patches than in larger forest patches. However, some species such as flycatching birds and accipiters may respond favorably to canopy gaps and corridors which they utilize as foraging sites or flyways.

Riparian areas are usually areas of high diversity. Fragmentation of riparian habitats by roads may create impacts on habitat quality and connectivity. Patch size may be reduced, and roads may separate important habitat associations between the uplands and riparian areas. Songbirds, such as the brown creeper and dark-eyed junco, utilizing both the riparian and upslope forested habitat

(McGarigal and McComb 1992) used habitats more effectively when they were connected (Hutto 1995).

Road and trail edges may serve as ecological traps (Andrews 1990 in Ouren et al. 2007; Kokko and Sutherlan 2001) for some species. These areas may have the necessary resources for species to live and potentially reproduce but impose high mortality rates. For example, some bird species are attracted to roadsides due to the lush vegetation for nesting and foraging (Clark and Karr 1979 in Ouren et al. 2007). Although the road and trail sides contains suitable habitat, these individuals are at greater risk of mortality of being hit by vehicles or predation (Books and Lair 2005; Mumme et al. 2000 in Ouren et al. 2007; Yahner et al. 1979 in Ouren et al. 2007; Kokko and Sutherland 2001). It is more likely that effects of increased predation would apply, than being hit by an OHV on trails designed for slow speed, such as those proposed in this project.

Behavioral changes in response to human use

The immediate behavioral responses of wildlife to recreation (e.g. flush response, alert, and flight distances, distances moved) have conventionally been used to compare the degree of disturbance presented by different activities (Taylor and Knight 2003). Frid and Dill (2002) suggested human-caused disturbance (e.g. walking, motorized vehicles, wildlife viewing) is a form of predation risk, in that animals respond to human activities in the same way they might respond to their predators. People approaching wildlife on a direct line, straight towards them, produce an increase in flight response (Bennett and Zuelke 1999; Klein et al. 1995). In addition, if the recreationist is off-trail and is coming straight at the wildlife, the animals have a much stronger tendency to flee (Knight and Cole 1995; Taylor and Knight 2003).

The stress of a flight response in any animal can cause physiological changes. Gabrielsen and Smith (in Knight 1995) listed the physiological changes mammals and birds experience as increases in heart rate, oxygen consumption, metabolism, respiratory rate, blood flow, body temperature and blood sugar, while decreasing blood flow to skin and digestive organs. These types of energy expenditures can reduce vigor and decrease energy. For example, when animals such as rabbits and squirrels encounter their predator, they can no longer consume energy, and they begin to expel it to enhance physiological changes associated with survival.

One short-term or immediate stress response of wildlife to recreation is a change in behavior. Some behavior changes include the stopping of foraging until the disturbances ceases, fleeing, or flushing, changes in physiological processes (like those previously described), nest abandonment or stopping mating calls (Knight and Cole 1995; Taylor and Knight 2003). Long-term disturbances can reduce overall vigor, and energy. Wildlife may change their habits, including reproductive behaviors, foraging habitats, food consumption, food sources, foraging areas and home ranges (Klein 1971; Knight and Cole 1995). Some species become habituated to human presence which may reduce their sensitivity, but may increase vulnerability to hunting or poaching.

Impacts due to noise

For the purposes of this analysis, noise is defined as any "human made sound that alters the behavior of animals or interferes with their normal functioning" (Bowles in Knight and Gutzwoulder 1995). The potential effects of noise on wildlife (AMEC 2005, Forman and Alexander 1998) include:

- Altered behaviors
- Hearing loss and decreased sound sensitivity
- Communication confusion
- Habitat loss
- Habituation

The impacts of these effects may include reduced reproductive success, mortality, and/or reduced habitat quality or habitat loss (AMEC 2005). An animal's sensitivity to sound varies with the frequency band to which it is most sensitive (AMEC 2005). Sound is usually measured in decibels (dB) and decreases with distance from the source. It is also affected by a variety of factors including topography, weather, features that act as barriers (trees), volume, and the source (AMEC 2005). In Oregon there is a state law of 99 dBs maximum (at 20 inches from the muffler) on all OHVs (http://www.oregon.gov/oprd/ATV/docs/hb_laws_rules.pdf). Noise emitted from many OHVs can reach illegally high levels. It is the rider's responsibility that their machine complies with the sound regulations for the area in which they are operating. In order to ride legally on public land in the State of Oregon, riders must adhere to the Oregon OHV Guide (updated annually) standards on OHV Equipment Requirements and Operator Safety and Education requirements.

Altered Behaviors: Similar to behavior changes to recreational activities, there are behavior responses to noise. Responses can be mild, (wariness, walking slowly away, freezing, or crouching), moderate (running away, hiding in dens or burrows, flying short distances) to intense (panic flight, urinating or defecating and running at high speeds). These behaviors interrupt foraging, nurturing young, and in the case of panic responses can lead to injury or death (Bowles in Knight 1995). Burger and Gochfeld (1998) found shorebirds' foraging time decreased and avoidance of disturbance increased within 100 m (328 ft) of the source. Various mammal studies have shown mammals may leave an area where noise is, but return at some point once the noise is gone (Bowles in Knight 1995).

Hearing loss and decrease in sound sensitivity: Although sounds from OHVs are not the loudest sounds, they are emitted more frequently in wildlife habitats than other high intensity sounds (Brattstrom and Bondello 1983 in Ouren et al. 2007) and effects on animals can vary from reduced sensitivity to partial deafness or hormonal stress responses depending on loudness and proximity.

Marler et al. (1973) used sound pressure of 95-100 dB, which represents many OHV sound levels, e.g. two stroke engines 70-101 dB, four stroke engines 60 dBs, ATVs 78dB, and snowmobiles 75dB. The noise level of 99 dB (highest allowed in Oregon, measured 20 inches from the machine) would be loud enough, to create partial deafness in canaries and songbirds (Marler et al. 1973; Konishi 1969). Wildlife within the project area would not experience this noise level at a constant rate, nor would they receive this sound level 20 inches away unless they are in or immediately adjacent to the trail. It is more probable wildlife would experience intermittent sound levels of 99 dB or less, with a rare occasion of illegal engine reaching above 99 dB, but generally much farther away than 20 inches. So, while deafness is unlikely, there could be a decreased sensitivity. For example, sand lizards and kangaroo rats exposed to playback recordings of dune buggies at lower decibels than they would have been actually exposed to experienced loss of hearing sensitivity for weeks after and were unresponsive to predator sounds (Brattstrom and Bondello 1983 in Ouren et al. 2007).

Communication Confusion: Human-made noise has the potential of interfering with animal communication signals, sounds animals listen to for orientation, and for predator-prey detection (Erbe et al. 1999 in AMEC 2005). Noisy environments can cause problems with intra-species communication (i.e. breeding season), and can interfere with detection, discrimination, and localization of appropriate signals (Wollerman 1998 in AMEC 2005). Klump et al. (1986) study showed how the great tit can hear the sparrow hawk coming and gives one of three alarm calls to warn others of the presence of sparrow hawks. Communication between the species fails if frequency noise masks either the noise produced from the sparrow hawk or the alarm call. Reijen and Foppen (1994) stated that where primary song was affected by vehicle disturbance, birds appeared reluctant to establish nesting territories. This could affect populations whose numbers are already low (AMEC 2005). Konish (1970) found all birds could hear frequencies below 1 kHz, which may be used to detect low broad-band noises by predators. Vehicle noise may indirectly cause mortality by eliminating a species' ability to detect and capture necessary food items or detect and avoid predators (Montana TWS 1999). In addition, ambient (background) noise affects the distance at which

vocalizations, human-made noises, and other sounds can be detected (AMEC 2005). Ambient noise in terrestrial environments includes sound like animal calls and songs (e.g. birds, frogs, and insects), water, and wind (AMEC 2005). At times, OHV noise may simulate natural sounds (e.g. thunder) to which animals are adapted and result in inappropriate responses. In a study conducted by Brattstrom and Bondello (1983 in Ouren et al. 2007), spadefoot toads subjected to taped motorcycle sounds emerged prematurely from their burrows during the wrong season (absence of rain). Grubb et. al (2012) found that noise associated with log truck traffic near nests of northern goshawks had little disturbance effect to birds at the nests being studied. Summers et. al (2011) reported that traffic noise is not the main cause of negative relationships between bird species richness and abundance and proximity to roads.

Habitat Loss: Habitat loss is a potential impact of noise disturbance on wildlife. Studies on ungulates and carnivores have shown heavily traveled roads are avoided or used little in comparison to lightly traveled roads (Forman et al. 2003; Rowland et al. 2005). Large mammals tend to have lower population densities within 100-200 meters of roads and other animals seem to avoid roads (i.e. arthropods, small mammals, birds) (Forman and Alexander 1998; Barton and Holmes 2007; Eigenbrod et al. 2007; Fletcher et al. 1999; Montana TWS 1999; Gaines et al. 2003; and Ouren et al. 2007).

Many studies show breeding birds near highways and OHV trails have reduced densities, population decline and/or are more likely to abandon their nest (Forman et al. 2003; Barton and Holmes 2007; Montana TWS 1999; Kaseloo 2006; Zande et al.1980; Reijnen et al. 1995; Reijnen and Foppen 1995). Depending on the species the amount of habitat lost due to noise varies.

Habituation: Some animals do show the ability to adapt to noise. Flushing distance may decrease, avoidance distances may decrease, and individual wildlife may learn to ignore the sound (Bennett and Zurlke 1999; Zande et al. 1980; Richens and Lavigne 1978; Moen at al. 1982 in Zielinske et al. 2007). Additionally, some songbirds can become habituated to certain people visiting their nest sites and may become aggressive to others they have not become accustomed to (Knight 1995). Mule deer were found to use areas closer to roads at Starkey Experimental Forest and Range (Johnson, 2000), but this pattern of use was attributed to avoidance of elk rather than selection of habitat near roads. Preisler (2006) noted that the response of elk to human disturbance lessened after a few days of disturbance and suggested that the elk had either habituated or found refugia close to roads, rather than fleeing to the far corners of experimental pastures at Starkey Experimental Forest and Range.

Whittaker and Knight (1999) stated that animals may become habituated to trail recreation because the movement is always occurring on a certain line of travel continually. Their study illustrated an animal's probability of flushing due to recreation increased when the activity was off-trail versus on-trail. Other studies have shown animals are also more likely to habituate to trail activities versus those activities that are unpredictable (MacAurthur et al. 1982; Miller et al. 2001). The energetic cost for wildlife of responding to disturbances from recreation can also affect the carrying capacity of wildlife habitat (Stalmaster 1983). In some cases, wildlife may habituate to predictable disturbance from recreation, but in other cases they may not (Taylor and Knight 2003). However, habituation may lead to attraction, which could have wildlife consequences. For example, habituated wildlife may become prone to negative human activities like poaching and hunting (Singer 1975) due to baiting practices.

Physical Alteration of Habitat

Effects of direct habitat alteration depend on the scale at which they occur and the tolerance of the species in question. Reducing one acre of habitat for a species that has a large home range and large quantities of habitat available would have very little impact, if any, on that species. Reducing one acre of habitat on a species that is not mobile and has a three acre home range may affect that

individual's ability to successfully reproduce or survive. Affecting one or a few such individuals may have little or no effect on the population or species across the landscape.

Direct and Indirect Effects – General Effects to Wildlife

Access for Predators and People

Alternative 1

Prior to implementation of the Travel Management Rule in 2011, there had been few restrictions to cross country travel across the Forest except in designated areas (e.g. wilderness, research natural areas, Travel Management Areas, Roadless Areas). Closed roads have administrative use allowed. This use is highly variable in any given year from short-term daily use for a vegetation management project to years of inactivity. Because of the variability and high degree of inactivity these roads are not included in the disturbed habitat analysis, but considered in cumulative effects. Outside of closed areas cross country travel had been permitted on Ochoco National Forest prior to 2011, and many miles of user created trails, closed roads, non-motorized trails and other unauthorized routes received motorized use. Within the project area there are approximately 674 miles of Maintenance Level 2 (ML2) roads. Of those ML2 roads, 659 miles are legal for mixed use including use by OHVs. In addition there are 140 miles of open Maintenance Level 3 to 5 roads that are not legal for OHV use, 270 miles of unclassified or other jurisdiction roads, and 669 miles of closed roads, many of which are currently receiving unauthorized OHV use. Given the traditional pattern of "open unless designated closed" on this Forest, there are currently large areas with moderate to high levels of human disturbance and predator access.

Action Alternatives

This project does not propose to construct any new roads. Proposed trail construction would utilize roads, user-created trails, fire lines, snowmobile trails, and other areas disturbed from management activities wherever possible. Through the action alternatives, OHV use would only be allowed on designated trails, shared use roads and/ or play areas, and would no longer be permitted on user-created trails that are not included as part of the designated system. Within each action alternative, there is a proposal to decrease habitat disturbance by closing and rehabilitating user-created trails, physically closing roads that are not managed as open roads, and converting roads into trails. Table 134 displays the length of trail by existing disturbance type. "Miles of trail not on roads" includes new routes, as well as routes on existing disturbance that are not recognized in GIS as Forest System Roads (i.e. temporary roads, skid roads, user created trails, or old roads that have been removed from the transportation database). Reinforcement of existing closures would occur on roads previously closed under separate NEPA documents, when those roads fall within the OHV Management Area for the proposed trail system, but are not included in the proposed trail system. Rehabilitation of unwanted user-created routes or closed roads would occur where such routes fall within the OHV Management Area for the proposed trail network, and where there is a resource need (i.e. damaged riparian or other sensitive areas) or where the presence of such routes may create confusion about which routes are open and which are not. Rehabilitation would include measures to restore stability, vegetative cover and to conceal the unwanted route. A combination of rehabilitation of unwanted user created or unauthorized routes, and reinforcement of existing road closures would be implemented across the OHV Management Area, which should help to ameliorate effects of human access across the project area. However, closed roads, converted trails and rehabilitated routes may still provide access for predators. Given the relatively open travel conditions present across much of the project area for hunters and predators alike, it is assumed that animal mortality rates would be similar to what currently exists.

Table 134. Comparison of alternative actions.

Alternative	Miles of mixed use (OHV legal) road	Miles of trail route on open roads	Miles of trails on closed roads	Miles of trails on decommissioned roads	Miles of trails not on roads
Alternative 1	659	0	0	0	0
Alternative 2	659	46	44	11	69
Alternative 3	659	13	30	7	50
Alternative 4	659	53	62	14	81
Alternative 5	661	30	47	7	51
** No new construction would occur in Alternative 1.*					

Fragmentation of habitat patches

Literature was reviewed to determine at what distance from roads impacts are seen relative to disturbance and edge effects. Forman (2000) described a "road effect distance" of 200 meters (660 feet) for secondary roads to calculate the indirect loss of habitat and the displacement of many species. Forman also mentions the road effect zone is highly variable and is dependent on the species affected, adjacent habitat, road type, and traffic volume. Noss and Cooperrider (1994) report edge effects are not linear and the zone varies in width depending on what is being measured. They report edge effects seen as far as 240 meters. Therefore, the 200 meter road effect distance can be used to assess edge effects as well. This distance may over-estimate effects for some species and would under-estimate effects for others. However, this distance captures known effects for many species and provides a relevant measure of change between the existing condition and the alternatives. The analysis would also assume that motorized trails would have a similar effect as roads, and a 200 meter affected distance for all motorized trails proposed as part of the Ochoco Summit OHV system. It is assumed that the 200 meter road effect distance would also include those effects for motorized access for dispersed camping. Vehicles accessing dispersed campsites are usually traveling at a very low rate of speed for short distance (no more than 300 feet). Engines are only on for short periods of time and therefore, effects realized for the 200 meter road effect zone would include those for motorized access for dispersed camping as well. This 200 meter road effect distance would be referred to as disturbed habitat in the analysis. For an estimate of acres affected due to fragmentation of habitat by the network of existing open roads and by the proposed activities refer to the column labeled "Acres within 660' (200m)" in Table 135.

Alternative 1

Fragmentation would continue within the road effect zone (200 meters each side of roads). For an estimate of acres affected due to fragmentation of habitat by the network of existing open roads refer to Alternative 1 and the column labeled "Acres within 660' (200m)" in Table 135.

Action Alternatives

Fragmentation would occur within the road/trail effect zone (200 meters each side of roads or motorized trails) for the OHV travel system described in each alternative. Acreage within the 200 m fragmentation band is displayed for each alternative in Table 135.

Impacts due to human use and noise

Noise and human disturbance from vehicle use on roads and the associated fragmentation (edge effect) and potential behavioral changes are primary effects to wildlife species and habitat. These factors affect the quality of habitat and species use adjacent to roads. Effects to a variety of species have been documented in the literature, many of which do not occur on the Ochoco National Forest. Data is not available for all species or conditions found on the National Forest. Therefore, we assume that species in the same family would experience similar effects. Disturbance associated with noise is

assumed to be greatest within the road effect zone (200 meters each side of roads) as well as along unauthorized routes and via cross country travel. Disturbance would decrease beyond the road or motorized trail effect zone for each of the action alternatives, and as a result habitat quality would increase as distance from road or trail increases. Acreage within five potential disturbance bands is displayed in Table 135. At 1 mile or more from a motorized route noise and disturbance impacts are assumed to drop to the ambient level (zero impact from motorized use of the route); Table 135 displays the acreage in the project area that is within one mile of an existing or proposed route, and the acreage that is more than one mile from existing or proposed routes.

Alternative 1

Disturbance would continue within the road effect zone (200 meters each side of roads) as well as along unauthorized routes and via cross country travel. For disturbance effects of existing open roads refer to Table 135 (Alternative 1).

Action Alternatives

Disturbance would continue within the road effect zone (200 meters each side of roads or motorized trails) for the OHV travel system described in each alternative. Decreased habitat quality, reduced reproductive potential, and avoidance of the road effect zone are potential effects as a result of habitat alteration physically or due to disturbance. Acreage within five potential disturbance bands is displayed in Table 135. Those acres within the 200 m zone would experience the highest level of impact due to noise. Impacts decrease as distance from motorized route increases. At 1 mile or more from a motorized route noise and disturbance impacts are assumed to drop to the ambient level (zero impact from motorized use of the route); see Table 136.

Table 135. Comparison of alternatives, acres within distance bands of motorized routes.

Alternative	Acres within 660' (200m)	Acres 660' to ¼ mile	Acres ¼ mile to ½ mile	Acres ½ mile to ¾ mile	Acres ¾ mile to 1 mile
Alternative 1	115,127	70,793	66,473	26,794	11,614
Alternative 2	125,745	70,192	61,299	23,450	10,484
Alternative 3	123,036	70,652	62,775	24,142	10,565
Alternative 4	129,390	70,155	58,977	22,224	10,423
Alternative 5	124,432	70,203	61,983	23,877	10,664
No new construction would occur in Alternative 1.					

Table 136. Comparison of alternatives, total area within 1 mile and beyond 1 mile from a motorized route.

Alternative	Total Acres (% of area) less than 1 mile from motorized route	Total Acres (% of area) more than 1 mile from motorized route
Alternative 1	290,802 (96.4%)	10,779 (3.6%)
Alternative 2	291,170 (96.5%)	10,411 (3.5%)
Alternative 3	291,170 (96.5%)	10,411 (3.5%)
Alternative 4	291,170 (96.5%)	10,411 (3.5%)
Alternative 5	291,159 (96.5%)	10,422 (3.5%)

Physical Alteration of Habitat

Effects of direct habitat alteration depend on the scale at which they occur and the tolerance of the species in question. Reducing one acre of habitat for a species that has a large home range and large quantities of habitat available would have very little impact, if any, on that species. Reducing one

acre of habitat on a species that is not mobile and has a three acre home range may affect that individual's ability to successfully reproduce or survive. Affecting one or a few such individuals may have little or no effect on the population or species across the landscape.

This project will not be removing or impacting substantial amounts of dead and down wood; will have limited landscape level impacts to various plant associations; and will avoid springs, bogs and other unique riparian habitat. Thus, this project is not expected to result in changes to habitat for species that use dead and down logs (including bears, American marten and other species); a wide range of species that use various plant communities; and species that use springs, bogs and other unique habitat (including shorebirds, waterfowl, gastropods, amphibians and a variety of other species). For estimates of acres of plant communities and special habitats potentially impacted by the footprint of the proposed trails system refer to the Botany Section of this EIS, as well as to those described below.

Alternative 1

Physical effects to special habitats (SHAB) such as meadows, riparian woodlands, shrublands and rocky sites would continue within the affected zone along open roads, as well as along unauthorized routes. Most cross-country travel and use of closed roads should be curtailed with implementation of the Travel Management Plan, but some illegal cross-country travel and motorized use of closed roads may still occur. Direct and indirect effects of existing open roads are related to road maintenance activities, dust, run-off and vehicles being driven off the road surface for various reasons such as campsite access, firewood cutting, parking, etc. There would be no effects from a designated trail system within the project area.

Action Alternatives

Direct and indirect effects would continue within the road effect zone on roads that remain open and for any additional length of motorized route included in the OHV trail system described in each alternative. Direct and indirect effects include those described above for Alternative 1, as well as for soil disturbance associated with new trail construction, maintenance and conversion of old road beds to motorized trails. Most cross-country travel and use of closed roads should be curtailed with implementation of the Travel Management Plan, but some illegal cross-country travel and motorized use of closed roads may still occur. Under the action alternatives active enforcement within the OHV Management Area would occur at a higher level with implementation of education and enforcement programs under the leadership of COHVOPs. There would also opportunities for funding to support closure, rehabilitation and restoration of unwanted and unauthorized routes within the OHV Management Area.

Alternative 2

Within the designated trail system approximately 36 miles of designated route impact 18 acres of special habitat. Of the designated route miles on SHAB, 11 miles are on open roads. The designated system would include 126 miles in forested plant association groups (PAGs) and 44 miles in PAGs other than forested (juniper woodland, juniper steppe, non-forested). Of the designated route miles in forested PAGs: 11 miles of class I routes are on open roads; 16 miles of class II routes are on open roads; and 3 miles of class III routes are on open roads. If an average width of 10' of impact to vegetation is assumed on routes not on existing roads, then approximately 1.2 acres per mile could be affected by direct habitat alteration of forested PAGs, a total of 115 acres for this alternative. Of the route miles in PAGs that are not forest land, 3 miles of class I routes are on open roads; 13 miles of class II routes are on open roads; and 1 mile of class III routes are on open roads. If the same average width of habitat alteration is assumed as in forested PAGs, then non-forested habitat alteration could potentially affect 32 acres under this alternative. The area impacted by clearing could be reduced in the long-run on routes where roads are converted to trails (up to 55 miles), as well as where

unauthorized routes are closed. Such closures are proposed on a total of 209 sites under this alternative.

Alternative 3

Within the designated trail system approximately 17 miles of designated route impact 7 acres of special habitat. Of the designated route miles on SHAB, 5 miles are on open roads. The designated system would include 82 miles in forested plant association groups (PAGs) and 19 miles in PAGs other than forested (juniper woodland, juniper steppe, non-forested). Of the designated route miles in forested PAGs 4 miles of class I routes are on open roads, and 6 miles of class III routes are on open roads. If an average width of 10' of impact to vegetation is assumed on routes not on existing roads, then approximately 1.2 acres per mile could be affected by direct habitat alteration of forested PAGs, a total of 86 acres for this alternative. Of the route miles in PAGs that are not forest land, 1 mile of class I route is on open roads, and 4 miles of class III routes are on open roads. There are no class II routes proposed under this alternative. If the same average width of habitat alteration is assumed as in forested PAGs, then non-forested habitat alteration could potentially affect 17 acres under this alternative. The area impacted by clearing could be reduced in the long-run on routes where roads are converted to trails (up to 37 miles), as well as where unauthorized routes are closed. Such closures are proposed on a total of 145 sites under this alternative.

Alternative 4

Within the designated trail system approximately 40 miles of designated route impact 22 acres of special habitat. Of the designated route miles on SHAB, 14 miles are on open roads. The designated system would include 164 miles in forested plant association groups (PAGs) and 48 miles in PAGs other than forested (juniper woodland, juniper steppe, non-forested). Of the designated route miles in forested PAGs: 24 miles of class I routes are on open roads; 6 miles of class II routes are on open roads; and 7 miles of class III routes are on open roads. If an average width of 10' of impact to vegetation is assumed on routes not on existing roads, then approximately 1.2 acres per mile could be affected by direct habitat alteration of forested PAGs, a total of 152 acres for this alternative. Of the route miles in PAGs that are not forest land, 10 miles of class I routes are on open roads; 5 miles of class II routes are on open roads; and 1 mile of class III routes are on open roads. If the same average width of habitat alteration is assumed as in forested PAGs, then non-forested habitat alteration could potentially affect 38 acres under this alternative. The area impacted by clearing could be reduced in the long-run on routes where roads are converted to trails (up to 76 miles), as well as where unauthorized routes are closed. Such closures are proposed on a total of 277 sites under this alternative.

Alternative 5

Within the designated trail system approximately 28 miles of designated route impact 20 acres of special habitat. Of the designated route miles on SHAB, 10 miles are on open roads. The designated system would include 102 miles in forested plant association groups (PAGs) and 32 miles in PAGs other than forested (juniper woodland, juniper steppe, non-forested). Of the designated route miles in forested PAGs 6.5 miles of class I routes are on open roads, 4.5 miles of class II routes are on open roads, 7 miles of class III routes are on open roads and 1.2 miles of class IV routes are on open roads. If an average width of 10' of impact to vegetation is assumed on routes not on existing roads, then approximately 1.2 acres per mile could be affected by direct habitat alteration of forested PAGs, a total of 47 acres for this alternative. Of the route miles in PAGs that are not forest land, 2.8 mile of class I route is on open roads, 8.9 mile of class II route is on open roads, 4.5 mile of class III route is on open roads, and 0 miles of class IV routes are on open roads (no non-forested PAGs in the Class IV network). If the same average width of habitat alteration is assumed as in forested PAGs, then non-forested habitat alteration could potentially affect 13.5 acres under this alternative. The area impacted by clearing could be reduced in the long-run on routes where roads are converted to trails

(up to 54 miles), as well as where unauthorized routes are closed. Such closures are proposed on a total of 185 sites under this alternative.

Cumulative Effects – General Effects to Wildlife

Past, present and reasonably foreseeable actions which have effects that could combine with effects from this project are the basis of cumulative effects analysis. The effects of projects that have a zone of influence which is shared with the potential area of effects from this project, and which have affects that may be present during the same period of time (effects overlap in time and space) are listed in this EIS in Table 7. This project does not include a substantial amount of vegetation management (limited clearing and hazard tree abatement along trails and staging areas), so this project does not result in landscape level cumulative impacts to structural habitat components when considered in combination with past, present and reasonably foreseeable salvage, hazard tree removal, thinning and prescribed burning treatments. However, the development of a system of access routes in order to implement commercial thinning projects and the open forest conditions created through vegetation and fuels management projects may combine with this project's effects of increased access such that there is a cumulative increase in the potential for disturbance. On the other hand, reinforcement of road closures associated with Bailey Butte Burned Area Emergency Reponses (BAER) result in more effective closure of ML 1 roads within the fire perimeter.

The Forest-level Travel Management Plan would close the National Forest System lands to cross country travel except on designated routes or in designated areas. With implementation of the forest-level Travel Management Plan acres of disturbed habitat would be limited to only those associated with roads, mineral material sources (rock pits) and motorized trails that are designated as open to the public for motorized use. Thus, the road closure reinforcements and rehabilitation of user created trails proposed in the action alternatives would combine with the Travel Management Plan, so that disturbance would be reduced in areas distant from open roads and trails within the OHV Management Area.

Threatened, Endangered and Sensitive Species

Threatened, Endangered and Sensitive species were analyzed using the 2011 update to the R6 Regional Forester's Sensitive Species list. Table 137 includes all terrestrial animal species documented or suspected to occur on the Ochoco National Forest and their status within the Ochoco Summit project area.

Threatened, Endangered, and Candidate Wildlife Species

Gray wolf is the only terrestrial wildlife species federally listed or under review for listing under the Endangered Species Act that is likely to occupy any portion of this project area. However, based on the R6 Regional Forester's Threatened, Endangered and Sensitive Species List (R6 TES List, July 13, 2015) wolves are not suspected or documented to occur in breeding populations or to persist on Ochoco National Forest. Occupied Gray Wolf Range is defined in The Reintroduction of Gray Wolves to Yellowstone National Park and Central Idaho FEIS (USDI, 1994): For the purposes of that FEIS "occupied wolf range" is defined as follows: Areas of confirmed presence of resident breeding packs or pairs of wolves or area consistently used by $\geq$ 1 resident wolf or wolves over a period of at least one month (USDI, 1994, p.76). Confirmation of wolf presence is to be made or corroborated by the U.S. Fish and Wildlife Service. Therefore, until an active pack is identified within the Ochoco National Forest, USFWS would recommend a no effect determination (Cordova, 2012). If a pack (i.e., pair) were to be identified in the project area, the only land use restriction would include a Limited Operating Period around den sites (when there are five or fewer breeding pairs of wolves in the recovery area) within a 1-mile radius around the active den site from April 1 through June 30 (Cordova, 2012). Candidate Species are to be considered by conducting biological evaluations (BE) to determine potential effects of all programs and activities on these species (FSM 2670.32). On

September 22, 2015 the USFWS determined that greater sage-grouse do not warrant protection under the Endangered Species Act. Therefore they are no longer federal Candidate Species. They are addressed below as a Sensitive Species. Similarly, on August 13, 2014, the USFWS withdrew its proposal to list the wolverine under the Endangered Species Act (ESA). As a result of this action, the wolverine returns to the Sensitive Species list and is addressed below.

Regional Forester's Sensitive Species

The Biological Evaluation (BE) is a documented review of Forest Service activities in sufficient detail to determine how a proposed action may affect sensitive wildlife species. This section of this report serves as the BE for this project for terrestrial wildlife species. Sensitive species were analyzed using the 2015 update to the R6 TES List. Table 137 includes all terrestrial animal species documented or suspected to occur on the Ochoco National Forest and their status. Columbia spotted frog, western ridged mussel (bivalve mollusk), Columbia clubtail (dragonfly), *Namamyia plutonis* (caddisfly), Harney Basin duskysnail, Indian Ford juga and Crater Lake tightcoil (snail) occupy aquatic or semi-aquatic environments and are discussed in the aquatic species section. Species classified as sensitive by the Forest Service are to be considered by conducting a BE to determine potential effects of all programs and activities on these species (FSM 2670.32). This section of this EIS serves as the BE for terrestrial wildlife species for the Ochoco Summit Trail System project.

Table 137. Regional TES terrestrial animal species for the Ochoco National Forest.

Species	Listing Status	Habitat	Presence Within Ochoco Summit Area
Gray wolf (outside Northern Rocky Mountains, *Canis lupus*)	Endangered	Generalist, remote areas	Habitat Present – Dispersal/Transient
Bald Eagle (*Haliaeetus leucocephalus*)	Regional Forester Sensitive	Lakes, Reservoirs, Large Trees for Nesting	Habitat Present – Known Nests
Upland Sandpiper (*Bartramia longicauda)*	Regional Forester Sensitive	Large Wetlands	Habitat Present – Historic Occurrence
Bufflehead (*Bucephala albeola*)	Regional Forester Sensitive	Mountain Lakes and Ponds	Habitat Present – Migratory/Transient
Horned grebe (*Podiceps auritus)*	Regional Forester Sensitive	Shallow ponds and marshes	Habitat Present – Unknown
American Peregrine Falcon (*Falco pergrinus anatum*)	Regional Forester Sensitive	Lakes, Rivers, cliffs and rock outcrops	Habitat Present - Unknown
Tricolor Blackbird (*Agelaius tricolor*)	Regional Forester Sensitive	Large Marshes and Bogs with Emergent Plants	No Habitat
Lewis' Woodpecker (*Melanerpes lewis*)	Regional Forester Sensitive	Open Forests, Burned Forest or Cottonwood Galleries	Habitat Present - Documented
White-Headed Woodpecker (*Picoides albolarvatus*)	Regional Forester Sensitive	Ponderosa Pine or Mixed Conifer Forests Dominated by Ponderosa Pine	Habitat Present - Documented
Greater Sage Grouse (*Centrocercus urophasianus phaeios*)	Regional Forester Sensitive	Sagebrush Without Tree Cover	Habitat Present – Documented
North American Wolverine (*Gulo gulo*)	Regional Forester Sensitive	Mixed Forest Mosaic, High Elevations	Habitat Present – Documented

Table 137. Regional TES terrestrial animal species for the Ochoco National Forest.

Species	Listing Status	Habitat	Presence Within Ochoco Summit Area
Pygmy Rabbit (*Brachylagus idahoensis*)	Regional Forester Sensitive	Sagebrush with Friable Soils	No Habitat
Townsend's Big-Eared Bat (*Plecotus townsendii*)	Regional Forester Sensitive	Roost Sites in Buildings, Caves and Bridges	Habitat Present – Documented
Silver-Bordered Fritillary (*Boloria selene*)	Regional Forester Sensitive	Wet meadows, marshes, bogs and more open parts of shrubbier wetlands	Habitat Present – Documented
Johnson's Hairstreak (C*allophrys johnsoni*)	Regional Forester Sensitive	Mostly in old growth coniferous forests with mistletoe presence	Habitat Present - Unknown
Western bumblebee *(Bombus occidentalis)*	Regional Forester Sensitive	open meadows or grassland areas where suitable populations of flowing plants are present	Habitat Present - unknown

After a review of existing records, habitat requirements, and existing habitat components, it was determined that the following sensitive species have habitat present in the project area or are known tooccur and would be included in this analysis: Northern bald eagle (*Halaieetus leucocephalus*), Upland Sandpiper (*Bartramia longicauda*), Bufflehead (*Bucephala albeola*), Horned Grebe (*podiceps auritus*), American Peregrine Falcon (*Falco pergrinus anatum*), Lewis' woodpecker (*Melanerpes lewis*), White-headed woodpecker (*Picoides albolarvatus*), Greater Sage Grouse (*Centrocercus urophasianus phaeios*), North American wolverine (*Gulo gulo*), Townsend's Big-Eared Bat (*Plecotus townsendii*), Silver-bordered fritillary (*Boloria selene)*, Johnson's hairstreak (*Callophrys johnsoni*) and Western bumblebee (*Bombus occidentalis*).

The following species were determined not to occur in the project area based on a review of habitat requirements, and habitat types present in the project area and a lack of existing sighting information: tricolored blackbird (*Agelaius tricolor)* and pygmy rabbit (*Brachylagus idahoensis).* Enough information is available about the habitat needs for these species (see the statements below) to determine that their habitat is not present in the project area. No additional surveys are required and these species will not be discussed further in this analysis.

Tricolored blackbird (*Agelaius tricolor*)

The Tricolored blackbird is a highly gregarious colonial breeder largely endemic to California. Breeding colonies are scattered and intermittent in Oregon. The Oregon population was estimated to have declined by 22 percent in the 1980s, but the Oregon population represents only one percent of the total tricolored blackbird population (Beedy et al. 1999). The species currently holds rankings in Oregon as SP Sensitive (peripheral or naturally rare) and by the Natural Heritage program as G3 Vulnerable – either rare throughout its range or found locally in a restricted range. Tricolored blackbirds nest in large lowland marshes with an abundance of tall emergent or shrubby vegetation. Nesting occurs in fresh-water marshes of cattails, tules, bulrushes and sedge, or in thickets of willows or other shrubs. The project area does not contain any marshes with expansive thickets of cattail, bulrush, willow, nettles or blackberries that could potentially provide adequate nesting habitat for this colonial nesting species. While the tricolored blackbird has been documented to occur between Prineville and Madras (Marshall et al. 2003) and they occasionally are posted as sightings near Powell Butte by local birders on the COBOL internet site, there are no known breeding locations of

this species on the Forest. Implementation of any alternative would have "No Impact" on the tricolored blackbird. Because no effects are anticipated, there are no cumulative effects.

Pygmy rabbits (*Brachylagus idahoensis*)

Pygmy rabbits typically occur in dense stands of big sagebrush growing in deep friable (easy to crumble) soils and its range is generally restricted to northern parts of the Great Basin (Csuti 1997, NatureServe 2008). Verts and Carraway (1998) indicate the species range is from Montana, Idaho and Oregon as far south as Utah, Nevada and California. A disjunct population occurs in se Washington. Though specimens had been collected historically from south of a line between Redmond and Baker City in Oregon, surveys conducted by Weiss and Verts in 1984 found no occupied sites north of a line between Millican, Paulina and Seneca. Verts and Carraway (1998) concluded that the geographic range of the species has shrunk considerably in historic times. Locally the species is only known to occur at a site near Pine Mountain (south of Highway 20). The species currently holds rankings in Oregon as Sensitive and by the Natural Heritage program as G5 globally secure, S2 Imperiled in Oregon. Suitable habitat for this species does not occur within the project area and the current species range does not include the area potentially affected by this project. Implementation of any alternative would have "No Impact" on the pygmy rabbit. Because no effects are anticipated, there are no cumulative effects.

Direct, Indirect and Cumulative Effects - TES species with Habitat Present or Known or Suspected Occupancy in the Project Area

Northern Bald Eagle (*Haliaeetus luecocephalus*), R6 Sensitive

The Bald eagle is found throughout Alaska, Canada, continental US and as far south as Baja California Sur, Mexico. The species has breeding territories across Oregon and is also found throughout the state outside of the breeding season. A detailed account of bald eagle habitat requirements can be found in the Pacific Bald Eagle Recovery Plan (USDI 1986). Bald eagle nesting territories are normally associated with lakes, reservoirs, or rivers. Nests are usually located in large conifers in uneven-aged, multi-storied stands with old-growth components (Anthony et al. 1982). Nest trees usually provide an unobstructed view of the associated body of water. Live, mature trees with deformed tops are often selected for nesting. East of the Cascade Mountains in Oregon, bald eagles prefer nesting in ponderosa pine trees that average 46 inches in diameter (range 21-76 inches) and tend to be larger than the surrounding trees (Anthony et al 1982).

The northern bald eagle was officially de-listed as a federal threatened species on August 8, 2007. The Federal Register (Vol. 72, No. 130/Monday July 30, 2007) stated the bald eagle has made a dramatic resurgence from the brink of extinction. The banning of DDT, coupled with cooperative conservation efforts of the Service, States, other Federal agencies, non-government organizations, and individuals, have all contributed to the recovery of our national symbol. While the bald eagle has been de-listed they are still protected under the Bald and Golden Eagle Protection Act of 1940. This law provides for the protection of bald eagles and golden eagles by prohibiting the take, possession, sale, purchase, barter, offer to sell, transport, export or import, of any bald or golden eagle, dead or alive, including any part, nest, or egg, unless allowed by permit (16 U.S.C. 668(a); 50 CFR 22). The U.S. Fish and Wildlife Service (2007) prepared Bald Eagle Management Guidelines to help landowners, land managers, and others to meet the intent of this Act. In addition, monitoring of selected bald eagle nest sites would continue to occur including sites on national forest system lands. The Land and Resource Management Plan (LRMP) also provides direction for the management of habitat through the designation of Bald Eagle Management Areas (BEMAs) and protection of known nest and roost sites.

Existing Condition: Table 138 displays the results of nesting surveys conducted in the project area by Frank Isaacs (Isaacs and Anthony 2008) and by district personnel over a period of 14 years. Nesting surveys were conducted which contributed to post de-listing monitoring data.

Table 138. Bald eagle territories and historical nesting status 2002-2015 within Ochoco Summit Trail System project area.

Name	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002
Shady Creek	-	-	1	1	1	1	oF	1	oF	O?	1	2	oF	O?
Yellowjacket	-	1	1	1	O?	1	- (new)							
Rock Creek	NS	NS	NS	NS	O?	-	NS	NS	NS	NS	1	2	2	oF
Wolf Creek	1	oF	1	2	2	2	O?	2	NS	2d	1	2	2d	2
Total Young	1	1	3	4	3	4	0	3	0	2	3	6	4	2

Compilation from Isaacs and Anthony 2002 to 2006 and survey results from 2007 to 2015

1 or 2 = # young produced, feathered - = status unknown
oF = site occupied, nest failed O? = occupied outcome unknown
NS = site not surveyed 2d = two downy young when last observed

Within the Ochoco Summit Trail System Project Area there are three designated BEMAs and two mapped bald eagle winter roost areas. The bald eagle observations that have been documented in the project area are associated with established nesting territories or roost sites.

Effects Common to All Alternatives: All action alternatives exclude roads in proximity to known nests and roosts from the designated OHV system of routes. None of the proposed trail system would occur within ½ mile of any known eagle nest or within any BEMA or mapped roost area.

Determination: The Deschutes and Ochoco National Forests completed a Joint Aquatic and Terrestrial Programmatic Biological Assessment (BA) for Federal Lands within the Deschutes and John Day River Basin Administered by the Deschutes and Ochoco National Forests in August 2006. At the time of that document's completion, the northern bald eagle was still federally listed as a threatened species. In subsequent BAs bald eagle PDCs were included until they were delisted. The current BA (April 2014) does not include PDCs for the bald eagle. The PDCs for the northern bald eagle from past BAs were reviewed in relation to the Ochoco Summit Trail System project as proposed and project design criteria were determined to be consistent. The project is also consistent with the National Bald Eagle Management Guidelines (USFWS 2007). Because there would be no removal of nest trees or potential nest trees, that all motorized routes are greater than ½ mile from the known nests, and that BEMAs would not be entered with new trail construction, the determination is "**No Impact**" to the bald eagle or their habitat. Because no effects are anticipated, there are no cumulative effects for any alternative.

Upland Sandpiper (*Bartramia longicauda*), R6 Sensitive

Upland sandpipers breed in prairie-grassland habitats from Alaska and Canada to N. Dakota and adjacent states. A small, disjunct relict population occurs in Oregon and Idaho. The species winters in papas of South America. Habitat for upland sandpiper is present in this project area due to the inclusion of Big Summit and Little Summit Prairies and their extensive open wetland areas. According to Marshall et al. 2003, Oregon's upland sandpiper population, probably the largest west of the Rocky Mountains, is close to extirpation, and that remnant breeding populations are limited to Bear and Logan Valleys in Grant County. However, some field guides show isolated or rare occurrences in South Central Oregon and northern California (Kaufman 2000, Sibley 2000). Breeding by this species at Big Summit Prairie was reported in 1919, and a single bird was observed in that area in 1987. Continental range has been decreasing over the last two centuries due to hunting in the late 1800's, and conversion of prairie habitat to farming and grazing (White 1983). Though populations east of the Rocky Mountains are stable or increasing, populations west of the Rockies are declining and its continued existence in the Northwest is precarious (Marshall et al. 2003). Marshall et al offered as possible reasons for the western population declines the following: encroachment of

pine into meadows, use of herbicides to control or eliminate forbs in nesting meadows, overgrazing in meadows especially during incubation and brood rearing, down-cutting of streams which impacts the water table and meadow systems and management practices on wintering grounds. The species currently holds rankings in Oregon as Sensitive and by the Oregon Natural Heritage Information Center as G5 globally secure, S1 critically imperiled in Oregon.

Existing Condition: Upland sandpipers have been recorded historically at Big Summit Prairie, but no records are known from the area since 1987. The expansive wetland complex of Big Summit Prairie is largely under private ownership, with only small amounts under management by the Bureau of Land Management. The majority of the prairie habitat in Big Summit Prairie is grazed seasonally by cattle. The majority of Little Summit Prairie is also under private ownership and is grazed seasonally by cattle. It is suspected that the historic breeding population reported in the area early in the 1900s is no longer present on the prairies of the Ochoco Mountains. Surveys conducted in 1993 did not result in any sightings, and there are no records of upland sandpipers in the sighting record database forest-wide.

Effects Common to All Alternatives: This alternative would result in no direct effects to the upland sandpipers or potential habitat for them because no new OHV trails, trailheads or staging areas would be developed within expansive prairie-grassland habitats in the project area. Crossings of any meadow areas would have a hardened surface or crossing structure to prevent impacts to wetland vegetation in accordance with design criteria outlined in Chapter 2 of this EIS. Mitigations for botanical resources should also provide protection to reproductive habitat for this species. There are no proposed trails or staging areas within 1 mile of documented populations of this species.

Determination: The selection of any alternative would have "**No Impact**" on the upland sandpipers. This determination is based on the absence of this species within the project area, and because no suitable habitat would be impacted by project activities. Because no effects are anticipated, there are no cumulative effects.

Bufflehead (*Bucephala albeola*), R6 Sensitive

The bufflehead is North America's smallest diving duck. It breeds from central Alaska through British Columbia to northern Washington, through south and west central Canada to west central Quebec. Isolated breeding populations occur in Oregon, California, Montana, Wyoming and north central US. It winters throughout Oregon but is an uncommon breeder in the central and southern Cascades (Marshall 2003). The bufflehead would use tree cavities or artificial nest boxes in trees close to water. Marshall (1996) stated that human disturbance from high recreation use at Cascade Lakes and a shortage of suitable nesting cavities due to forestry practices may be having an impact on their population status. The Montana Chapter of the Wildlife Society conducted a review of effects of recreation on Rocky Mountain wildlife species including waterfowl. Korschgen and Dahlgren (1992) reviewed 21 journal articles on human disturbance of waterfowl and compiled and reported that waterfowl are wary, seeking refuge from all forms of disturbance, particularly those associated with loud noise and rapid movement. Activities along shorelines such as fishing, bird watching, hiking, and traffic were noted as disturbances to waterfowl although to a lesser degree compared to rapid overwater movement and loud noise; sailing, windsurfing, rowing, or canoeing, wading, and swimming. Disturbance effects can include increased rate of nest desertion and/or reduced hatching rate, both of which can lead to a declining population. The Oregon breeding population is considered sensitive by the ODFW because of small size and limited nesting habitat (Marshall et al 2003). The species currently holds rankings in Oregon as Sensitive and by the Natural Heritage program as G5 globally secure, S2 Imperiled in Oregon.

Existing Condition: Buffleheads are not commonly seen on Ochoco National Forest. However, an occasional bufflehead is spotted during migration on small ponds and reservoirs on the Forest, including a fall migration sighting of a single bufflehead on a borrow pit pond within the Ochoco

Summit Trail System Project Area. Older forested stands adjacent to the lakes may provide snag habitat for this cavity nester, but most lakes of substantial size in the project area area have developed or dispersed campsites used during the summer months and fall hunting seasons. Thus, there is limited potential for lakes and ponds in this project area to provide suitable habitat for nesting bufflehead ducks. One bufflehead sighting was recorded in June of 1999 about 1 ½ miles east of the southeast corner of the proejct area, and a migrating bufflehead was observed on a borrow pit pond in the project area in November of 2007.

Effects - Alternative 1: This alternative would result in no direct effects to the bufflehead because no new OHV trails or closed roads would be opened or developed within the riparian zone of lakes or ponds in the project area. Because of the known recreational use of closed or unauthorized routes to otherwise protected lakes and ponds during the breeding season, it is assumed the selection of this alternative may result in some level of disturbance to nesting buffleheads, if present, along the riparian zones of these small lakes. The determination is "**May Impact Individuals or Habitat, But Would Not Likely Contribute to AaTrend Toward Federal Listing or Cause a Loss of Viability to the Population or Species"** of bufflehead**.**

Effects Common to All Action Alternatives: All action alternatives propose to reinforce existing closures on routes that access riparian zones of several small lakes or ponds. Overall, this would result in a reduction of motorized use within the riparian zone of these water bodies. However, all action alternatives also propose staging areas in locations with borrow pit ponds. These sites are accessed by open roads, are devoid of snags and subject to heavy recreational use and thus are not likely to provide nesting habitat for buffleheads. However, they may provide resting areas during migration. Motorized access to these ponds is generally snowed in during spring migration and seasonal restriction on the trail would also reduce disturbance during spring migration. However, the increase in use of these sites due to designation of a new trail system may reduce the capability of these ponds to provide secure stop-over sites during fall migration.

Determination: All action alternatives would reduce motorized use of several small ponds and reservoirs compared to the existing condition. However, the action alternatives may compound disturbance effects at Cottonwood Pit and Walton Sno-park ponds. Since use of these ponds by bufflehead is most likely to occur only during fall migration when the ponds are free of ice, the majority of the increased human use at these sites would occur outside of the period of time bufflehead are likely to use them as stop-over habitat. Since these ponds already have high levels of human use and they do not have suitable nesting sites, they are not likely to be occupied by bufflehead during the breeding season and would not affect reproduction. Therefore, implementation of any action alternative "**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**" of bufflehead.

Horned Grebe (*Podiceps auritus*), R6 Sensitive

Information on this species was obtained from the Association for Biodiversity Information (ABI) website Nature Serve, which can be viewed at: http://www.natureserve.org/explorer. In North America the horned-grebe breeds from central and southern Alaska and Canada south to Idaho, northern South Dakota, northern Iowa, and central Wisconsin, with the highest breeding densities in southwestern Manitoba. It winters in North America, mainly along the coast south to California, Texas, Florida (less commonly interior, from the Great Lakes south). Areas of highest winter density include northwestern Washington and the Gulf Coast near Pensacola (Florida); to a lesser degree, various national wildlife refuges along the Atlantic coast from South Carolina to southeastern Canada (Root 1988). In winter inland presence is dependent on ice-free water, usually near springs or moving water (Marshall et al, 2003).

This migratory species arrives in winter habitat in the West mainly in October, departs for northern breeding areas mostly by April, peak influx in south-central Canada breeding areas early May. This mostly non-gregarious species may aggregate at staging areas and resting areas during migration. Migrates day and night.

Its habitat includes marshes, ponds and lakes, occasionally along sluggish streams (breeding); bays, estuaries and seacoasts, and in migration commonly in inland freshwater habitats, especially lakes and rivers (nonbreeding) (AOU 1983). It nests on small and large lakes and ponds (about 0.1 ha or larger), in calm waters of marshes, along rivers and streams. It favors areas with much open water, and usually nests among tall vegetation in shallow water. Highest breeding densities occur in pothole marshes of aspen woodland.

Diet consists mainly of small fishes, crustaceans and aquatic insects, as well as amphibians and leeches. Aquatic insects predominate in summer, crustaceans and fishes in winter. It forages by diving in shallow water, often near emergent vegetation, and also picks food from water surface or from vegetation (Terres 1980, Johnsgard 1987).

Existing Condition: There are no known records of this species on Ochoco National Forest. It is listed in Common Birds of the Ochoco Region (USFS, 2001) as uncommon fall and spring (migration) and rare in winter and summer. Marshall et al (2003) do not show breeding bird survey data for this species in Central Oregon other than in southwestern Deschutes County. They do note that birds migrate thorough Deschutes, Crook and Jefferson Counties, arriving in March and early April in the spring, and passing back through in late October. Most depart from eastern Oregon by early December. Within the Ochoco Summit Trail System Project analysis area there is a limited amount of lakeshore areas with abundant emergent vegetation that could function as nesting habitat and there are no known nesting records within or near the project area.

Effects - Alternative 1: This alternative would result in no direct effects to the horned grebe for several reasons. First, no new OHV trails or closed roads would be opened or developed within the riparian zone of lakes or ponds in the project area. Second, forgoing discouragement of motorized recreational use of closed or unauthorized routes to otherwise protected lakes and ponds would not likely result in disturbance to this species since they are not expected to occur within the analysis area. The determination is "**No Impact"** to horned grebe for Alternative 1**.**

Effects Common to All Action Alternatives: All action alternatives propose to reinforce existing closures on routes that access riparian zones of several small lakes or ponds. Overall, this would result in a reduction of motorized use within the riparian zone of these water bodies. On the other hand, all action alternatives also propose staging areas in locations with borrow pit ponds. There is potential for increased in use of these sites due to the improvement of facilities outside of the OHV season of use, which could indirectly affect the capability of these ponds to provide secure stop-over sites during fall migration. Because this species in not known or expected to occur on Ochoco National Forest, and because the timing of migration is outside of the season of use for this OHV trail system, there would be no direct effect to this species from designation or use of the trail system or staging areas. Given that this species is not known to occur on the Forest, it is not expected that any potential increase in human use at these sites outside of the OHV season of use would actually translate into disturbance to this species.

Determination: All action alternatives would reduce motorized use of several small ponds and reservoirs compared to the existing condition. However, the action alternatives may increase potential level of human use at Cottonwood Pit and Walton Sno-park ponds. Since use of these ponds by horned grebes is only likely to occur only during fall migration when the ponds are free of ice, the majority of the increased human use at these sites would be associated with fall hunting seasons. Since these ponds already have high levels of human use and they are not expected to be used by

horned grebes, implementation of any action alternative would have **"No Impact"** on horned grebes. Because no effects are anticipated, there are no cumulative effects.

American Peregrine Falcon (Falco pergrinus anatum), R6 Sensitive

This species breeds on every continent except Antarctica. The subspecies anatum breeds from the northern edge of boreal forests south into Mexico (except along the northern coastal region from the Gulf of Alaska to Washington). In Oregon peregrine falcons occur as resident and migratory populations. They nest on cliffs greater than 75 feet in height and within one mile of some form of water (Pagel 1992). Nesting occurs in xeric areas of eastern Oregon, marine habitats of western Oregon, montane habitats to 6,000 feet elevation, small riparian corridors statewide, and more recently urban habitats of the lower Willamette and Columbia Rivers. Riparian corridors are used for travel and as hunting areas (90-95 percent of all prey items are birds that may come from these systems, Pagel 1992). The range-wide population has been increasing. It was listed under the ESA in 1969, with a dramatic resurgence in the Pacific Northwest population following the 1972 ban on the use of DDT and later bans on several other persistent insecticides. The American peregrine falcon was federally delisted in 1999, but remains on the Regional Forester's Sensitive Species List as Sensitive in both Oregon and Washington (USDA 2008).

Existing Condition: There are no known peregrine falcon eyries on Ochoco National Forest. Within the Ochoco Summit project area there is a limited amount of suitable cliff habitat that could function as nesting habitat. Cliffs in the area are considered to have low potential to support nesting peregrine falcons. In the project area general observations of peregrine falcons were recorded near Duncan Butte in May of 1978, near Buck Point in July of 2002 and at Deep Creek in 2003. Additional records occurred on private land between 1986 and 1995 approximately 3 miles south of the project area's southeast corner, one in July and three in January.

Effects Common to All Alternatives: Cliff habitat and potential foraging areas would not be modified by any alternative proposed by this project. There are no proposed trails or staging areas within 1 mile of any know nest area.

Determination: Implementation of any alternative would have "**No Impact**" on the peregrine falcon. Because no effects are anticipated, there are no cumulative effects for any alternative.

Lewis' Woodpecker (*Melanerpes lewis*), R6 Sensitive

Lewis' woodpecker breeds from southern British Columbia, southwest Alberta, Montana and South Dakota and Nebraska to central California, Colorado, Arizona and New Mexico. It winters in milder portion of this range from Oregon to Mexico and w Texas. They breed in low numbers in open habitats along river and stream valleys in Eastern Oregon. The species is most common in open habitats (e.g. burns) and uses cottonwood galleries in the Blue Mountains (Marshall et al. 2003). This woodpecker is a medium-sized bird that relies on flycatching during the spring and summer and stored mast and fruits in the fall. Wisdom (2000) reported that burned ponderosa pine forest created by stand-replacing fires provide highly productive habitats as compared to unburned pine. They are not considered strong cavity excavators but require large snags in an advanced stage of decay that are easier to excavate. Lewis' woodpeckers would also use old cavities created by other woodpeckers. Forty-two percent of the nest trees on the eastern edge of the Mt. Hood National Forest were in ponderosa pine (typically snags) and 43 percent were in living and declining Oregon white oak. The mean diameter of nest trees was 26 inches and mean nest tree height was 41 feet (Marshall et al. 2003). Haggard and Gaines (2001) determined that the Lewis' woodpecker was most abundant in low snag density stands within a stand replacement fire study conducted on the Wenatchee National Forest in Washington. Marshall et al. (2003) reports the species is declining throughout its range possibly due to loss of suitable habitat, competition for nest holes, and the effects of pesticides. In Oregon drastic declines since the 1960's are attributed to loss of lowland oak habitat and competition

from European starlings. The species currently holds rankings in Oregon as Sensitive and by the Oregon Natural Heritage Information Center as G5 globally secure, S4 not rare and apparently secure in Oregon.

Existing Condition: Existing district wildlife sighting records show a few observations of Lewis's woodpeckers in or near the project area. Woodpecker surveys conducted between 1992 and 1995 (targeting pileated, white-headed, black-backed and three-toed) did not produce any records for Lewis' woodpecker. Surveys conducted in 2008 (targeting white-headed and Lewis' woodpeckers) produced records for six other species of woodpeckers and sapsuckers, but no Lewis' woodpeckers. Records (2003 to 2007) from the local chapter of the Audubon Society (formerly East Cascade Bird Conservancy) had the majority of its Lewis' woodpecker records at lower elevations (off the Forest), during migration. However, one record included four woodpeckers in late August within the project area. Of the three records of Lewis's woodpeckers in the project area, two are more than 5 miles from any proposed trail or staging area, while the other is within 1 mile of a class III trail and about 1 mile from a class III staging area in an active gravel pit.

Effects Common To All Alternatives: Hamann et al. (1999) and Gaines et al. (2003) conducted literature reviews of recreational associated effects on wildlife including studies on woodpeckers and other cavity nesting birds. Their reviews of existing published literature showed that recreational trail-associated disturbances did not present a problem to woodpeckers and cavity nesters as a group. Hamann et al. (1999) also stated that recreational activity is unlikely to be focused around nest sites of these species and by design woodpeckers and other cavity users are relatively more secure from nest predation than any other group of forest birds. Therefore at the present, recreational disturbance is not known to be a major limiting factor.

Altman in the Landbird Conservation Strategies for the Northern Rocky Mountains (2000) lists the Lewis' woodpecker as the Focal Species for both 1) the Burned Old Forest conservation focus in the Dry Forest habitat type and 2) the Large Snags in Riparian Woodland conservation focus in the Riparian habitat type. He also lists them as a species to benefit from the presence of large patches of old dry forests. Recommendations include road closures or fuel wood restrictions to minimize the loss of large ponderosa pine snags. No snags would be intentionally targeted for felling with the exception of hazard trees or snags near trails or staging areas. Project design and layout would minimize the loss of existing large snags and this would be consistent with the recommendations by Altman (2000).

Determination: Current literature reviews state that the woodpecker guild is not known to be disturbed from recreational trail users and Project Design Features have been incorporated to minimize the incidental removal of large diameter trees and snags. Because effects are limited to incidental loss of snag habitat on a very small proportion of the landscape in a scattered arrangement, proposed activities are not likely to substantially reduce habitat within individual home ranges or at the landscape scale. Refer to the discussion on effects to snag habitat in the section on Primary Cavity Excavators, under Management Indicator Species (MIS). The selection of any alternative would lead to a determination of "**No Impact**" on the Lewis' woodpecker. Because no effects are anticipated, there are no cumulative effects for any alternative.

White-Headed Woodpecker (*Picoides albolarvatus*), R6 Sensitive

The white-headed woodpecker, a resident of montane forests, is found from southern interior British Columbia south through Central Washington, Northern Idaho, Eastern Oregon and Southwest Oregon, Northern and Central California, and the eastern edge of Central Nevada to the mountains of Southern California (Marshall et al. 2003). They are an uncommon permanent resident in forests of the Ochoco, Blue and Wallowa Mountains. They are medium sized birds and unique because of striking plumage with a mostly white head with males having a red patch on the nape. The presence of old growth pine is thought to be important to white-headed woodpeckers. Larger diameter pines

provide bark crevices for the invertebrate prey of white-headed woodpeckers and are good cone producers. During the winter months they rely on seeds from ponderosa pine and sugar pine. Old-growths stands also have greater densities of the large-diameter snags that white-headed woodpeckers appear to select for nesting (Frenzel 2002). He also reported that the presence of sugar pine may be important at high elevation sites as an alternate food source. They usually excavate nest cavities in snags, but other recorded substrates include stumps, leaning logs, and the dead tops of live trees. Frenzel's study area on the Deschutes and Winema National Forests (2002) determined that nest trees ranged from 23.6 to 118.1 cm (9-46 inches) with an average diameter of 27 inches and 89 percent of the nest trees were in ponderosa pine. He also measured canopy closure at the nest tree which ranged from 0 percent to 57 percent with a mean of 13 percent.

Frenzel (2002) concluded population recruitment for this woodpecker was insufficient to offset mortality in his study areas on the Deschutes and Winema National Forests. He also reported that shrub growth, increased understory tree densities from fire suppression, may be factors affecting levels of mammalian nest predation and vulnerability of adults to avian predation. Marshall et al. (2003) stated that the long-term stability of this woodpecker in Oregon and Washington appears to rest with reversing the declining health of ponderosa pine forest. The species currently holds rankings in Oregon as Sensitive and by the Natural Heritage program as G5 globally secure, S3 rare or uncommon but not imperiled in Oregon.

Existing Condition: Existing district wildlife sighting records show numerous observations of white-headed woodpeckers in or near the project area between 1989 and 2010. Woodpecker surveys conducted between 1992 and 1995 (targeting pileated, white-headed, black-backed and three-toed) produced many records for white-headed woodpecker, including multiple records within the project area. Surveys conducted in 2008 (targeting white-headed and Lewis' woodpeckers) produced records for six species of woodpeckers and sapsuckers, including white-headed woodpeckers within the project area (Polie Creek, Marks Creek, Ochoco Creek, Rush Creek). Survey efforts in spring/summer 2010 have recorded white-headed woodpecker responses near Polie Creek and Little Summit Prairie (both within the project area). In addition, records from local Audubon Society members (formerly East Cascade Bird Conservancy) from 2003 to 2007 described numerous sightings of white-headed woodpeckers, including nine in the project area from June to October in 2004 through 2006.

Effects Common to All Alternatives: Hamann et al. (1999) and Gaines et al. (2003) conducted literature reviews of recreational associated effects on wildlife including studies on woodpeckers and other cavity nesting birds. Their reviews of existing published literature showed that recreational trail-associated disturbances did not present a problem to woodpeckers and cavity nesters as a group. Hamann et al. (1999) also stated that recreational activity is unlikely to be focused around nest sites of these species and by design woodpeckers and other cavity users are relatively more secure from nest predation than any other group of forest birds. Therefore at the present, recreational disturbance is not known to be a major limiting factor.

Altman in the Landbird Conservation Strategies for the Northern Rocky Mountains (2000) lists the white-headed woodpecker as the Focal Species for the Large Patches of Old Forest conservation focus in the Dry Forest habitat type. He also lists them as a species to benefit from the presence of grassy edges and openings in dry forest. Recommendations include various measures to minimize the loss of snags, particularly soft snags, and high cut stumps for hazard tree removal. No snags would be intentionally targeted for felling with the exception of hazard trees or snags near trails or staging areas. Project design and layout would minimize the loss of existing large snags and high stumping in suitable white-headed woodpecker habitat types will be included in the design elements for this project, consistent with the recommendations by Altman (2000).

Determination: Current literature reviews state that the woodpecker guild is not known to be disturbed from recreational trail users and Project Design Features have been incorporated to minimize the incidental removal of large diameter trees and snags. Because effects are limited to incidental loss of snag habitat on a very small proportion of the landscape in a scattered arrangement, proposed activities are not likely to substantially reduce habitat within individual home ranges or at the landscape scale. Refer to the discussion on effects to snag habitat in the section on Primary Cavity Excavators, under Management Indicator Species (MIS). These measures incorporated into any alternative would have "No Impact" on the white-headed woodpecker. Because no effects were identified, there would be no cumulative effects for any alternative.

Greater Sage-Grouse (*Centrocercus urophasianus phaeios*), R6 Sensitive

Greater sage grouse are found in foothills, plains, and mountain slopes where sagebrush is present and the habitat contains a mixture of sagebrush and meadows in close proximity. Though the historic range for the species was from south central British Columbia to northern Arizona and New Mexico, to Nebraska and Oklahoma, the range has contracted within all states and provinces currently occupied. This species is a current resident in the western states (southeast Oregon, southern Idaho, Nevada, Montana and Wyoming). In Oregon sage-grouse occur in Central and Southeastern Oregon in the Western and Northern portions of the Great Basin (USFWS, 2010). Scattered or isolated populations also occur in Colorado, Utah, central Washington, eastern California, south central Alberta, southwestern Saskatchewan, southwestern North Dakota and northwestern South Dakota. This species aggregates on breeding sites (leks) in the spring which are open sites with sparse cover which could conceal a predator. After breeding the females nest in stands of tall sagebrush with spreading (umbrella shaped) crowns and abundant bunchgrass cover. After hatching the females lead their chicks to riparian areas and other sites where succulent forbs and invertebrate food resources are abundant. These birds eat sagebrush leaves during the winter and they tend to select the more palatable species such as Wyoming and mountain Big Sagebrush, though they may also be found in Basin Big sagebrush among other species. Winter habitat containing palatable sagebrush probably is the most limited seasonal habitat in some areas (NatureServe 2008). A key component of sage-grouse habitat is a wide open sage-steppe setting largely free of trees or other vertical structures that could serve as perches for birds of prey. Population declines have occurred for this species throughout its range. In March 2010, the USFWS determined that protection for the sage-grouse under ESA was warranted (range-wide), but precluded from listing action due to higher listing priorities. The finding also stated that the Western subspecies was not warranted to be listed separately, but was included in the range-wide listing. On September 22, 2015 the USFWS determined that greater sage-grouse do not warrant protection under the Endangered Species Act. Therefore they are no longer a Candidate Species for federal listing under ESA.

Existing Condition: While this habitat type and sage grouse are known to occur on the Ochoco National Forest, this habitat type does not occur in large enough patches to provide high quality nesting and brood rearing habitat within the project area. Numerous records exist for sage-grouse sightings within 1 to 6 miles of the southeast boundary of the project area. These were all general sightings and most occurred between July and October. However, two springtime records occurred, one outside the project area area by about 4 miles and one on the Forest outside the project area by about 3 miles. Core area has been mapped along the southeast corner of the project area (ODFW 2011).

Effects Common to All Alternatives: Some relatively small patches of potentially suitable nesting or brood rearing habitat occur in proximity to proposed trails. However, these sagebrush habitat patches are not likely to be utilized by nesting sage-grouse hens due to the presence of raptor perches (small patches or intermixed scab/stringer habitat) and distance from known leks (breeding sites). There are no proposed trails or staging areas within 4 miles of sighting locations. No trails are proposed within the core area or within four miles of any known lek (breeding site).

Determination: The Deschutes and Ochoco National Forests completed a Joint Aquatic and Terrestrial Programmatic Biological Assessment for Federal Lands within the Deschutes and John Day River Basins Administered by the Deschutes and Ochoco National Forests in August 2006. At the time of that document's completion, the greater sage grouse was under review for federal listing. The current BA (April 2014) does not include PDCs for the sage-grouse. The PDCs for the sage grouse in the previous BAs were reviewed in relation to the Ochoco Summit Trail System project and the project was determined to be consistent. No trails or staging areas are proposed within proximity to any known occupied habitat or within mapped core or low density habitat (ODFW, 2011); or Priority Area of Conservation (USFWS, 2013); or Preliminary General Habitat (PGH) or Preliminary Priority Habitat (PPH), or Sagebrush Focal Area or Sage-grouse Strategic Area (BLM, 2015). For these reasons, implementation of any alternative would have "**No Impact"** on the greater sage-grouse. Because no effects are anticipated, there are no cumulative effects for any alternative.

North American Wolverine (*Gulo gulo*), R6 Sensitive

The wolverine has a Holarctic distribution. In North America the historic range included all of Alaska and Canada and extended south through western mountains to California, Colorado and Utah, as well as in the mid-west and east to Indiana and Pennsylvania. The current range south of Canada is restricted to isolated wilderness areas. Though it was thought extirpated in Oregon (Bailey 1936), a few individuals have been killed (confirmed records) and many unconfirmed sightings reported over the past five decades. The wolverine is the largest terrestrial member of the mustelid family with males weighing 26 to 40 pounds and females 17 to 26 pounds. Wolverines are opportunistic feeders consuming a variety of foods depending on availability. There is no evidence hunting by wolverines is limited by habitat structure. Primarily a scavenger rather than a hunter, the wolverine forages where carrion can be found (Ruggiero 1994). In addition to carrion they would also prey on small animals and birds and eat fruits, berries, and insects. Copeland et al. (2007) reported little seasonal movement (400 meter elevational band) among collared wolverines in Idaho and the modest shift was likely due to prey availability in the form of ungulate carrion at lower elevation and upslope movement to locate rodents at higher elevations in the summer.

Wolverines occupy a wide variety of habitats from the arctic tundra to coniferous forest. The most common habitats are those that contain a high diversity of microhabitats and high prey populations. Copeland (2007) described wolverine habitat in the contiguous United States as consisting of small, isolated "islands" of high-elevation, alpine habitats containing sufficient depth of snow during the denning period, separated from each other by low valleys of unsuitable habitats. Wolverines occupy habitat in a high elevation band from 6,888 feet to 8,528 feet in the mountains of the lower 48 states (Federal Register/ Vol. 73, No. 48/ Tuesday, March 11, 2008). The intervening valleys in this area range from 3,198 feet to 4,920 feet and are unsuitable for long-term wolverine habitat because they do not have the snow conditions or other habitat features required by wolverines (Aubry et al. 2007 in Federal Register/ Vol. 73, No. 48/ Tuesday, March 11, 2008). High elevation alpine wilderness areas appear to be preferred in summer, which tends to effectively separate most wolverine and human interactions. Copeland et al. (2007) reported that adult males tend to travel more widely than females and as such, they are more likely found in lower, coniferous-dominated habitats simply by chance. The essential component of wolverine habitat may be isolation and the total absence of disturbance by humans (Ruggiero 1994). However, Copeland et al. (2007) reported that unmaintained winter roads used for snowmobile access to trapping sites in the study area were frequently used for travel by wolverines.

The most critical and limiting habitat for wolverines seems to be acceptable natal denning habitat. Magoun and Copeland (1998) described two types of dens used by wolverines: natal and maternal. Natal dens are used during parturition and occur more commonly in subalpine cirque basins associated with boulder talus slopes. Maternal dens are used subsequently to natal dens and before weaning occurs. They consist of a complex of dens associated with boulders or fallen trees. Magoun

and Copeland (1998) believe that a critical feature of wolverine denning habitat is the dependability of deep snow to persist through the denning period of February through May with at least one meter of snow depth. Ruggiero (1994) described natal dens having been found in snow tunnels, hollow trees and even caves in the ground. Ruggierro (1994) also reported that in forested habitats the structural diversity provided by large snags, fallen logs, and stumps would likely provide natal den sites. Aubry et al. (2007) reported that virtually all of the wolverine records located in the Pacific states were from within or near alpine areas. They also reported that spring snow cover was the only habitat layer in their study that fully accounted for the distribution of historical wolverine records in the western mountains.

Home ranges for adult wolverines tend to be large ranging from 38.5 square miles to 348 square miles (Banci 1994 in Federal Register Doc. 03-26475). Copeland (1996) radio collared wolverines in Idaho and reported annual home ranges of resident adult females averaged 148 square miles and an average of 588 square miles for resident adult males. Aubry et al. (2007) compiled verifiable and documented records of wolverine occurrences and suggest that the historical distribution of wolverines in the Cascade Mountain and Sierra Nevada was disjunct, contradicting previous interpretations. Current records (1995-2005) are limited to north-central Washington, northern and central Idaho, western Montana, and northwestern Wyoming (Aubry et al. 2007). A recent observation with photographs indicates wolverines are still present in California (Zielinski, pers. comm. 2008). Aubrey et al. (2007) found no current records in Oregon despite concerted efforts to obtain verifiable evidence of wolverine occurrence using remote cameras, bait stations, and helicopter surveys in many areas of the Pacific states. However, five verifiable records of wolverine presence in Oregon were documented from 1961 to 1994 (Aubry et al. 2007). Recently confirmed sightings were recorded in the Eagle Cap Wilderness.

Wolverine may be impacted by management practices that influence subalpine and alpine communities, particularly those that reduce the presence and opportunity for carrion availability (Copeland et al. 2007). Resource extraction (including timber harvesting), backcountry skiing and snowmobiling, roads and other forms of human disturbance merit careful consideration by those concerned about wolverine conservation (Ruggiero et al. 2007) Researchers in British Columbia found a consistent negative association between wolverine occurrence and areas where helicopter and backcountry skiing occur. However, the causal factors associated with these patterns are not well understood (Copeland et al. 2007). Squires et al. (2007) found that trapping was the primary factor explaining decreased survival in western Montana. He also determined that harvest pressure was capable of reducing isolated populations beyond sustainable levels despite a regulated harvest within a state-wide quota system.

In December of 2010 the USFWS found that the wolverine was warranted for federal listing under the Endangered Species Act, but was precluded from listing action due to higher listing priorities. On August 13, 2014, the USFWS withdrew its proposal to list the wolverine under the Endangered Species Act (ESA). Therefore they are no longer a Candidate Species for federal listing under ESA.

<u>Existing Conditions:</u> District records list multiple wolverine sightings near the west end of the project area between 1969 and 1992. There are also multiple records near the northeast corner of the project area between 1975 and 1997. Between these clusters of sighting were two records along the North Fork of the Crooked River in the 1980s. Potentially suitable natal denning habitat may be found in the Bridge Creek Wilderness Area, Lookout Mountain Recreation Area and Rock Creek/Cottonwood Creek area, as well as on the talus areas on north to northeast facing slopes below Mt Pisgah, Peterson Point, the rim above Keeton and Fry Creeks, Buck Point and the rim between Buck Point and Rock Creek. This species is included in the current Joint Aquatic and Terrestrial Programmatic Biological Assessment (USFS, 2014) with habitat suitability indicated as grand fir and talus PAGs, with a north aspect (0 to 22.5 degrees and 337.5 to 360 degrees, above 5,500 feet in elevation. According to this model, potential habitat would occur only on north facing slopes in small

disjunct areas on the north side and near the top of Ochoco Butte and in Bridge Creek Wilderness. It is unlikely that denning habitat would be found in remainder of the project area because of open roads, moderately high recreational use, and the lack of persistent snow cover in subalpine areas where denning might occur.

Effects – Alternative 1: This alternative would result in no direct effects to the wolverine because no new OHV trails or closed roads would be opened or developed which access potential denning habitat in the project area. However, because of the known recreational use of closed or unauthorized routes to otherwise protected talus slopes, remote high elevation areas and northeast facing basins, it is assumed the selection of this alternative may result in some level of disturbance to wolverine, if they are present, in these areas. The determination is "**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**" to wolverine.

Effects Common to All Action Alternatives: The selection of any action alternative would have no effect on potential wolverine denning in the project area. The most suitable potential denning habitat is found in wilderness, roadless, or unroaded areas, none of which are in proximity to any proposed trails or areas. High road densities, and year-round recreational use, including the designated snowmobile and Nordic ski trails, across the project area would likely preclude wolverine use of the Ochoco Summit Trail System project area as denning habitat. However, there are occasional reports of wolverine in the project area, so it is possible that increased motorized route density (action alternatives) could result in disturbance to individual wolverine passing through the area. The additional impact from proposed trails would likely be negligible compared to the existing impacts from open roads and designated over-the-snow routes.

Determination: Although at the present time there are no recent confirmed records of wolverine presence in the project area there are numerous unconfirmed historic records for this species. Alternatives 2, 4, and 5 propose a single 50" wide trail to connect between existing open roads on the south facing slope near the top of Ochoco Butte, near but not within potential habitat modeled as describe above. As this animal is known to be affected by motorized use, particularly over the snow, and this project would not prohibit use of proposed routes by over the snow vehicles, the action alternatives "**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**" for wolverine.

Townsend's Big-Eared Bat (*Plecotus townsendii*), R6 Sensitive

Townsend big-eared bat occurs from southern British Columbia to Baja California Norte and Sonora east to central South Dakota, eastern Colorado, western Oklahoma and Texas, and the central highlands and Isthmus of Tehuantepec, Mexico. Disjunct populations occur in the limestone cave regions of eastern USA (Verts and Carraway1998). Townsend big-eared bat maternity and hibernation colonies are typically in caves and mine tunnels. They roost almost exclusively in cavity roosts, both in human-made structures (that is, buildings, bridges, and mines) and caves (Christy and West 1993). They are extremely sensitive to disturbance while roosting, because they hang directly from the ceiling of the roost and do not go into torpor (temporary hibernation) during the day in summer colonies (Barbour and Davis 1969 and Dalquist 1948 cited in Christy and West 1993). Perkins and Levesque (1987) estimated the Oregon population at 2,300-2,600 bats and Gaines (1997 cited in NatureServe 2008) estimated 3,000-5,000 individuals in Oregon. NatureServe (2009) gives them a status of S2, Imperiled in the state of Oregon. The greatest threat to the species is vandalism and disturbance by humans. Disturbance of a nursery colony or of a hibernating group is likely to cause the bats to abandon the site and move to an alternate roost. An additional threat is blockage of cave/mine entrances through collapse or human activities (NatureServe 2009). Another potential threat to this species is introduction of the fungus responsible for causing white-nose syndrome to hibernating bats.

Existing Condition: Though there are mines on Ochoco National Forest and there are documented reports of Townsend's big-eared bats occurring on the district, these are not located in proximity to any proposed trail or staging area. There is one known location for Townsend's big-eared bat in the project area. It was recorded in 1998 and has been managed for use by bats and is known to have continued occupancy by bats, though species determinations have not been confirmed in recent years. Another record, about 1 ½ miles west of the project area area, came from a bat survey conducted in June of 1997.

Effects Common To All Alternatives: Cave, mine and existing wooden structures (potential roost sites) and potential foraging areas would not be modified by any alternative proposed by this project. There are no proposed trails or staging areas within 5 miles of the known roost location.

Determination: The selection and implementation of any alternative would have "**No Impact**" on the Townsend's big-eared bat. Because no effects are anticipated, there are no cumulative effects for any alternative.

Silver-Bordered Fritillary (*Boloria selene*), R6 Sensitive

The silver-bordered fritillary butterfly has a Holarctic range; in North America extending from northern Canada southward into the United States and as far south as New Mexico (NatureServe 2008). While the species is common and widespread in northeastern Washington and northern Idaho, colonies are extremely local and isolated southward, and are particularly vulnerable to local extinctions. Only two primary colonies are found in Oregon, one at Big Summit Prairie on the Ochoco National Forest and one in the Strawberry Mountains Wilderness on the Malheur National Forest (Miller and Hammond 2007). Suitable habitat for this species is described as mostly wet meadows, marshes, bogs, and more open parts of shrubbier wetlands (NatureServe 2008, Miller and Hammond 2007). This species is dependent on the maintenance of open and wet meadow habitats (Miller and Hammond 2007). Food sources for the adults include nectar sources such as composite flowers, including goldenrod and black-eyed susans (Opler et al. 2006). Eggs are laid singly near host plants and caterpillar hosts are violets including Viola glabella and Viola nephrophylla (Opler et al. 2006). NatureServe (2008) lists this species as G5, demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery. In Oregon its ranking is listed as S2 Imperiled.

Existing Conditions: Surveys for this fritillary species were conducted on the Lookout Mountain Ranger District (now part of Paulina Ranger District) in suitable habitat surrounding Big Summit Prairie between 1995 and 1998. Several sub-populations of this species were confirmed and mapped. Systematic surveys were also done in 2015. During that effort 21 sites with suitable habitat were surveyed and 59 species of butterflies were detected. Of the 21 sites surveyed, silver-bordered fritillaries were confirmed on eight sites (Ross, 2015). Three of these were coincident with the sites determined to be occupied in the surveys conducted in the 1990's. The remaining sites were reviewed and found to be distant for all routes and areas proposed under any action alternative. Within the project area suitable habitat for this species may occur in the wet meadow complexes where tributary streams enter wet meadow or marsh areas. Riparian habitat is also present in the project area on private lands along Little Summit Creek and North Fork of the Crooked River. However, it is currently unknown if suitable habitat conditions exist for this species on private lands.

Effects Common to All Alternatives: There are no proposals to develop new motorized trails or include user-created trails that access wet meadow habitat that may be providing habitat for this species of butterfly. Crossings of any meadow areas would have a hardened surface or crossing structure to prevent impacts to wetland vegetation in accordance with design criteria outlined in Chapter 2 of this document. Mitigations for botanical resources should also provide protection to reproductive habitat for this species. There are no proposed trails or staging areas within 1 mile of documented populations of this species.

Determination: The selection of any alternative would have **"No Impact"** on the Silver-bordered Fritillary butterfly. This determination is based on the premise that no suitable habitat would be negatively impacted by project activities. Because no effects are anticipated, there are no cumulative effects for any alternative.

Johnson's Hairstreak (*Callophrys johnsoni*), R6 Sensitive

The Johnson hairstreak butterfly is found from southwest British Columbia southward into the Coast Ranges to San Francisco in California; south in the Cascades and Sierra Nevada to Yosemite and also in the Blue Mountains of eastern Oregon. Suitable habitat for this species is described as coniferous forests, especially old growth (Opler et al. 2006) and old growth coniferous forests with red firs, western hemlocks, or gray pines on which its parasitic (mistletoe) hosts grows (NatureServe 2008). Johnson's hairstreak is believed to feed generally on all dwarf mistletoe species throughout its range, and to perhaps specialize on locally available dwarf mistletoes in specific localities (Miller per comm. 2008 cited by Schmitt and Spiegel 2008). Miller and Hammond (2007) describe suitable habitat as almost identical to that of the northern spotted owl except that the butterfly does not occur south of central California. The caterpillar food plant is western dwarf mistletoe. Adults feed on nectar from flowering plants in the composite family. Adults find nectar on low growing plants such as Oregon grape, ceanothus and pussypaws (NatureServe 2008; Pyle, 1981; and USDA, NRCS 2008). Miller and Hammond (2007) described management practices to benefit this species need to promote the maintenance of mature and old-growth conifers at middle to low elevations on the west slope of the Cascade Mountains and Coast Range. In Oregon its ranking is listed as S2, Imperiled, while globally its status is G3, very rare or local throughout its range or found locally in a restricted range (NatureServe 2008).

Existing Conditions: Opler et al. (2006) show Johnson hairstreak documentation for western and central Oregon plus the Blue Mountains in northeastern Oregon. The species is suspected to occur on the Ochoco National Forest, but currently there is no confirmed documentation for this species anywhere on Ochoco National Forest. Formal surveys have not been conducted. The species is closely associated with dwarf mistletoe which is present in the project area. However, an association of Johnson's hairstreak with the species of mistletoe present on this Forest has not been confirmed. Schmitt and Spiegel (2008) state that in the absence of recent large scale disturbance, dwarf mistletoe infestation levels can occur in early, mid, and late successional stands. Though the project area includes several small to moderately sized recent fire events, the project area has not experienced a large scale stand replacement event associated with an uncharacteristic wildfire. Therefore, mistletoe infection is assumed to be present in all stand age classes, which could serve as a host for the caterpillar, if it occurs in association with the mistletoe present on this Forest. In 2010 the Interagency Special Status/Sensitive Species Program (ISSSSP) funded widespread field surveys in Oregon and Washington to document presence of Johnson's Hairstreak butterfly (*Callophrys johnsoni*) at locations where species presence was currently unknown but likely, based on habitat modeling and specific survey site selection criteria. The resulting report (Davis and Weaver, 2010) discloses that no historic record for this species back to 1891 has been found in Crook or Wheeler County and that the entire Ochoco Summit Trail System project area has a low probability of occurrence for this species.

Direct and Indirect Effects - Alternative 1: The selection of this alternative would not result in any change in vegetative conditions of conifer stands in the project area because no new trail construction would be completed. The species may occur in the area, but no management action is planned that would impact the species. Thus, the determination is **"No Impact"** to the Johnson's hairstreak butterfly and their habitat. Because no effects are anticipated, there are no cumulative effects for this alternative.

Effects Common to All Action Alternatives: The selection of any action alternative would result in the designation of user created trails, roads converted to trails and inclusion of new trail construction. Trail widths needed for new construction would be approximately 50 inches wide for Class I machines (ATVs), approximately 80 inches wide for Class II machines (jeeps and buggies), and approximately 24 inches for Class III (motorcycles). New trails would be designed to minimize tree removal but may require trees up to six to eight inches in diameter to be cut some of which may be infected with mistletoe. Very little tree removal would be required at staging areas and trailheads. However, some trees with mistletoe infection could be identified as hazard trees at these areas. Mistletoe infection, however, is considered to be widespread throughout all plant associations and size classes over much of the 301,580-acre project area. Mistletoe infection would remain widespread throughout the project area if any of the action alternatives were selected for implementation. The incidental removal of mistletoe-infected trees during construction or maintenance would have a negligible effect on mistletoe in the project area, and thus would have very little effect on reproductive habitat for this species. Likewise, due to the relatively small proportion of the area physically impacted during construction, maintenance, and use of the trail system (refer to the Botany section), the abundance of flowering plants to serve as foraging sites for adults would not be substantially changed by the alternatives.

Determination: This species has not been documented to occur on Ochoco National Forest and formal surveys have not been conducted within the project area. Because the host species (mistletoe) are present, this butterfly may also be present. Due to the minimal scale of mistletoe removal relative to the extensive scale of mistletoe infection, the abundance and distribution of mistletoe host brooms (reproductive habitat for this butterfly) will not be substantially changed at the landscape scale under any action alternative. Likewise, the abundance of flowering plants that could serve as foraging sites for adults would be subject to a negligible reduction. Implementation of any action alternative "**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"** for the Johnson's hairstreak. This conclusion is based on the limited scope of this project, negligible impacts on suitable habitat from staging areas and trailheads, and the narrow trail width needed for trail construction compared to the size of the project area and the current magnitude of mistletoe infection.

Western Bumblebee (Bombus occidentalis), R6 Sensitive

Western bumble bees gather pollen and nectar from a wide variety of flowering plants, of which they obtain all their nutrition. Therefore a constant supply of flowers in bloom from spring to autumn is necessary to provide suitable habitat for this species (Evans et al 2008). Western bumble bees primarily nest underground in abandoned rodent nests (Laverty and Harder 1988), but will occasionally use clumps of grass on the surface (Macfarlane et al. 1994). Nesting sites may be limited by the abundance of rodents and the presence of undisturbed grassland (Evans et al 2008). Multiple factors may play a role in the recent widespread declines in Western bumble bee populations including; exotic disease organisms (National Research Council 2007, Rao and Stephen 2007, Evans et al 2008), insecticide applications, invasive plants and insects, air pollution, climate change, and habitat loss through; livestock grazing, urban development, and fragmentation (Evans et al 2008).

The Western bumble bee was historically found throughout Oregon (Stephen 1957, Milliron 1971). However, its abundance in areas of the state has dramatically declined, most notably along the coast and Willamette Valley (Rao and Stephen 2007; Evans et al 2008; Cameron et al 2011; Rao et al 2011). Numerous studies report the absence of this species in areas of Oregon where they were previously abundant (Stephen and Rao 2005, 2007; Rao and Stephen 2007, 2009; Evans et al 2008; Thorp 2008; Rao et al 2011).

Existing Condition: Survey records for this species are lacking across the Ochoco National Forest. However, potential habitat for this species is likely present in small, isolated patches in open meadows or grassland areas where suitable populations of flowering plants are present.

The project area contains 8,705 acres of potential open meadow habitat (refer to Special Habitat Section of the Botany Report). To date there have been limited surveys for western bumble bee on the Forest and it is unknown whether or not they occupy this habitat. It is reasonable to conclude that not all of the acres referenced contain the necessary flowering plant component needed to provide suitable foraging habitat, however for the purposes of this analysis it is assumed that suitable habitat is present in patches distributed across the 8,705 acres of meadow within the analysis area.

Direct and Indirect Effects - Alternative 1: The selection of this alternative would not result in any change in vegetative conditions of open meadow habitat with suitable populations of flowering plants. The current impact of unauthorized trails through such habitat would not be addressed with closure and restoration actions. This alternative would have "**No Impact**" on western bumblebee. Because no effects are anticipated, there are no cumulative effects for this alternative.

Effects Common to All Action Alternatives: The selection of any action alternative would result in the designation of user created trails, roads converted to trails and inclusion of new trail construction as well as closure, concealment and/or rehabilitation of unauthorized routes that access open meadow habitat suitable for this species. New trails would be designed to minimize impacts to meadow vegetation. Crossings of any meadow areas would have a hardened surface or crossing structure to prevent off-trail impacts to meadow vegetation in accordance with design criteria outlined in Chapter 2 of this document. Mitigations for botanical resources should also provide protection to foraging habitat for this species. There impact to potential overwintering habitat such as rodent burrows, brush and woody debris would be negligible at the landscape scale.

Determination: This species has not been documented to occur on Ochoco National Forest and formal surveys have not been conducted within the project area. Because potential habitat is present, this species of bumblebee may also be present. Due to the minimal scale of new disturbance from proposed new trails, trailheads and staging areas, and limited alteration of vegetation in meadow habitats and other areas of high botanical diversity (refer to the botany section on SHABs), the abundance and distribution of flowering plants and sub-surface overwintering sites (burrows, woody debris, etc) will not be substantially changed at the landscape scale under any action alternative. The abundance of flowering plants that could serve as foraging sites for adults would be subject to a negligible reduction as described in detail in the Botany Report the action alternatives would impact 1.4 to 2.9 acres of meadow habitat (less than 1/10 of one percent of the that available within the analysis area). Implementation of any action alternative "**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"** for the Johnson's hairstreak. This conclusion is based on the limited scope of this project and the narrow trail width needed for trail construction compared to the size of the project area and the current amount of habitat available at the landscape scale.

Cumulative Effects to TES Species with Habitat Present in the Project Area

Past, present and reasonably foreseeable projects which have effects that overlap in time and space with effects of this project are listed in Table 7. Due to the fact that this project does not include large scale vegetation management, there are no cumulative impacts to structural habitat components when considered in combination with thinning and prescribed burning treatments included in other projects. The effects of this project on mistletoe are negligible and would not result in measurable changes in the distribution and abundance of mistletoe (larval habitat) and understory flowering plants (adult habitat). The negligible reduction in mistletoe described above for Johnson's hairstreak is not expected to be substantial enough to result in cumulative effects when combined with vegetation management projects in the project area at a landscape scale. Similarly the small scale of reduction of

potential foraging habitat and sheltering sites for western bumblebee and North American Wolverine is negligible and would not result in cumulative effects when combined with vegetation management projects in the analysis area at a landscape scale.

This project's effect of increased access could combine with effects of increased accessibility due to development of routes used to implement commercial thinning projects, and with the more open forest conditions created through vegetation and fuels management projects. If this occurred in proximity to occupied habitat for TES species there could be an increase in the potential for disturbance. However, there is no mapped critical or essential habitat, or habitat with confirmed occupancy by the TES species (including Bald Eagle Management Areas, bald eagle roosts and nest buffers) within the zone of influence of any proposed route or staging area, with the exception of white-headed woodpecker. As noted in the section on Primary Cavity Excavators, white-headed woodpeckers prefer open forest conditions, and woodpeckers are not considered to be sensitive to disturbance from recreational activity. As stated above, the effects determination for this project is "no impact", and therefore negative cumulative impacts from human disturbance on white-headed woodpeckers are not anticipated to occur from this project. On the other hand, woodpecker habitat is vulnerable to illegal woodcutting. New routes would not be constructed with sufficient width to accommodate full size trucks and trailers (woodcutting equipment). In addition, some full width roads would have their width reduced to trail standards, or would be effectively closed under the action alternatives and thus, woodcutter access reduced. Woodcutter access is not expected to increase as a result of implementing any action alternative, so adverse cumulative effects to white-headed woodpeckers are not expected to result.

Increased levels of human use associated with this project could combine with increased human activity resulting from implementation of range and vegetation management projects in the project area in affecting species that are sensitive to human disturbance and which may occur in proximity to proposed routes or facilities (refer to discussions under North American wolverine and bufflehead). Due to the migratory or wide-ranging nature of these species and the lack of documented reproduction in the Ochoco Region or their persistence on Ochoco National Forest, cumulative effects for wolverine and bufflehead are not expected to be greater than that described in the direct and indirect sections for these species.

The Forest-level Travel Management Plan closes the Forest to cross country travel except on designated routes or in designated areas. Following full implementation of the forest-level Travel Management Plan acres of disturbed habitat would be limited to only those roads, areas and motorized trails that are designated as open to the public for motorized use. Thus, the road closure reinforcements, rehabilitation of user created trails and closures of unauthorized routes proposed in the action alternatives would combine with the rules for motorized travel in the Travel Management Plan, so that disturbance would be reduced in areas distant from open roads and trails, but would be increased in proximity to the currently closed routes that are designated open under the action alternatives.

Summary of Conclusions for Sensitive Species

1. There is no habitat present and/or the following species are not expected to occur within the project area and therefore, were not analyzed in detail: pygmy rabbit and tricolored blackbird. The determination for these species is **"No Impact".**
2. The selection of any alternative (1, 2, 3, 4 or 5) is expected to have **"No Impact"** on the bald eagle, upland sandpiper, horned grebe, peregrine falcon, Lewis' woodpecker, white-headed woodpecker, greater sage-grouse, Townsend's big-eared bat and the silver-bordered fritillary.
3. The No Action alternative would result in a determination of **"May Impact Individuals or Habitat, But Would Not Contribute to a Trend Toward Federal Listing or Loss of Viability To The Population or Species"** to the bufflehead and North American wolverine.

4. The No Action alternative would have **"No Impact"** to the Johnson hairstreak and western bumblebee.
5. The action alternatives (2, 3, 4 and 5) **"May Impact Individuals or Habitat, But Would Not Contribute to a Trend Toward Federal Listing or Loss of Viability To The Population or Species"** for the bufflehead, North American wolverine, Johnson's hairstreak and western bumblebee.

Table 139. Summary of conclusion of effects to Region 6 Sensitive Animal Species.

Species	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Bald Eagle	NI	NI	NI	NI	NI
Upland Sandpiper	NI	NI	NI	NI	NI
Bufflehead	MIIH	MIIH	MIIH	MIIH	MIIH
Horned Grebe	NI	NI	NI	NI	NI
American Peregrine Falcon	NI	NI	NI	NI	NI
Tricolored Blackbird	NI	NI	NI	NI	NI
Lewis' Woodpecker	NI	NI	NI	NI	NI
White-Headed Woodpecker	NI	NI	NI	NI	NI
Greater Sage-Grouse	NI	NI	NI	NI	NI
North American Wolverine	MIIH	MIIH	MIIH	MIIH	MIIH
Pygmy Rabbit	NI	NI	NI	NI	NI
Townsend's Big-Eared Bat	NI	NI	NI	NI	NI
Silver-Bordered Fritillary	NI	NI	NI	NI	NI
Johnson's Hairstreak	NI	MIIH	MIIH	MIIH	MIIH
Western bumblebee	NI	MIIH	MIIH	MIIH	MIIH
NI = No Impact MIIH = May impact individuals or habitat, but would not likely contribute to a trend toward federal listing or loss of viability to the population or species BI = Beneficial Impact					

Management Indicator Species (LRMP)

During the preparation of the Ochoco National Forest Land and Resource Management Plan (USDA 1989), a group of wildlife species were identified as Management Indicator Species (MIS). These species were selected because their well-being could be used as an indicator of other species dependent upon similar habitat conditions. Indicator species can be used to assess the impacts of management actions on a wide range of other wildlife with similar habitat requirements. The species listed in Table 140 were selected for the Ochoco National Forest.

Table 140. Ochoco National Forest Management Indicator Species.

Ochoco National Forest Management Indicator Species	Habitat	Species Present Within Project Area	Habitat Present Within Project Area
Primary Cavity Excavators	Dead wood habitat	Yes	Yes
Pileated Woodpecker	Old-growth mixed conifer forests	Yes	Yes
Northern Flicker	Old Growth Juniper	Yes	Yes
Golden Eagle and Prairie Falcon	Cliffs, talus, caves	Yes	Yes
Northern Bald Eagle	Lakeside/Reservoir, Large Trees	Yes	Yes

Table 140. Ochoco National Forest Management Indicator Species.

Ochoco National Forest Management Indicator Species	Habitat	Species Present Within Project Area	Habitat Present Within Project Area
Rocky Mountain Elk and Mule Deer	Mosaic of early, forage-producing stages and later, cover-forming stages of forests, in close proximity	Yes	Yes

The terrestrial MIS for this project area are the same as those listed for the Forest: primary cavity excavators (including, but not limited to woodpeckers and sapsuckers); pileated woodpecker; golden eagle and prairie falcon; bald eagle; Rocky Mountain elk and mule deer. Effects to the northern bald eagle and American peregrine falcon were discussed in the Proposed, Endangered, Threatened, and Sensitive Species section, previously in this Chapter. Golden eagles and prairie falcons are listed in the section on raptors, later in this chapter in the section titled "Other Species (LRMP)", but they are discussed here in detail because they are MIS species. Potential effects to the remaining MIS species are discussed in this section.

Primary Cavity Excavators (woodpeckers, chickadees and nuthatches)

Primary Cavity Excavators (PCE) include the Pileated Woodpecker and Northern Flicker (LRMP MIS), white-headed woodpecker and Lewis' woodpecker (TES and focal species), red-naped sapsucker (focal species), and other avian species that excavate their own cavities.

Primary cavity excavators are listed as a group, as Management Indicator Species (MIS) in the Ochoco National Forest Land and Resource Management Plan (LRMP). The primary cavity excavator MIS group includes birds that feed primarily on dead wood insects and that excavate their own nest cavities. The PCE group was selected as an indicator for animals that utilize dead or defective wood habitat. The primary cavity excavators serve as ecological indicators for a large number of species and for secondary cavity users, like swallows, blue birds and bats (LRMP FEIS 3-22). PCE species associated with the project area are listed below (Thomas et al., 1979). The species with an asterisk (*) are also dead wood insect users.

Pileated Woodpecker*
White-headed Woodpecker
Northern Flicker
Lewis' Woodpecker*
Williamson's Sapsucker*
Black-backed Woodpecker*
White-breasted Nuthatch*
Pygmy Nuthatch*
Red-naped Sapsucker*
Hairy Woodpecker*
Three-toed Woodpecker*
Red-breasted Nuthatch*
Downy Woodpecker*

Effects to the white-headed and Lewis' woodpeckers have been disclosed in the Threatened, Endangered, and Sensitive section of this Chapter. Effects to the black-backed, three-toed, pileated, hairy and downy woodpeckers and the red-naped and Williamson's sapsuckers, common flicker, chickadees and nuthatches are discussed here. These species have been grouped into guilds as described below. Direct, indirect, and cumulative effects are discussed at the end of this section.

Black-backed and Three-toed Woodpeckers (guild of species dependent upon the presence of bark beetles):

The black-backed woodpecker ranges from Alaska and Canada south to the central Sierra Nevada of California and east to Newfoundland, New York and the Midwest. In North America the Three-toed woodpecker is found throughout Alaska and Canada, but is found to the south only in the mountains of the western states, with its southern limit in Arizona and New Mexico.

Habitat use by both woodpeckers shows some similarities and some differences in stands selected for nesting, roosting, and foraging. Marshall et al. (2003) described the center of abundance for black-backed woodpeckers in Oregon as the lodgepole pine forest east of the Cascade crest between Bend and Klamath Falls. For the three-toed woodpecker, Marshall et al. (2003), describes the species as rare and local reports come sparingly from both slopes of the Cascades and the Blue Mountains. Habitats for both species include lodgepole pine forests, mixed conifer, and mountain hemlock, although forest type may not be as important as the presence of bark beetles (Marshall et al. 2003). Both species show an affinity for burned forests and there is good evidence that bark-beetle killed forests are important habitats in Oregon and the species also occurs sparingly in unburned, mature forests (Marshal et al. 2003). However, stand-replacing fires produce habitats that briefly contain abundant food resources for woodpeckers (McCullough et al. 1998 cited in Marshall et al. 2003). After three to five years, the majority of the insects inhabiting the dead wood emerge as adults and do not re-colonize the dead trees, resulting in a decrease in food availability and hence habitat suitability for woodpeckers. These species currently hold rankings in Oregon as Sensitive and by the Natural Heritage program as G5 globally secure. The Oregon State Heritage Program lists both species ranking as S3, Vulnerable. Possible reasons for this listing may be due to fire suppression, cutting of snags, and loss of mature and old-growth forests (NatureServe 2009). Wisdom et al. (2000) reported that results from breeding bird surveys (BBS) indicate black-backed trends from 1966-1995 as stable in North America. For the three-toed woodpecker, Wisdom et al. (2000) reported from 14 BBS routes, trend data showed an annual 0.7 percent decline between 1966 and 1995.

Wisdom et al. (2000) stated there are several factors affecting these species. Silvicultural practices (tree harvest before susceptibility to beetle attack) and fire management policies (salvage logging) have altered natural patterns of beetle outbreaks. Also, increasing road densities have allowed greater human access into forested regions for snag removal as firewood. Interspecies competition for nest cavities by hairy woodpeckers and Lewis' woodpeckers (Goggans et al. and Saab and Dudley 1995 cited by Wisdom et al. 2000) may potentially reduce black-backed reproductive success.

Existing Condition**:** All lodgepole pine, ponderosa pine with lodgepole, mixed conifer, and mountain hemlock PAGs with trees between 5-20 inches diameter were used to estimate acres of potentially suitable nesting habitat in the project area. This size range was used because the Goggans et al. study (1989) showed nest tree diameters ranged from 7-17 inches. In 1967 to 1968 three fires burned approximately 6,100 in the Ochoco Creek and Marks Creek Watersheds, which were subsequently salvaged. The Hash Rock Fire of 2000 burned about 4,600 acres in the Marks Creek Watershed; the Maxwell Fire of 2006 burned about 6,965 acres in Upper North Fork Crooked River Watershed; the Bridge Creek fire of 2008 burned about 5,300 acres in the Bridge Creek Watershed; and the 747 Fire of 2002 burned 15,091 acre on national forest system land in Rock Creek Watershed. These are examples of wildland fires that have occurred irregularly across the project area and provided short-term foraging areas in the past. In 2014 the Bailey Butte fire (part of the Waterman Complex) and four fires within the Ochoco Complex (Fox, Lava, Antelope Springs and Broadway) burned portions of Ochoco National Forest within the project area. The Bailey Butte Fire was the largest of these at 10,272 acres, with 7,789 acres on Ochoco National Forest. The 9,960 Fox Fire had 2,766 acres on Ochoco National Forest. The Lava Fire at 137 acres was entirely on Ochoco National Forest. Antelope Springs and Broadway Fires were the smallest named fires in the Ochoco complex at 14 acres and 5 acres respectively. Numerous small fires were ignited by the same mid-July lightning storm, but were extinguished or went out on their own while they were small. As a result of the recent fire events, potential nesting habitat is distributed in patches across the project area, particularly in in moderate to high severity areas of fires such as on about 2,900 acres across Bailey Butte Fire and 950 acres inside the Fox Fire perimeter. Recently created stand replacement fire areas are expected to provide habitat for these species for approximately 3 to 7 years while bark beetles are active.

District observational records show 23 reports of black-backed woodpecker sightings and one nest in the project area. Most of these were general sightings between 1990 and 1995. However two records are from surveys in recent years. Only two records of three-toed woodpeckers were found in or adjacent to the project area with no nests recorded.

Pileated, Hairy, and Downy woodpeckers; red-naped and Williamson's sapsuckers; Common Flickers (guild of species dependent upon snags and/or live trees with internal rot for nesting or roosting cavities and as a forage substrate):

The pileated woodpecker is found in forested areas of the eastern and western U.S. and in Canada. The hairy woodpecker breeds from Alaska and Canada southward and coast to coast to California and Florida and in mountains and highlands of Mexico and Central America. The downy woodpecker is also found coast to coast from Alaska and Canada to California and Florida except in the desert southwest. Red-naped sapsuckers breed from British Columbia and Alberta south to Nevada, Arizona and New Mexico. Similarly the Williamson's sapsucker is a western species, breeding from British Columbia to California, New Mexico and Colorado. The hairy and downy woodpeckers, the common flicker and the Williamson's sapsucker are described as a common inhabitant of Oregon and the pileated woodpecker is an uncommon species in Oregon limited attitudinally by habitat availability (Marshall et al. 2003). However, there are differences in their selection of preferred habitats. The common flicker is generally most abundant in open forests and forest edges. The Williamson's sapsucker prefers mid-to-high elevation mature or old-structured forests with fairly open canopy cover and aspen stands. The downy woodpecker prefers riparian areas with hardwoods. The hairy utilizes mixed-conifer forests and ponderosa pine as well as adjacent deciduous stands, while the pileated occurs primarily in dense mixed conifer forests in late seral stages or in deciduous trees stands in valley bottoms (Marshall et al. 2003).

Population trends in Oregon have been reported as stable (Williamson's sapsuckers) or a non-significant decline ranging from 0.4-0.6 percent per year based on Breeding Bird Surveys 1966-2000 as reported by Marshall et al. (2003) for the remaining species. Among the species in this guild, only the pileated woodpecker holds a ranking in Oregon as Sensitive, all of these species are ranked by the Oregon Natural Heritage Information Center as G5 globally secure. NatureServe (2009) listed the following as the top five major threats afflicting pileated woodpeckers (1) conversion of forest habitats to non-forest habitats, (2) short rotation, even-age forestry, (3) monoculture forestry, (4) forest fragmentation, and (5) removal of logging residue, downed wood, and pine straw that would ultimately put nutrients back into the ecosystem and provide foraging substrate. The Oregon Natural Heritage Information Center 2009 lists the hairy, downy, and pileated woodpeckers, and the red-naped sapsucker ranking as S4, Apparently Secure. For hairy woodpeckers possible local declines may result from usurpation of nest cavities by house sparrows or starlings at lower elevations. The Williamson's sapsucker is listed as S4B, Apparently Secure for breeding populations and S3N, Vulnerable for nonbreeding populations (NatureServe 2009). This ranking differs from the 2008 S5 Secure listing, there were no reasons given for the declines. The common flicker is ranked as S5, demonstrably widespread, abundant and secure (NatureServe 2009; Csuti 1998)

Existing Condition: Pileated woodpecker habitat for the Ochoco National Forest is defined as ponderosa pine stands with Douglas-fir and grand fir understories, or mixed conifer stands with greater than 15-20 inch in diameter trees and a dense canopy condition. For the Williamson's sapsucker, nesting habitat includes ponderosa pine and grand fir stands where the ponderosa pine present was greater than 15-20 inches in diameter in an open canopy condition and in mixed conifer stands. Hairy woodpeckers and northern flickers are habitat generalists and occur throughout the project area, especially in open stands. Downy woodpeckers are found in deciduous and mixed deciduous-conifer forests and in riparian habitat, where they are most abundant (Marshall et al. 2003). There has been no specific survey conducted for hairy and downy woodpeckers, the common flicker and the Williamson's sapsucker, although these species were detected and recorded in surveys

conducted between 1992 and 1995, and in 2008 and 2010. District observation records include records of 14 Williamson's sapsucker sightings, more than 130 pileated woodpecker sightings, 2 downy woodpecker nests, 15 sightings of hairy woodpecker and 20 sightings of flicker in the project area. While conducting other forest work, observers have seen these species within the project area numerous times without recording the observations in a database.

The Land and Resource Management Plan (LRMP) allocated a network of Old-growth Management Areas (OGMA) including approximately 19,570 acres across the Forest (outside of Wilderness and Research Natural Areas). The OGMAs are in mixed conifer or ponderosa pine stands and average 300 acres in size. The emphasis for these areas is to provide habitat for wildlife species dependent on old growth stands, with pileated woodpecker as the major indicator species. Adjacent or in proximity to each of these OGMAs is an additional 300 acres (average size) of mapped pileated woodpecker feeding habitat (pfh). The mapped feeding habitat is not identified as a management allocation in the LRMP, but recommendations for this habitat are included along with the standards and guidelines for OGMAs. Generally the OGMAs are intended to provide reproductive habitat for pileated woodpeckers, while the mapped feeding habitat is intended to provide supplemental foraging habitat no further than ½ mile from reproductive areas.

Mountain and black-capped chickadees; red-breasted, white-breasted and pygmy nuthatches (guild of species dependent upon dead or defective wood to gain entrance to hollow or decaying wood):

The black-capped chickadee is found in the Northern part of North America, from Canada and Alaska south to California and North Carolina. The Mountain chickadee is a western North American species, resident from British Columbia to Baja California, Montana, New Mexico and Texas. The red-breasted nuthatch is found from Alaska and Canada to California and North Carolina, except absent from the southern Midwest. The white-breasted nuthatch is a resident across North America from Canada to Mexico, except absent from the Great Plains. The pygmy nuthatch is resident in western North America from British Columbia to Baja California, Texas and the highlands of Mexico.

This guild of species includes species dependent upon dead or defective woody materials that allow access for use of natural cavities or for excavation of cavities using existing cracks to gain entrance to hollow or decaying wood. These species will also utilize cavities left by other primary cavity excavators (sapsuckers and woodpeckers) and thus they can be used as an indicator for many other species of secondary cavity nesters. There are differences in their selection of preferred habitats. Mountain chickadees are more common in the mountainous areas of Central Oregon than the black-capped chickadee which tends to be restricted to riparian woodlands and lower elevation areas in eastern Oregon. Red-breasted nuthatches generally prefer dense moist forests in comparison to white-breasted and pygmy nuthatches which prefer open pine ponderosa pine forests. To survive cold winter nights, the pygmy nuthatch goes into a state of torpor when roosting communally inside tree cavities. Thus, the presence of large hollow trees and snags is important to this species during both nesting and over-wintering seasons (Marshall et al. 2003).

Christmas Bird Count (CBC) data indicate stable populations for Oregon for both the black-capped and mountain chickadees. However, Breeding Bird Survey (BBS) data show slight declines in Oregon for both species. Though it is speculated that riparian woodland destruction may have caused black-backed woodpecker populations declines in e Oregon over the past 100 years, it is noted that local populations of mountain chickadees show patches of increasing and decreasing populations (Marshall et al. 2003). The mountain chickadee is ranked G5 globally secure, S4 not rare and apparently secure in Oregon. The black-capped chickadee is ranked G5 globally secure, S5 demonstrably widespread, abundant and secure in Oregon. Declining population trends in Oregon for white-breasted nuthatch are largely attributed to loss of open stands of large diameter oak. Population

data for pygmy nuthatches was inconclusive, though it is speculated that localized population declines may have occurred since 1940 in response to loss of large diameter live ponderosa pine trees and large snags. The red-breasted nuthatch is considered to be common and flexible in use of different forest types, but is dependent on large-diameter trees, snags and structural diversity in forest stands (Marshall et al. 2003). The white-breasted and pygmy nuthatches are both ranked G5 globally secure, S4 not rare and apparently secure in Oregon. The red-breasted nuthatch is ranked G5 globally secure, S5 demonstrably widespread, abundant and secure in Oregon.

Existing Conditions: On Ochoco National Forest mountain chickadees are abundant and make their homes in mid- to high-elevation forests mainly in ponderosa pine, lodgepole pine and mixed conifer stands, though they will also use juniper woodlands and aspen stands within coniferous forests. On the other hand the black-capped chickadee is relatively uncommon among grand fir forests of the Blue Mountains (Csuti 1997, Marshall et al 2003). White-breasted and pygmy nuthatches prefer open forests. The white-breasted nuthatch uses a variety of open woodlands such as ponderosa pine and juniper at low to moderate elevations in Central Oregon, while the pygmy nuthatch is generally restricted to mature ponderosa pine with less than 70% canopy closure. In contrast the red-breasted nuthatch prefers denser coniferous forests. Though specific surveys for these species have not been conducted within the project area, the mountain chickadee and the white-breasted nuthatch are commonly observed while conducting other forest work, and both species have been recorded at many locations on a Breeding Bird Survey (BBS) route that passes through a portion of the eastern half of the project area. A pygmy nuthatch was recorded along Lookout Mountain Trail and a black-capped chickadee was recorded along the BBS route, both within the project area.

Direct and Indirect Effects – Primary Cavity Excavators:

Alternative 1 - No Action

Alternative 1 would likely result in continuation of the current trend of retention of the current pattern of disturbance from unregulated motorized vehicle access, user-created trails, and use of roads moderated by the current level of enforcement of the Travel Management Plan . Since typical user-created trails develop without felling of trees, and since woodpeckers are relatively protected from increases in predation, the pattern of recreational access associated with implementation of this alternative would not lead to loss of habitat or increased predation. The exception to this is the current trend of illegal firewood cutting which may result in both disturbance and habitat reduction on user created roads and closed roads that where closures are not reinforced. As stated below, recreational trail-associated disturbance does not affect the PCEs, so there would be no direct or indirect effects to primary cavity excavators from implementation of this alternative.

This alternative would not designate any motorized routes, or modify the current patterns of human use in OGMAs or mapped feeding habitat for pileated woodpeckers. Existing user created or unauthorized routes within these habitats would not be closed or rehabilitated.

Action Alternatives

By design (nesting in tree cavities), woodpeckers and other cavity users are relatively more secure from nest predation than any other group of forest birds. For the woodpecker guild and cavity nesters, Hamann et al. (1999) and Gaines et al. (2003) have conducted literature reviews of recreational effects, including OHV use. Their reviews show that recreational trail-associated disturbances do not present a problem to woodpeckers and cavity nesters as a group. Hamann et al. (1999) also state that recreational activity is unlikely to be focused around nest sites of these species. Gaines et al. (2003) also conclude recreational trail-associated disturbance does not affect the guild. Therefore, recreational disturbance and increased nest predation are not known to be a major limiting factor to primary cavity excavators along motorized trails.

Refer to Chapter 2 for a full description of each alternative. Alternatives 2, 3, 4 and 5, propose new trail construction ranging from 50-81 miles (dependent upon alternative) where trees potentially could be felled and thus habitat directly altered. A Project Design Feature (Chapter 2) would limit tree felling during trail construction unless the trail design cannot be modified. This circumstance would be considered infrequent, as most trails would be routed along previously disturbed areas (also a Project Design Feature). Generally dead trees along trail systems are not felled unless the lean over the trail, or lean toward the trail and are within striking distance of the trail. During initial construction and maintenance on designated routes on closed or decommissioned roads, hazard tree felling may occur. Within the Bailey Butte Fire area, the development of the staging area and trails would be deferred until Phase 3 of the implementation for this project (refer to the Implementation Plan) in order to allow for natural fall down or top breakage of fire effected trees along proposed trails. Action alternatives propose trail placement on existing closed and decommissioned roads ranging from 37 to 76 miles (dependent on the alternative). Felled hazard trees would remain on site either as large wood habitat or as strategically placed obstacles to control trail width, to add complexity or difficulty (trail features), or to augment road and trail closures or restoration sites. Associated actions include the rehabilitation of user-created roads and trails using rocks, boulders, logs, and/or subsoiling to restore these lands. A small excavator may be needed to implement this restoration. These actions would be short-term events with project completion taking from a few hours to a few days to implement for each segment. Rehabilitation is not projected to result in any impact to PCEs. Staging areas are also proposed for OHV users including using existing campgrounds, Snoparks or mineral sources (rock pits). Alternatives 2, 4 and 5 also propose new staging areas to provide OHV parking and may include amenities like toilets, picnic tables, and fire rings. Larger staging areas maybe three to five acres in size and the small staging areas with fewer facilities would range from one to two acres in size. Danger tree felling would focus on staging areas where the greatest hazard exists. Since these staging areas involve open roads, mineral sources and existing campsites, some level of hazard abatement will occur in these areas regardless of whether they are established as staging areas or not, see Cumulative Effects below.

Because of the very limited circumstances in which snags or live trees would be removed during construction or maintenance activities, effects would be limited to individual woodpeckers from habitat alteration, alternatives would have a negligible effect on snag distribution and abundance at the landscape scale and no effect to local populations is expected to result from implementation of this project.

The action alternatives would each designate motorized routes within OGMA and mapped feeding habitat for pileated woodpeckers (pfh). Alternative 2 proposes 2.6 miles; Alternative 3 proposes 1.4 miles; Alternative 4 proposes 2.9 miles; and Alternative 5 proposes 1.5 miles of designated route in OGMAs. Each of the action alternatives also proposes to designate motorized routes within mapped feeding habitat as follows: Alternative 2 has 2.8 miles; Alternative 3 has 0.7 miles; Alternative 4 has 2.5 miles; and Alternative 5 has 2.2 miles of designated routes in pfh. The majority of these route miles (both in OGMA and pfh) are on, or connect existing roads or are near the exterior boundary of the OGMA or pfh. Existing unwanted user created or unauthorized routes within these habitats would be closed, concealed and rehabilitated. No habitat would be removed within the Ochoco Summit OHV project area, other than minimal hazardous snags. Because the Ochoco Summit OHV Project Area is over 300,000 acres and there are likely tens of thousands of existing snags present, the impact of removal of incidental hazard trees during trail maintenance would not result in a measurable change in available habitat. New trail layout would also avoid placing trails where snags currently exist. Hamann et al. (1999) and Gaines et al. (2003) studies show woodpeckers are not disturbed by OHV traffic. Therefore Ochoco Summit OHV project would not contribute to a negative trend in viability on Ochoco National Forest for any primary cavity excavator, including the pileated woodpecker and northern flicker.

Cumulative Effects - Primary Cavity Excavators

With Implementation of the Travel Management Rule, motorized travel is to be restricted to designated routes and existing Maintenance Level 2 (and higher) roads. Hazard tree abatement would continue to occur along 674 miles of maintenance level 2 roads, 125 miles of maintenance level 3 to 5 roads, numerous industrial work areas (such as gravel pits, corrals, and industrial camps) and at administrative sites and high recreational use areas (such as campgrounds and trailheads). Hazard tree removal is proposed in the Bailey Butte Fire Project along 17.2 miles of roads within approximately 588 acres. In addition that project proposes salvage of fire killed trees on an additional 234 acres of stand replacement fire area and directional falling of trees along 6 miles of streams as a riparian restoration treatment. At the same time continued tree mortality due to inherent levels of insects and disease would result in snag recruitment overtime, as well as snag pulses associated with fire events (such as those described above under the section on Existing Condition) which would partially offset loss of snags to hazard abatement, salvage, riparian restoration and firewood cutting. In addition, many acres of ponderosa pine forests and mixed conifer stands would be treated to maintain more open pine dominated forests with large trees to the benefit of the subset of the woodpecker guild dependent on such habitat. Treatments to improve forest health in all forest types would occur which would alter the rate of tree mortality and thus snag recruitment. Dead and defective tree and log habitat would continue to be well distributed at the landscape scale, though the area along open roads would likely experience reduced snag abundance over time.

SEIS Table 140 was reviewed for projects that overlap in time and space with the Ochoco Summit Trail System project. Several recent large-scale vegetation management decisions have been implemented or are in the process of implementation (Spears, Canyon, Howard Elliot Johnson, Zane, Jackson, Wolf) or are being planned (Gap, Black Mountain) that partially overlap the Ochoco Summit Trail System project area. The hazard trees potentially removed during implementation of these projects added to the very minimal numbers projected for OHV trail maintenance and staging areas are not expected to result in measurable changes in existing snag numbers across the project area. The primary effect of these vegetation management projects on snag habitat is related to rate, size and density of snag recruitment due to improved forest health. These effects are disclosed in the NEPA documents for those projects and this OHV trail project would result in negligible changes to the rate, size or density of snag recruitment over time. Therefore, no additive cumulative effects to the woodpecker guild and cavity nesters in general are projected due to implementation of this project. In summary, there would be no aggregated effects for the woodpecker guild or any other PCE beyond those discussed under direct and indirect effects because this project would not appreciably change snag habitat at a landscape scale.

Snag densities on private land in the project area are assumed to be low because most landowners want to reduce wildfire potential and utilize wood products on their land. Consequently, snag habitat is likely limited or may not be available to woodpeckers for very long, and would not represent a reliable source to contribute to nesting populations.

Viability Assessment for Pileated Woodpecker

Background (Ecology): The pileated woodpecker was chosen as a terrestrial management indicator species (MIS) for mature and old-growth forest (LRMP 1989, p. 243 and 251). The pileated woodpecker is also an indicator of late-successional habitat on all forests across the region. It is assumed that if good habitat is provided for pileated woodpeckers and their population is maintained at some desired level, that adequate habitat is also being provided for other species that share similar habitat requirements (LRMP FEIS p. 3-21). The pileated woodpecker plays an important ecological role by excavating nest cavities that are later used by other birds and small mammals (Thomas 1979) and by feeding on forest insect pests.

The pileated woodpecker occurs primarily in dense mixed conifer forests in late seral stages or in deciduous stands in valley bottoms (Marshall et al. 2003). Pileated woodpeckers nest in large diameter (> 21”d.b.h.) and tall snags, and depend heavily on carpenter ants for food. They commonly feed on dead grand fir trees and downed logs. They also roost in large hollow trees and tend to select relatively dense stands with grand fir common. They typically select for multi-strata mixed conifer LOS. The pileated woodpecker’s habitat associates prefer dense forest conditions, and they include Townsend’s warbler, hermit thrush and red-breasted nuthatch among others. Some of these are discussed further in the Landbirds section of this document. As dense mixed coniferous stands often contain a high density of dead or dying trees, habitat for this species also represents habitat for the black-backed and three-toed woodpeckers, which are attracted to stands with abundant snags and activity by bark beetles and wood boring beetles.

Pileated woodpecker habitat is managed through guidelines in the Ochoco Forest Plan and recommendations of best available science. The BBS indicate that the population trend of the pileated woodpecker is increasing in both Oregon and the Northern Rockies BCR during all time intervals. The trend represents the yearly percentage change. During the period of the 1966 to 2006, there was an estimated 2 percent population increase per year in Oregon and a 4.6 percent population increase per year in the Northern Rockies BCR. The Oregon Natural Heritage Information Center 2009 list states the pileated woodpecker species ranking as S4, Apparently Secure. NatureServe (2009) listed the following as the top five major threats affecting pileated woodpeckers (1) conversion of forest habitats to non-forest habitats, (2) short rotation, even-age forestry, (3) monoculture forestry, (4) forest fragmentation, and (5) removal of logging residue, downed wood, and pine straw that would ultimately put nutrients back into the ecosystem and provide foraging substrate.

Recommendations for management of the Pileated woodpecker ("Habitat Use and Management of Pileated Woodpeckers in Northeastern Oregon,” Bull et al. 1992), includes management of 900 acres of habitat for each territory. It is also recommended that the 900 acres contain 75% grand fir types; 25% would be old growth and the remainder in mature stands. At least 50% would have 60% canopy closure or greater. Dense stands in these relatively moist PAGs, dominated by large tree structure would have provided the best primary nesting habitat for pileated woodpeckers.

Existing Condition: The pileated woodpecker is considered to be an uncommon species in Oregon, limited attitudinally by habitat availability, and they are an uncommon permanent resident in the Blue Mountains (Marshall et al. 2003). Pileated woodpecker habitat for the Ochoco National Forest is defined as ponderosa pine stands with Douglas-fir and grand fir understories, or mixed conifer stands with greater than 15-20 inch in diameter trees and a dense canopy condition. The Ochoco National Forest Land and Resource Management Plan allocated Old Growth Management areas (OGMA) across the Forest to serve as reproductive habitat for the pileated woodpeckers. An additional 300 ac. of supplemental feeding habitat has been designated adjacent to each OGMA reproductive habitat area. Currently, there are twenty-five allocated old growth areas within the project area, totaling 7,693 acres. Satellite imagery from 2004 was used to characterize vegetation, which was subsequently used to estimate pileated woodpecker reproductive habitat within the watersheds potentially affected by this project. Currently pileated woodpecker primary reproductive habitat (based on GNN data) includes approximately 7,931 acres across the project area. The satellite imagery only provides a broad scale look at the live-tree component and does not provide information on stand specific snag or down log levels. In general, multistoried large tree structure with a significant fir component with abundant snags is the preferred habitat for the pileated woodpecker. The large blocks of preferred habitat with primary nesting habitat are currently distributed west of Big Summit Prairie and along the northern 1/2 of the project area. The OGMAs were surveyed in the 1990s for the presence of pileated woodpeckers. The surveys confirmed the presence of nesting pileated woodpeckers at Polie Creek OGMA. Numerous pileated woodpecker sightings were also recorded within and adjacent OGMAs across the project area including: Long Prairie OGMA D1-01;

Lytle Prairie OGMA D1-02; Fox Canyon OGMA D1-03; Kemp Spring OGMA D1-04; Davis Spring OGMA D1-06; Lost Lake OGMA D1-07; Indian Butte OGMA D1-08; Peterson Creek OGMA D1-09; Scotts Camp OGMA D1-10; Deep Creek OGMA D1-11; East Porter Creek OGMA D1-12; Rush Creek OGMA D1-13; South Lookout OGMA D1-14; Polie Creek OGMA D1-15; Bridge Creek OGMA D1-17; Nature Creek OGMA D1-18; East Wolf Creek OGMA D2-05 and Chamberlin Spring OGMA D2-11. Pileated woodpeckers have been recorded elsewhere in the project area including multiple general sightings at: Snowshoe Point; Marks Lake; Carrol Glade; South Fork Howard Creek; West Fork Howard Creek; east flanks of Round and Lookout Mountains; north and west flanks of Mt. Pisgah; headwaters of Peterson, Porter and Keeton Creeks; Little Summit Creek and north flanks of Paulina Butte; and upper Wolf and Rock Creeks..

Effects Common to All Alternatives: The alternatives would not treat LOS stands or forest stands within pfh or designated OGMAs. All alternatives would maintain the existing acres of fir-dominated understory and canopy closure, at least in the short term. In all alternatives, all existing snags would be left that are not deemed to be a safety hazards. Because the Ochoco Summit Trail System Project Area is over 300,000 acres and there are likely tens of thousands of existing snags present, the impact of removing of incidental hazard trees during trail maintenance would not result in a measurable change in available habitat. New trail layout would also avoid placing trails where snags currently exist. Since the action alternatives do not propose harvest of snags, the amount of existing snags present within the project area should not be substantially altered by implementation of any alternative. All alternatives would maintain the suitability of all existing habitat for pileated woodpeckers in the short term.

Conclusion: The pileated woodpecker is widely distributed in North America. It occurs primarily in dense, late seral stages of mixed conifer or deciduous tree stands. Its conservation status globally and nationally is secure and it is apparently secure in the State of Oregon (NatureServe). The pileated woodpecker does not have any special federal listing status as Candidate, Threatened or Endangered but it is listed as Vulnerable in the Blue Mountains on the State of Oregon Sensitive Species list. The State Vulnerable status indicates that the pileated woodpecker is facing one or more threats to their populations but is not currently imperiled with extirpation. The pileated woodpecker is not considered a focal species in the Partners in Flight Conservation Strategy for Landbirds in the Northern Rocky Mountains of Eastern Oregon and Washington and is not a priority species on the USFWS Birds of Conservation Concern. Population trend data from the North American Breeding Bird Surveys indicate that the pileated woodpecker has an increasing population trend in Oregon and in the Northern Rockies Bird Conservation Region. While the interpretation of this data should be done with caution, a steady population increase is indicated. The Partners in Flight species assessment database also indicates a large population increase in the Northern Rockies Bird Conservation Region. The Partners in Flight population assessment database indicates that in the portion of the Northern Rockies Bird Conservation Region that is in Oregon (Blue Mountains, including the WWNF) the average number of pileated woodpeckers seen per breeding bird survey route was 1.02.

The broad-scale source habitat analysis conducted by Wisdom et al. (2000) indicated that there have been basin-wide declines of source habitat of the pileated woodpecker in the interior Columbia Basin, however, habitat of the pileated woodpecker is strongly increasing in the Blue Mountains Ecological Reporting Unit. In the Blue Mountains ERU there was more than a 100% increase in the amount of source habitat from historical conditions. This analysis was a coarse-scale analysis and based on a large pixel size (100 hectares or 247 acres), and included both private and public lands. Priority nesting habitat of the pileated woodpecker is still available in adequate amounts and distribution to maintain pileated viability on Ochoco National Forest. Currently, there are approximately 14,508 acres of priority nesting habitat on Ochoco National Forest, within 23 of the 34 watersheds (68%) on the Forest (including Crooked River National Grassland). Of the watersheds that historically

provided priority nesting habitat (Ochoco National Forest excluding Crooked River National Grassland), 23 of 24 watersheds (96%) currently provide priority nesting habitat. Though 55% of the priority nesting habitat on the Forest falls within the project area boundary, only a small fraction of it would be directly impacted by proposed trails or staging areas. As shown in Table 159 (Landbird Section) a maximum of 125 acres in forested PAGS would be impacted by action alternatives, far less than that would involve priority nesting habitat for pileated woodpeckers.

This viability assessment indicates the pileated woodpecker is well distributed across the Ochoco National Forest and there are adequate amounts, quality, and distribution of habitat to provide for pileated woodpecker population viability. Given the relatively wide range of this species, increasing population and habitat trends, and the amount and distribution of habitat remaining, within the project area, at the forest level and across the eco-region, viability for this species is expected to be provided for on Ochoco National Forest. Given that this project impacts less than 1% of the suitable priority nesting habitat across the Forest, the overall direct, indirect and cumulative effects may result in a very small negative trend of habitat in the short term. However, this reduction in nesting habitat is insignificant at the Forest scale and is not expected to reduce the viability of this species at the Forest level. For these reasons this project is expected to result in continued viability of pileated woodpeckers on Ochoco National Forest. A more detailed Viability Assessment for MIS is included as an appendix to this report.

Viability Assessment for Northern Flicker

Background: The northern flicker was chosen as a terrestrial management indicator species (MIS) for old growth juniper (LRMP FEIS 3-21 and 4-96). Many researchers have reported on aspects of behavior and nest use by flickers as part of general studies of cavity nesting birds. Recently, such interest has intensified as flickers have been recognized as "keystone" excavators which may influence the abundance of secondary cavity nesters in forest systems (Martin et al. 2004).

Existing Condition: A variety of forest types do exist in abundance and well distributed across the Forest and in this project area, including but not limited to dry site pine and juniper woodlands, where large or old juniper and other potential nesting sites are available.

Effects Common to All Alternatives: The proposed action alternatives do not include removal of trees in dry site ponderosa pine PAGs with size class 5. No tree removal within size class 5 juniper PAGs is prescribed. The alternatives are not likely to remove old-growth juniper or other juniper trees with sufficient size and defect to serve as potential nest sites for northern flickers.

Conclusion: Even though the flicker was selected as an indicator for old growth juniper, they do nest in a wide variety of forest types. A variety of forest types do exist in abundance and well distributed across the Forest and in this project area, and this species is widespread and common. None of the alternatives would substantially alter habitat for this species. For these reasons this project will not contribute to a negative trend in viability for northern flickers on Ochoco National Forest. A more detailed Viability Assessment for MIS is included as an appendix to this report.

Big Game - Deer and Elk

The 301,580 acre project area provides both summer and winter range habitat for mule deer and Rocky Mountain elk. Within the project area there are 17,828 acres in Winter Range, 25,183 acres in General Forest Winter Range, and 195,735 acres in General Forest (summer range) allocations. Both species are considered popular big game species and when combined contribute thousands of recreational visitor days each year to this area during hunting seasons, and for general wildlife viewing and photographic opportunities during other times of the year. The Oregon Department of Fish and Wildlife and Travel Oregon contracted with Dean Runyan and Associates in 2008 to conduct an economic analysis by county of fishing, hunting, and wildlife viewing (ODFW 2009). Table 141 and Table 142 display the results that survey participants spent on hunting and wildlife viewing in

Crook and Wheeler Counties (based on Oregon Travel Impact 1991-2008). The selected counties in the table show an estimated dollar value placed on consumptive and non-consumptive recreational activities associated with terrestrial wildlife in this part of Oregon.

Table 141. Annual travel-generated estimated expenditures toward hunting and wildlife viewing in Crook and Wheeler Counties, Oregon (overnight or day trips 50+ miles one way, or non-residents).

County	Hunting Expenditures	Wildlife Viewing
Crook	$2,584,000	$6,769,000
Wheeler	$1,168,000	Sample size too small to report data reliably
Total	$3,752,000	$6,769,000
State Total Percent	3.6%	1.4%
State Total	$104,458,000.	$495,260,000.

Table 142. Annual local estimated expenditures toward hunting and wildlife viewing in Crook and Wheeler Counties, Oregon (residents and day trips less than 50 miles one way).

County	Hunting Expenditures	Wildlife Viewing
Crook	$683,000	$218,000
Wheeler	$103,000	Sample size too small to report data reliably
Total	$786,000	$218,000
State Total Percent	2.5%	1.0%
State Total	$31,574,000.	$33,173,000.

Table 143 displays mule deer hunting data for the wildlife management unit potentially affected by the project (ODFW 2012).

Table 143. Numbers of deer hunters, hunter days and predicted reproductive success in the Ochoco Wildlife Management Unit (Years 2010-2012).

Mgmt. Unit and Counties	# of Rifle Tags 2010	# of Rifle Tags 2011	# Deer Population Estimate (Spring 2012)	–Fawn Ratio Forecast (fawns/100 adults)
Ochoco WMU # 37 (Hunt: 137) Crook, Wheeler, and Grant	2,800	2,800	15,400	40
*Population estimate May 2011 and spring 2012 was 15,400 deer.				

Though telemetry data are lacking for deer on Ochoco National Forest, mule deer may not engage in the long distance high density migrations observed with some of the deer of South Central Oregon. An example of this is the large migration that crosses Highway 97 on the Deschutes National Forest. ODFW's interpretation of telemetry data that were collected from mule deer on the Deschutes National Forest between 2005 and 2010 indicates that some collared animals return to the same summer range area each year suggesting strong site fidelity. Deschutes telemetry data also suggest some does drop their fawns before reaching their desired summering area and then continue their migration with their fawns. The higher elevations in Ochoco Summer Project Area do become snowbound in the winter and deer are known to concentrate in foothills and valley bottoms along the Crooked and John Day Rivers and their tributaries during the winter. Thus, it is likely that deer do migrate across the mid elevation areas where proposed trails are located during their seasonal movements.

Spring deer counts are conducted by ODFW to determine population levels as compared to the management objective for each unit.

Table 144 shows the April deer counts conducted by ODFW within the management unit potentially impacted by the Ochoco Summit Trail System project. The 2015 estimate for mule deer in the Ochoco WMU was 15,000 deer (72% of the MO of 20,500).

Table 144. April mule deer populations expressed as a percentage of the Management Objective (MO), Ochoco Wildlife Management Unit.

Year	Population Size	Percentage of Management Objective
2007	16,500	80
2008	15,700	77
2009	15,500	76
2010	16,000	78
2011	15,400	75
2012	15,400	75
2013	15,000	73
2014	14,800	72
2015	15,000	73

Mule deer populations in most of the western United States began experiencing a decline in the mid-1990s. The Western Association of Fish and Wildlife Agencies (2004) reported there were a multitude of factors adversely impacting mule deer populations including habitat loss to development, deterioration of forage quality and quantity, droughts, severe winter weather, competition with other ungulates, predation, disease, poaching and increased hunting mortality. As displayed in Table 144, deer populations are currently reaching 75 percent of the management objectives for the Ochoco Wildlife Management Unit (WMU) and showing a relatively stable population over the last five years displayed, and a slight downward trend (8.8 % decrease) over the 9 years displayed. Elsewhere in Central Oregon and across the West, steady declines in deer populations have been noted.

Table 145 displays elk hunting data for the wildlife management unit potentially affected by the project (ODFW 5/2012).

Table 145. Numbers of elk hunters, estimated population and hunter success in the Ochoco Wildlife Management Unit (Years 2008-2012).

Mgmt. Unit and Counties	# of Rifle Tags 2011	# of Archery Tags 2011	# Elk Population Estimate (2012)	Calf ratio forecast (calves/100 adults)
Ochoco WMU # 37, Crook, Wheeler and Grant	1,215	700	4,032	40
Mgmt. Unit	**# of Rifle Tags 2010**	**# of Archery Tags 2010**	**# Elk Population Estimate (2010)**	**% Success Rifle 2010**
Ochoco WMU # 37	1,345	750	4,300	25
*total number of rifle elk tags issued in 2008-2009 was 1275-1.075, while the number of archery tags was 850-750.				

The ODFW's elk population estimates in the Ochoco WMU for a recent 10-year period are displayed in Table 146. These animals move to several winter range areas associated with foothills and valley bottoms along the Crooked and John Day Rivers and their tributaries. The majority of the summering elk are in small to moderately sized herds in various locations across the Ochoco Mountains. Aspen stands and wet meadow complexes interspersed in coniferous cover and riparian woodlands serve as calving grounds and are also used extensively by elk for foraging areas. Remote areas with limited access, irregular topography and/or effective hiding cover provide security habitats. Elk population estimates are prepared by ODFW to determine population levels as compared to the management

objective for each unit. The elk population, though quite close to the management objective, appears to be experiencing a relatively steady trend over the past eight years, but a decline when compared to the population highs estimated in 2006 and 2007. In 2012 a different method was used (Sightability) to estimate the population so caution should be used in comparing 2012 data to estimates from previous years. The 2015 estimate for elk in the Ochoco WMU was 4,050 elk (88% of the MO of 4,600).

Table 146. Winter elk populations expressed as a percentage of the Management Objective (4,600) in the Ochoco Management Unit.

Year	Population Size	Percentage of Management Objective
2006	4,600	100
2007	4,700	102
2008	4,300	93
2009	4,000	87
2010	4,300	93
2011	3,900	85
2012	4,032	90
2013	4,000	87
2014	4,200	91
2015	4,050	88

Mule deer and elk are listed as Management Indicator Species for the Ochoco National Forest and elk in particular can act as a barometer for species sensitive to human disturbance. The Land and Resource Management Plan (LRMP, 1989) provides habitat management direction for big game animals. This project would not substantially impact the amount or arrangement of forage and cover. Thus, the analysis for this project is focused on road density, disturbance and security habitat. For this analysis, road densities and motorized impacts are analyzed by subwatersheds. Target open road densities are 3.0 miles per square mile or less, to achieve deer summer range habitat effectiveness targets. The open road density in this analysis is displayed within the 3 allocations with standards and guidelines for road density related to elk management (Winter Range, General Forest Winter Range and General Forest). Road density is also displayed by watershed to distinguish which areas have the highest open road densities. Disturbance was evaluated using distance banding from motorized routes. Bands close to motorized routes have high potential for disturbance to big game, while areas distant from any motorized route have low probability for disturbance to big game from use of the route. Elk security habitat is based on distance from any motorized route of more than ½ mile. High value elk security habitat meets that criteria and occurs in blocks at least 250 acres in size.

Key Indicators for Big Game Habitat

Effects to big game will be displayed at several scales including 5th field watersheds and 6th field subwatersheds and the entire project area area. The following indicators will be used to compare the effects of alternatives to big game:

- Open road and trail miles available for motorized use within 5th field watersheds expressed in miles of route per square mile of National Forest System roads and trails.
- Number of 5th-field watersheds and 6th-field subwatersheds with an open route density of greater than 3.0 miles of National Forest System roads and trails open for motorized use.
- Acres of National Forest land greater than 1 mile from an open motorized route in the project area.
- Acres of National Forest land within 4 distance bands within 1 mile from an open motorized route and percent of the project area.
- Acres providing elk security habitat (>1/2 mile from an open motorized route).
- Acres providing elk security habitat (>1/2 mile from an open motorized route) in patches at least 250 acres in size.

- Potential for displacement of big game onto private land as expressed by acres of secure cover within 2 miles of private land.

Of the factors included in the Habitat Effectiveness Index (HEI), motorized route density is the only index that may be affected by the proposed alternatives. This is because the potential change in cover quantity and quality (as defined by crown closure and height) under the proposed alternatives would be negligible at the landscaped scale which would be appropriate for the HEI analysis. For example, if the maximum direct physical effect to forested habitat is 190 acres in Alternative 4 (refer to the section on Physical Alteration of Habitat in General Effects to Wildlife) and the total acres in General Forest in the project area is 195,735 acres, then the largest potential change in cover would be less than 1/10th of one percent at the scale of the project area's General Forest Allocation (there are no proposed trails in winter range). This amount of change in cover is not large enough to trigger a change in either the cover quantity index or cover quality index in the HEI analysis. Thus, this project's analysis is based on motorized route density and distance from motorized routes. Measures based on findings from research at the Starkey Project (Wisdom et. al 2005) were used as key indicators and serve as the primary basis for comparison of alternatives for potential effects on big game and are discussed in detail in the effects analysis that follows.

Effects of Motorized Vehicle Access to Big Game

Effects to deer and elk habitat from motor vehicle access can be discussed in terms of direct and indirect impacts from disturbance, impacts to habitat, and increased legal and illegal harvest. The LRMP approved in 1989 recognized a need to limit motor vehicle access, and set guidelines on target road densities for elk winter range and elk summer range. At the time the LRMP was written no guidelines were drafted to account for off-highway vehicle use, consequently motorized densities were based on passenger cars, two wheel and four-wheel drive trucks on open system roads. Off-highway vehicle use has increased greatly since 1990 and is contributing to the amount of motorized vehicle use across the Forest including this project area. Public scoping letters and participation in public meetings conducted for this project indicate many users may prefer trails over driving on roads because of the reduced traffic levels and for the recreational experience provided by trails with complexity, technical difficulty and interesting features.

***Disturbance*:** Stankowich (2008) conducted a comprehensive review and meta-analysis of research on ungulate escape responses from human and vehicle disturbances. His review found evidence that ungulates pay attention to approacher behavior, have greater perceptions of risk when disturbed in open habitats, and that females or groups with young offspring show greater flight responses than adult groups. He also found that humans on foot were more likely to evoke a response than other stimuli (vehicles, noises) and that hunted populations showed significantly greater flight responses than non-hunted populations.

A key element of elk habitat management is providing hiding cover and security areas especially during the fall hunting seasons. Some studies have shown that elk when disturbed by motor vehicles will leave an area that lacks sufficient hiding cover (Hillis et al. 1991 and Wisdom et al. 2004). Hillis et al. (1991) defined elk security cover as forested habitat at least 250 acres in size and at least ½ mile from a road open to motorized travel. Recent studies at the Starkey Project in northeast Oregon (Wisdom et al. 2005) have disclosed even more information on the effects of roads and road densities on deer and elk. Rowland et al. (2000) summarized the direct impacts of roads and associated traffic on elk, in addition to outright mortality from vehicular collisions as follows: (1) Elk avoid areas near open roads but it varies in response to traffic rates; (2) Elk vulnerability to mortality from hunter harvest, both legal and illegal, increases as open road density increases; and (3) In areas of higher road density, elk exhibit higher levels of stress and increased movement rates. Rowland et al. (2005) also noted that elk use increased as distance from open roads increased and suggested that judicious

closing of certain road segments, particularly road spurs, may retain or create blocks of habitat that serve as security areas for elk while allowing sufficient road access for other management needs.

An important finding from the Starkey Experimental Forest and Range studies is that road (or route) density is not the best predictor of habitat effectiveness for elk. Instead a model based on distance bands proved to be a more spatially explicit and biologically meaningful tool for assessing effects from roads. Road densities do not provide a spatial depiction of how roads are distributed on the landscape (Rowland 2005). Consequently, a distance banding analysis was conducted on the 301,580 acre project area. Open motorized routes (roads and trails) were buffered at five scales to display the amount of National Forest acreage within the buffers. The distance bands applied included: a) acres and percent of the project area within ¼ mile, b) acres and percent of the project area ¼ to ½ mile from an open motorized route, c) acres and percent of the project area ½ to ¾ mile from an open motorized route, d) acres and percent of the project area ¾ to 1 mile from an open motorized route and e) acres and percent of the project area greater than one mile from an open motorized route. Hillis et al. (1991) defined elk security habitat for forested stands greater than 250 acres in size and greater than ½ mile from an open route. Acreage in cover greater than ½ mile from an open motorized route is assumed to provide greater security for elk than cover within ½ mile of a motorized route. Thus, the amount of cover more than ½ mile from motorized routes and within 1 mile of private land was used as a measure of potential to avoid displacement of elk from federal onto private land.

Disturbance impacts to mule deer from off-road use, including motorized use, are more difficult to quantify. Mule deer studies from the Starkey Project in northeastern Oregon showed little measureable response to off-road treatments (ATV riding, mountain biking, hiking and horseback use) as compared to control periods of no activity reported by Wisdom et al. (2004). Mule deer movement rates increased only slightly however, during periods of all four off-road activities except ATV riding. Estimated probabilities of mule deer flight response were similar among all four activities versus control periods. This suggested that deer were not exhibiting the same tendency for flight as shown by elk in relation to off-road activities. However, Wisdom et al. (2004) also reported that deer may be responding to fine-scale changes in habitat use, rather than substantial increases in movement rates and flight responses. For example, it is possible that deer may respond to an off-road activity by seeking dense cover rather than running from the activity. This could lead to animals spending more time in dense cover and less foraging may occur resulting in less fat reserves needed for winter survival.

Studies by Stankowich (2008) showed that humans on foot have more impact on mule deer than other stimuli studied (vehicles, noise, and horseback). Kutilek and Ferris (1989 in Montana TWS 1999) found black-tailed deer avoided OHV areas during high peak use but returned to established home ranges after traffic levels subsided.

In another study Yarmoloy (1988 in Ouren et al. 2007) studied mule deer does equipped with radio collars and several were intentionally followed by ATVs for nine minutes a day for 15 days. The harassed does shifted their feeding patterns into darkness, used cover more frequently, and increased their flight distance from ATVs. The harassed does also showed reduced reproduction success the following year compared to the control does that were not harassed. These effects would not be expected to occur in most of the project area because off-route travel would not be permitted under any action alternative (see Project Design Features, Chapter 2).

Hayden et al (2008) stated that disturbance factors in and of themselves have generally not been implicated in lower mule deer population performance. However, given the nutritional and energy requirements of deer, it seems reasonable to assume such factors could combine with a number of other factors to negatively impact deer. Habitat Guidelines for Mule Deer in the Northern Forest

Ecoregion (Hayden et al. 2008) provided a list of recommendations to minimize negative effects of human encroachment. Those applicable to the project include:

- Develop consistent regulations for OHV use.
- Develop and maintain interagency coordination in enforcement of OHV regulations.
- Designate specific areas and times (seasonal use restrictions) for activities such as OHV use that disturb habitat or deer.
- Cluster recreational activities to maintain or create large blocks of undisturbed habitat. Direct new development toward previously disturbed areas (clumped rather than dispersed distribution).
- Seasonally separate humans and mule deer at critical periods.
- Through education, modify human behaviors to reduce recreational effects to mule deer.
- Monitor activities that may unduly stress deer at important times of the year. Reduce or regulate disturbance if deemed detrimental. When applicable, encourage enforcement of regulations regarding dogs running at large or chasing wildlife and wildlife harassment by snowmobiles and OHVs.

At the present time, motorized road use in the OHV project area could be described as low to moderate during most of the year. Typically, most roads begin to melt out from winter snow in April and motorized use is available until November depending on snowfall timing and depth. During the spring and summer, road use is generally light, except near dispersed campsites along the main roads and where personal use firewood cutting is permitted. The general exceptions are roads and user-created OHV trails near population centers such as Prineville, which see substantial use during all periods that roads and trails are snow-free. However, motorized use in the entire project area changes dramatically beginning in late August with the onset of archery hunting season. The rifle deer season starts in late September or early October and is followed by rifle elk season in mid-October. Usually in early November the legal personal use firewood permittees shut down because of the end of the season and/or snowfall closes access roads.

***Off-Road Recreation Effects*:** The amount of habitat impacted by OHVs and 4-wheel drives and random cross-country travel is difficult to quantify. It is unlikely all motorized trails have been located, consequently the amount of habitat currently being disturbed by motorized travel is only estimated. As noted in the Recreation Report: using estimates from the 2008 National Visitor Use Monitoring (NVUM) survey on the Ochoco National Forest, more than 14,000 forest visitors participated in OHV or Motorized Trail Activities on the Forest in that year. For the purpose of this analysis, it is assumed that there are approximately 5000 visitors participating in OHV use within the project area (slightly more than 1/3 of the estimated total forest OHV participation). Most of this use occurs seasonally as the higher elevations become inaccessible due to snow. Based on observational data from Forest Service staff, the heaviest use within the Ochoco Summit project area occurs on summer weekends, and holidays from approximately May 1 – Sept. 30, with less recreational use occurring weekdays, and during the shoulder seasons. An exception to this is during hunting season. Starting with bow hunting in August and continuing through November, there are hunting camps scattered across the area. During this time, there is increased use of OHVs primarily for hunting purposes, not recreational riding. Most of the ongoing recreational OHV use in the project area occurs in the Marks Creek and Ochoco Creek subwatersheds, especially in the spring when the higher elevation areas are still snowed in. Later in the season OHV use increases in the central and eastern portions of the project area as the snow free season progresses. Known routes in use identified previously by the Central Oregon Motorcycle and ATV Club (COMAC) included routes in eight of the nine watersheds in the project area. However many of the miles identified by COMAC are on open roads. Therefore the length of routes identified by COMAC cannot be used to estimate off-road impacts to big game. Also there is an important distinction between recreational ATV use and use by hunters to access hunting areas or to retrieve game. Recreational users are more likely to use narrow,

winding or difficult routes, while hunters on ATVs are more likely to use wider and straighter routes such as roads, whether open or closed (personal communication, Ramming, 2010).

Studies have examined deer and elk response to modes of off-road recreation at Starkey in northeastern Oregon (Wisdom et al. 2005; Naylor et al. 2009). Wisdom et al. (2005) measured responses by mule deer and elk to four off-road recreation activities including hiking, mountain biking, horse riding, and ATV riding. The distance deer and elk moved and movement rates were measured in response to the activity and during control periods where no recreational activity was permitted. Mule deer responses contrasted sharply with elk. Mule deer showed little measureable response to the off-road treatments. However, movement rates increased slightly, during periods of all four off-road activities except ATV riding. Wisdom hypothesized that deer may well be responding to the treatments with fine-scale changes in habitat use (such as seeking cover), rather than substantial increases in movement rates and flight responses. The response by deer to human disturbance can also be complicated in areas with elk due to interspecific avoidance. Rowland et al. (2000) found that while elk selected gentle slopes farther from roads and on westerly aspects, deer selected steeper slopes, closer to roads and on easterly aspects. Johnson concluded that elk and mule deer select resources in opposite ways on shared ranges during the spring in the Blue Mountains Province, and that mule deer selection appears to be explained in large part as a result of avoidance of areas used by elk.

However, Wisdom et al. (2004) cautioned against inferring their study results to other areas where mule deer are common and elk are absent or sparse. In the absence of moderate or high densities of elk, mule deer may exhibit different distribution and selection patterns in relation to roads and traffic. Within the the Ochoco Summit Trail System project area, elk densities are moderate to high. Spatial separation of elk and deer on spring and summer range may occur in the Ochoco Summit area, such as has been observed in numerous studies: Collins and Urness (1983); Wallace and Krausman (1987); Wickstrom et.al. (1984); Latham et.al (1996, 1997); Wisdom et al. (2005); and Johnson (2000). Therefore, if elk patterns of movement or use are altered as a result of human activity, then mule deer use may increase in areas avoided by elk.

Movement rates by elk increased substantially during off-road activities as compared to the control periods (Wisdom et al. 2005 and Naylor et al. 2009). ATV use showed the greatest response by elk resulting in the greatest increase in movement, distance moved, and probability of flight response. The study suggests that elk were displaced from preferred security and foraging areas as a result of flight behavior during the daytime off-road activities. ATV riding and mountain biking caused the largest reductions in elk feeding time and increases in elk travel time and elk showed no habituation to mountain biking (Naylor et al. (2009). Preisler et al. (2006), in a study of elk and ATV use at Starkey, showed that elk appeared to respond at long distances (greater than 1,000 meters) to ATVs and that the estimated probability of flight appeared to be higher when elk were closer to ATV routes, even when the distance to the ATV was large. His study noted that a significant number of elk appear to ‘freeze’ while the ATVs pass very close (50-100 meters) that seem to suggest the possibility that elk are using topography and vegetation to escape detection at close distances to roads. Preisler et al. (2006) also concluded that over successive days of treatments (exposure to ATV riders) elk appear to adjust their distribution so that they are located closer to areas that are not visible from routes and during the nine days of rest in-between treatments, the animals appeared to return to their pretreatment distributions. Naylor (2008) found that elk behavior patterns were similar to controls each morning before treatments (ATV exposure) commenced, and then returned to pre-disturbance level 1 to 2 hours after each treatment ended. He also found that behavior patterns outside of the treatment times appeared to be unaffected by the treatment activity. Preisler (2006) also noted that during days 4 and 5 of treatment elk appeared to have either habituated to the activity or found close refugia, rather than fleeing to the far corners of the study pasture. He concluded that over successive

days of treatment, that elk appear to adjust their distributions so that they are located in or closer to areas that are not visible from the motorized route.

To assess the amount of big game habitat impacted from motorized disturbance a distance banding analysis was completed showing acreage within four distance bands within 1 mile of open roads or motorized trails, and acres in two distance bands greater than 1 mile from an open road or motorized trail. This analysis does not separate the on-road and off-road effects, but considers them in combination with equal impacts. The distance bands were selected based on several references, including: ODFW (2009); Mason, Bruce and Girard, Inc. for ODFW (2008); Preisler (2006); Rowland (2000, 2005), Roloff (1998) and Gaines (2003).

***Effects from Legal and Illegal Harvest*:** Roads open for motorized use provide the predominant hunter access into the Ochoco Wildlife Management Unit (WMU). As shown in Table 147, current overall open road densities in the 5th field watersheds range from 1.17 mi/mi2 to 2.34 mi/mi2. The greater the open motorized route density the greater the potential for game violations, as well as legal harvest during hunting seasons. Road hunting in itself is not considered illegal by the State of Oregon as long as the driver steps away from the road surface to fire the weapon. High open road and/or motorized trail densities may provide additional access for poaching of big game animals. Poaching is considered one of the factors contributing to the general decline in mule deer numbers in central Oregon. However, as stated above, trails proposed under this project would be designed for slow speed and technical difficulty, so would not necessarily provide easy access for poachers.

In addition to big game mortality from motorized access, there are other impacts to deer and elk. Johnson et al. (2004 in Wisdom et al. 2005) stated that elk trying to elude hunters can deplete fat reserves needed for over-winter survival and that elk responded to hunters by fleeing, whereas deer appear to elude hunters by hiding. Cook et al. (1996, 2005) reported that forage intake and nutritional quality during August and September can be determinants of winter survival of elk calves. Cook et al. (2005) also reported that the effects of the summer-autumn nutrition on fat accretion of cows and growth of calves significantly influenced their survival probability under harsh winter conditions. These months coincide with archery elk seasons and also when other recreationists such as late season campers, photographers and other forest visitors take to the woods to enjoy the fall colors. Time spent hiding from people takes away from foraging. While Rowland et al. (2000, 2004) found elk showed increasingly strong selection toward areas with increasing distance from roads open to motorized traffic, some recreationists would travel on foot that distance to pursue their activity. The research at Starkey also indicated that mule deer moved closer to roads with the assumption that they changed their distribution within the study area in relation to opposite changes in distribution by elk. This could lead to higher levels of deer harvest where road densities are also high.

The distributional pattern of open roads and motorized trails are important in determining the security an area can provide for elk during hunting seasons. Where possible, clumping road/trail closures can maintain security areas which Hillis et al. (1991) has described as a non-linear patch greater than 250 acres in size and greater than ½ mile from an open motorized route. Other authors have also referred to the ½ mile distance as a threshold for security (Rowland, 2005) though smaller patches may also be of benefit. Other authors have suggested that the highest impacts occur within the first ¼ mile (ODFW, 2008; Gaines, 2003). Some references imply that the level of the impact decreases on a continuum as distance from motorized increases (ODFW, 2008; Rowland, 2000, 2005). In its report to ODFW, Mason et al (2008) stated that the anticipated effect of a roadway on deer and elk drops to zero one mile (1600 m) away from the road. Naylor (2009) stated that a distance greater than 1290 m was beyond the distance where roads would greatly affect elk distribution. Gains (2003) provided tables displaying suggested zones of influence for a variety human uses, including motorized routes. He suggests a zone of influence on deer and elk of 300 m for motorized trails and up to 1300 m for open roads. The effects discussion on alternatives provide analysis conducted at several distance

banding scales to determine and display various zones of influence and the amount of security habitat for big game under each alternative.

Executive Order 13443: Executive Order 13443 was signed by President Bush on August 13, 2007 and is intended to enhance hunting opportunities on federal public lands. The stated purpose of the Executive Order is to "direct federal agencies that have programs and activities that have a measureable effect on public land management, outdoor recreation, and wildlife management, including the department of the Interior and the Department of Agriculture, to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitats." Maintaining motorized access is probably one of the most frequently expressed public comments the Ochoco and Deschutes National Forests receive during requests for public input on travel management. While open roads increase access for recreational activities including hunting, it does come at a cost to wildlife. Roads and other access lessen the amount of security habitat for big game and increase the amount of land base subject to motorized disturbance. Roads also increase hunter opportunity and may increase the potential for poaching or harassment. The key is to find a balance on providing a level of motorized access for all recreational users and undisturbed habitats for those species more susceptible to human disturbance.

Table 147 displays combined road and proposed trail densities by 5th field watershed and by alternative. Alternative 1 represents the existing condition for each 5th field watershed and assumes all operational maintenance level 2 or higher roads are open and that all operational maintenance level 1 roads are closed. Table 147 displays open road and motorized trail densities in the project area expressed as miles of route per square mile of land base on National Forest System land within each 5th field watershed. All acres within any subwatershed that overlapped with any project alternative have been included in the analysis, which results in a total project area of 301,580 acres. The actual area within 1 mile of any proposed designated motorized trail system route is about 100,000 to 110,000 acres.

Table 147. Total combined open motorized density of roads and trails expressed in miles per square mile, by alternative and watershed (National Forest System lands only) without mitigation.

5th Field Watershed	5th Field square miles NFS Lands Only	Alt. 1 Total Motorized Density (Roads + Trails)mi/mi2	Alt. 2 Total Motorized Density (Roads + Trails) mi/mi2	Alt. 3 Total Motorized Density (Roads + Trails) mi/mi2	Alt. 4 Total Motorized Density (Roads + Trails) mi/mi2	Alt. 5 Total Motorized Density (Roads + Trails) mi/mi2
Bridge Creek	24.37	1.31	1.31	1.31	1.33	1.33
Deep Creek	82.25	1.90	2.57	2.34	2.68	2.34
Lower Beaver Creek	36.86	1.60	1.85	1.85	1.90	1.88
Lower North Fork Crooked River	33.52	1.27	1.27	1.27	1.27	1.27
Mountain Creek	30.06	1.17	1.20	1.17	1.20	1.16
Paulina Creek	25.15	1.89	1.93	1.93	1.93	1.95
Rock Creek	22.16	1.52	1.56	1.56	1.56	1.56
Upper North Fork Crooked River	139.07	2.34	2.65	2.46	2.66	2.55
Upper Ochoco Creek	74.70	1.66	1.81	1.95	2.10	2.03
Total	**471.14**	**1.83**	**2.09**	**2.01**	**2.17**	**2.06**

Direct and Indirect Effects– Big Game

Alternative 1 – No Action

***Disturbance*:** Alternative 1 would retain the current pattern of disturbance from unregulated cross-country motor vehicle access, user-created trails, and use of closed roads until implementation of the forest-wide Travel Management Plan (see Cumulative Effects). Though this alternative would provide the highest amount of security habitat based on open roads, it would offer the poorest assurance of security for deer and elk due to the current configuration of the existing network of roads and the current pattern of use. There would be limited opportunity to close roads, to reinforce existing closures, to designate a defined OHV trail system or to rehabilitate user-created trails and other unauthorized routes. Open road densities on National Forest system lands only would remain at the current level (refer to Table 147). Though open road densities do not exceed Forest Plan guidelines of 3.0 mi/mi2 in General Forest allocation at the 5th field watershed scale, the road density does exceed that level on one of the 31 6th field subwatersheds in the project area (Lower Big Summit Prairie). A table of existing road densities in each of the subwatersheds in included in the Transportation section of this EIS (Table 9). Mixed use by passenger cars, industrial traffic and OHVs would occur on 659 miles of operational maintenance level 2 roads. Motorized use other than by OHVs would continue to occur on 140 miles of highway legal only roads (maintenance level 2 to 5) roads and on 270 miles of unclassified or other jurisdiction roads.

Distance banding analysis of existing open roads (based on operational maintenance level) shows there are a total of 50,177 acres of National Forest lands greater than 800 m (1/2 mile) from an existing road (elk security habitat). This represents approximately 17% of the project area. Of these,

47,969 acres occur in patches greater than 250 acres in size, or 96% of the total area more than ½ mile from an open road. Security areas in patches greater than 250 acres are distributed across all nine watersheds (and 28 of 31 subwatersheds) within the project area. The subwatersheds that did not contain elk security patches greater than 250 acres are Drift Canyon (in Lower Beaver Creek), Middle Rock Creek (in Rock Creek) and Lower Big Summit Prairie (in Upper North Fork Crooked River). In contrast, 115,127 acres (38 percent) of the project area is within 200 m (660 feet) of an existing open road. These high-disturbance zone acres are distributed across all nine watersheds (and 30 of 31 subwatersheds) in the project area. Within these areas elk would continue to experience high levels of disturbance from motorized use. It is assumed that lands within the 200 m (660 foot) zone are unavailable for consistent elk use as cover or foraging areas at least during daylight hours when motorized traffic is more likely to occur.

***Off-road Motor Vehicle Access*:** Unregulated motorized access from all user groups would likely continue to degrade big game habitat security until full implementation of the forest-level Travel Management Plan is achieved. This would result from unregulated access into deer hiding cover patches, elk security cover blocks, and into calving and fawning grounds during critical time periods of May and June. In the absence of a designated system of OHV routes, it is reasonable to assume user-created trails may continue to increase in mileage and further expand across the project area until implementation of the Travel Management Rule is fully realized through public understanding of the Travel Management Plan and the MVUM maps.

Executive Order 13443: There would be no loss of hunting acreage or motorized access within National Forest System lands in the project area. However, the proportion of the hunting public that prefers a less motorized landscape and a higher quality hunting experience would likely have a decreasing degree of satisfaction as the human population and use of the National Forest lands expands. Conversely, those hunters seeking areas with a high degree of motorized use would continue to benefit from limited funding to maintain and enforce existing closures and to manage motorized access. Legal and illegal harvest of deer and elk would be expected to continue at the same rate or slightly increasing as human population increases and more user-created motorized routes become established.

Negative impacts including disturbance during calving seasons would be expected to continue at the current trend. Security areas in patches greater than 250 acres in size would be available to elk across nine 5th field watersheds in the project area as displayed in Table 148. This alternative would provide a total of 47,969 acres of security habitat in blocks greater than 250 acres in size. Security areas (greater than ½ mile from open roads) in patches less than 250 acres in size would occur on a total of 2,179 acres distributed across eight watersheds. There would also be limited opportunity to improve security habitat through reinforcement of road closures and closure of unauthorized routes under this alternative.

Table 148. Acres of elk security area greater than ½ mile from any open motorized routes, acres in ( ) are in blocks greater than 250 in size.

5th Field Watershed	Watershed Acres (ONF)	Alt. 1 Elk Security Area Acres	Alt. 2 Elk Security Area Acres	Alt. 3 Elk Security Area Acres	Alt. 4 Elk Security Area Acres	Alt. 5 Elk Security Area Acres
Bridge Creek	15,595	4,385 (4,274)	4,373 (4,263)	4,373 (4,263)	4,373 (4,263)	4,371(4,260)
Deep Creek	54,561	4,551 (3,745)	1191 **(378)**	2,114 **(1,024)**	794 **(1)**	2,135(992)
Lower Beaver Creek	23,611	4,364 (4,176)	3,559 (3,421)	3,559 (3,421)	3,559 (3,421)	3,580(3,443)
Lower North Fork Crooked River	21,458	4,920 (4,868)	4,644 (4,593)	4,644 (4,593)	4,644 (4,593)	4,634(4,583)

Table 148. Acres of elk security area greater than ½ mile from any open motorized routes, acres in ( ) are in blocks greater than 250 in size.

5th Field Watershed	Watershed Acres (ONF)	Alt. 1 Elk Security Area Acres	Alt. 2 Elk Security Area Acres	Alt. 3 Elk Security Area Acres	Alt. 4 Elk Security Area Acres	Alt. 5 Elk Security Area Acres
Mountain Creek	19,244	6,986 (6,986)	6,959 (6959)	6,986 (6,986)	6,959 (6,959)	6,977(6,977)
Paulina Creek	16,094	1,704 (1,609)	1,697 (1,602)	1,697 (1,602)	1,697 (1,602)	1,695(1,601)
Rock Creek	14,181	3,567 (3,466)	3,510 (3,409)	3,510 (3,409)	3,510 (3,409)	3,508(3,407)
Upper North Fork Crooked River	89,005	9,907 (9,433)	9,362 (9,104)	9,778 (9,108)	9,352 (9,067)	9,603(9,102)
Upper Ochoco Creek	47,832	9,793 (9,412)	9,078 (8,734)	8,486 (8,108)	8,197 (7,819)	8,443(8,066)
Total	301,580	50,177 (47,969)	44,374 (42,460)	45,148 (42,514)	43,085 (41,132)	44,944 (42,431)
Shaded cells represent more than 10% reduction in total elk security area. Bold print acres represent more than 50% reduction in 250+ acre security areas.						

Alternative 2

***Disturbance and Off-road Motor Vehicle Access*:** Alternative 2 would reduce the current pattern of disturbance from unregulated cross-country motor vehicle access, user-created trails, and use of closed roads because of the rehabilitation and concealment proposed at 89 sites on user created routes, 11 sites on decommissioned roads and 109 sites on closed roads. This treatment would reinforce existing closures. However, this alternative would also increase the length of motorized route network by 69 miles. This alternative would provide a system of designated routes intended to provide a legal, planned, designed, engineered and maintained series of routes for motorized use. This should reduce the level of traffic on existing unauthorized or unwanted user-created routes. A regulated trail network providing approximately 69 miles of new motorized trails and up to 55 miles of roads converted to trails for a total of 124 miles in the designated trail system. The trail systems would be linked with shared use roads, including 46 miles which would be designated as connecting routes for the trail network. Where unwanted unauthorized or user created routes intersect the designated routes they would be closed, rehabilitated or concealed. This alternative would also reinforce existing closures on closed roads that intersect designated routes. Refer to Chapter 2 for a detailed description of each alternative. This alternative would be of moderate size and would provide for some increase in future use, and thus may have a potential to prevent future proliferation of unauthorized or user-created trails due to sufficiency of trail length.

Legally open road and trail densities on National Forest system lands would increase in some watersheds as shown in Table 147. Open road densities would exceed Forest Plan guidelines of 3.0 mi/mi2 in General Forest allocation on four of the 31 6th field subwatersheds in the project area (Elliot Creek, Lower Big Summit Prairie, Porter Creek and Lower Marks Creek). A table of road densities in each of the subwatersheds is included in the Transportation section of this EIS (Table 9). Mixed use by passenger cars, industrial traffic and OHVs would occur on 659 miles of operational maintenance level 2 roads. It is projected that motorized use would increase approximately 2 to 5 percent per year as the OHV trail system develops and becomes more widely known to users. Motorized use other than by OHVs would continue to occur on 140 miles of highway legal only (maintenance level 2 to 5) roads and 270 miles of unclassified or other jurisdiction roads.

Distance banding analysis of the combination of existing open roads (based on operational maintenance level) and proposed trails indicates that there would be a total of 44,374 acres of National Forest lands greater than 800 m (1/2 mile) from an existing road (elk security habitat). This

represents approximately 15% of the proejct area (a 2% reduction compared to existing condition). Of these, 42,460 acres occur in patches greater than 250 acres in size, or 96% of the total security area more than ½ mile from an open road. Security areas in patches greater than 250 acres are distributed across all nine watersheds (and 27 of 31 subwatersheds) within the project area. The subwatersheds that did not contain elk security in patches greater than 250 acres are Drift Canyon (in Lower Beaver Creek), Middle Rock Creek (in Rock Creek), Lower Big Summit Prairie and Porter Creek (in Upper North Fork Crooked River). In contrast, 125,740 acres (42 percent) of the project area would be within 200 m (660 feet) of an open road or motorized trail. These high-disturbance zone acres are distributed across all nine watersheds (and 30 of 31 subwatersheds) in the project area. Within these areas elk would continue to experience high levels of disturbance from motorized use. It is assumed that lands within the 200 m (660 foot) zone are unavailable for consistent elk use as cover or foraging areas during daylight hours when motorized traffic is more likely to occur.

Rocky Mountain Elk Foundation (RMEF) has mapped elk habitat at a State by State scale. This habitat map may be too coarse of a scale to predict high use areas at the local level. However, the alternative was compared to the RMEF map, particularly areas identified as "crucial". Under this alternative, 31 miles of designated routes occur within RMEF's Crucial Winter Range. This represents 18% of the total designated route miles under this alternative. Assuming a reduction in habitat availability of 200 meters on each side of the route (160 acres per mile), this would translate to a potential reduction of 4,960 acres, or approximately 9 percent of the 53,435 acres of winter crucial habitat mapped within the project area. However, the mapped habitat is coded as summer, winter crucial and winter habitat on the RMEF map, and includes elevations ranging from 3800 feet to over 6,200 feet including all available aspects and slopes (including north facing cliffs and talus slopes). It is also entirely within the Rager Travel Management area where motorized access is limited as described above. The proposed season of OHV use for the trail network is outside of the critical winter period both inside and outside of the Rager TMA under all action alternatives. Therefore, although these routes are within the polygon shown on the RMEF habitat map as crucial winter habitat, the proposed trails would not be open for use by OHVs during the critical winter period. The impact of these trails on elk habitat would be during the summer use period. The entire 301,580 acre project area is coded as summer habitat on the RMEF map regardless of slope, elevation, aspect or terrain features. Using the same assumptions as described above, the 170 miles of trail system (including 46 miles of open roads) could increase impacts to summer habitat on 9 percent of the RMEF mapped summer habitat within the project area.

Potential elk calving and deer fawning habitat was mapped based on areas in proximity (within ¼ mile) to meadows, aspen and other riparian shrub habitats, where such areas occur on terrain with less than 25% slope. Under this alternative 84 miles of designated routes occur within potential elk calving habitat based on this model. Of those 30 miles are on open roads and 54 miles are not on open roads. There is potential for increased traffic on open roads included as part of the OHV trail system as well as on proposed routes that are not on open roads. Assuming a reduction in habitat availability of 200 meters on each side of the route (160 acres per mile), proposed system routes would impact habitat in potential elk calving areas on 13,440 acres or 12 percent of the 115,540 acres available within the project area. Areas with high concentrations of elk during the calving period based on telemetry data collected by Oregon Department of Fisheries and Wildlife between 1989 and 1994 (ODFW 1998) were avoided when planning for trail placement.

This alternative would have a moderate impact to elk compared to Alternatives 3 and 4 because of the amount of road closures, medium trail extent and density. As shown in Table 148, Alternative 2 would result in a reduction in amount and distribution of undisturbed security habitat for deer and elk compared to Alternatives 1 and 3. Designation of new motorized routes would result in the decrease in lands greater than ½ mile from a route. This alternative would provide a total of 44,374 acres of security habitat. Within those acres, 42,460 acres of the security habitat occurs in blocks greater than

250 acres in size. Security habitat less than 250 acres in size do not provide the same security cover advantages present in larger security area blocks, but they would occur on USFS managed land on 1,914 acres.

Executive Order 13443: Alternative 2 distance banding analysis showed there are 11,411 acres of National Forest System land greater than one mile from an open motorized route in the project area which would represent high quality security habitat for elk. There are also 44,345 acres (15 percent) of the project area's National Forest lands greater than ½ mile from open motorized route. These areas would provide higher quality hunting areas for hunters that prefer a more primitive experience with less traffic. However these acres would be less accessible for people who are not willing or able to reach them on foot or on horseback. Under this alternative, 125,745 acres (42 percent) of the project area are within 660 feet (200 m) of an existing road or proposed motorized trail and would be available for hunters that are not willing or able to travel more than 1/8 of one mile off an open road to access hunting areas.

Alternative 3

Disturbance and Off-road Motor Vehicle Access: Alternative 3 would reduce the current pattern of disturbance from unregulated cross-country motor vehicle access, user-created trails, and use of closed roads because of the rehabilitation and concealment proposed at 54 sites on user created routes, 7 sites on decommissioned roads and 84 sites on closed roads. This treatment would reinforce existing closures. However, this alternative would also increase the length of the motorized route network by 50 miles. This alternative would provide a relatively compact system of designated routes intended to provide a legal, planned, designed, engineered and maintained series of routes for motorized use. This alternative focuses on reducing impacts to big game, water, fish and non-motorized recreation. High density trail areas (described as moderately dense loops) are proposed in proximity to the Ochoco Divide Sno-Park and Walton Sno-Park on the west end of the project area. This alternative would leave a large gap between two separate trail systems. This should reduce the level of traffic on existing unauthorized or unwanted user-created routes within the portions of the landscape where routes area proposed. A regulated trail network providing approximately 50 miles of new motorized trails and up to 38 miles of roads converted to trails for a total of 88 miles in the designated trail system. The trail systems would be linked with shared use roads, including 13 miles which would be designated as connecting routes for the trail network. Where unwanted unauthorized or user created routes intersect the designated routes they would be closed, rehabilitated or concealed. This alternative would also reinforce existing closures on closed roads that intersect designated routes. Refer to Chapter 2 for a detailed description of each alternative. This alternative would be of relatively small size and may not provide for increases in future use, and thus may have less potential to prevent future proliferation of unauthorized or user-created trails.

Open road densities on National Forest system lands would increase in some watersheds as shown in Table 147. Open road densities would exceed Forest Plan guidelines of 3.0 mi/mi2 in General Forest allocation on two of the 31 6th field subwatersheds in the project area (Lower Big Summit Prairie and Lower Marks Creek). A table of road densities in each of the subwatersheds is included in the Transportation section of this EIS (Table 9). Mixed use by passenger cars, industrial traffic and OHVs would occur on 659 miles of operational maintenance level 2 roads. It is projected that motorized use would increase approximately 2 to 5 percent per year as the OHV trail system develops and becomes more widely known to users. Motorized use other than by OHVs would continue to occur on 140 miles of highway legal only (maintenance level 3 to 5) roads and on 270 miles of unclassified or other jurisdiction roads.

Distance banding analysis of the combination of existing open roads (based on operational maintenance level) and proposed trails indicates that there would be a total of 45,147 acres of National Forest lands greater than 800 m (1/2 mile) from an existing road (elk security habitat). This

represents approximately 15% of the project area (a 2% reduction compared to existing condition). Of these, 42,514 acres occur in patches greater than 250 acres in size, or 94% of the total security area more than ½ mile from an open road. Security areas in patches greater than 250 acres are distributed across all nine watersheds (and 27 of 31 subwatersheds) within the project area. A table that displays elk security habitat by subwatershed is included in the Project Record. The subwatersheds that did not contain elk security in patches greater than 250 acres are Drift Canyon (in Lower Beaver Creek), Middle Rock Creek (in Rock Creek), Lower Big Summit Prairie and Porter Creek (in Upper North Fork Crooked River). In contrast, 123,032 acres (41 percent) of the project area would be within 200 m (660 feet) of an open road or motorized trail. These high-disturbance zone acres are distributed across all nine watersheds (and 30 of 31 subwatersheds) in the project area. Within these areas elk would continue to experience high levels of disturbance from motorized use. It is assumed that lands within the 200 m (660 foot) zone are unavailable for consistent elk use as cover or foraging areas during daylight hours when motorized traffic is more likely to occur.

Rocky Mountain Elk Foundation (RMEF) has mapped elk habitat at a State by State scale. This habitat map may be too coarse of a scale to predict high use areas at the local level. However, the alternative was compared to the RMEF map, particularly areas identified as "crucial". Under this alternative, 15 miles of designated routes occur within RMEF's Crucial Winter Range. This represents 15% of the total designated route miles under this alternative. Assuming a reduction in habitat availability of 200 meters on each side of the route (160 acres per mile), this would translate to a potential reduction of 2,400 acres, or approximately 4 percent of the 53,435 acres of winter crucial habitat mapped within the project area. However, this mapped habitat is coded as summer, winter crucial and winter habitat on the RMEF map, and includes elevations ranging from 3800 feet to over 6,200 feet including all available aspects and slopes (including north facing cliffs and talus slopes). It is also entirely within the Rager Travel Management area where motorized access is limited as described above. The proposed season of OHV use for the trail network is outside of the critical winter period both inside and outside of the Rager TMA under all action alternatives. Therefore, although these routes are within the polygon shown on the RMEF habitat map as crucial winter habitat, the proposed trails would not be open for use by OHVs during the critical winter period. The impact of these trails on elk habitat would be during the summer use period. The entire 301,580 acre project area is coded as summer habitat on the RMEF map regardless of slope, elevation, aspect or terrain features. Using the same assumptions as described above, the 101 miles of trail system (including 13 miles of open roads) could increase impacts to summer habitat on 5 percent of the RMEF mapped summer habitat within the project area.

Potential elk calving and deer fawning habitat was mapped based on areas in proximity (within ¼ mile) to meadows, aspen and other riparian shrub habitats, where such areas occur on terrain with less than 25% slope. Under this alternative 54 miles of designated routes occur within potential elk calving habitat based on this model. Of those 9 miles are on open roads and 45 miles are not on open roads. There is potential for increased traffic on open roads included as part of the OHV trail system as well as on proposed routes that are not on open roads. Assuming a reduction in effective habitat of 200 meters on each side of the route (160 acres per mile), proposed system routes would impact habitat in potential elk calving areas by 8,640 acres or 7 percent of the 115,540 acres available within the project area. Areas with high concentrations of elk during the calving period based on telemetry data collected by Oregon Department of Fisheries and Wildlife between 1989 and 1994 (ODFW 1998) were avoided when planning for trail placement.

This alternative would have an impact to elk that falls between that of Alternatives 1 and 2 because of the amount of road closures, compact trail extent and density. Designation of new motorized routes would result in a decrease in lands greater than ½ mile from a route. As shown in Table 148, Alternative 3 would result in a reduction in amount and distribution of undisturbed security habitat for deer and elk compared to Alternative 1. This alternative would provide a total of 45,148 acres of

security habitat. Of those acres, 42,514 acres of security habitat occur in blocks greater than 250 acres in size. Security habitat less than 250 acres in size do not provide the same security cover advantages present in larger security area blocks.

Executive Order 13443: Alternative 3 distance banding analysis showed there are 10,411 acres of National Forest System land greater than one mile from an open motorized route in the project area which would represent high quality security habitat for elk. There are also 45,118 acres (15 percent) of the project area's National Forest lands greater than ½ mile from open motorized route. These areas would provide higher quality hunting areas for hunters that prefer a more primitive experience with less traffic. However these acres would be less accessible for people who are not willing or able to reach them on foot or on horseback. Alternative 3 has the fewest acres of all action alternatives within 660 feet of a motorized route because of road closures and a less extensive trail network which impacts fewer acres of big game habitat. Under this alternative, 123,036 acres (41 percent) of the project area are within 660 feet (200 m) of an existing road or proposed motorized trail and would be available for hunters that are not willing or able to travel more than 1/8 of one mile off an open road to access hunting areas

Alternative 4

Disturbance and Off-road Motor Vehicle Access: Alternative 4 would reduce the current pattern of disturbance from unregulated cross-country motor vehicle access, user-created trails, and use of closed roads because of the rehabilitation and concealment proposed at 106 sites on user created routes, 8 sites on decommissioned roads and 163 sites on closed roads. This treatment would reinforce existing closures. However, it would also increase the length of legally open motorized routes by 81 miles. The trails are generally distributed over a larger area than proposed in Alternatives 2 or 3. Implementation of Alternative 4 would provide an extensive system of designated routes with longer loops, scenic vistas and interconnection of loops which would attract use on the designated system and would reduce use in areas away from the designated system. This should reduce the level of traffic on existing unauthorized or unwanted user-created routes that are not part of the proposed trail network. This alternative would establish a regulated trail network providing approximately 81 miles of new motorized trails and up to 76 miles of roads converted to trails for a total of 158 miles in the designated trail system. The trail systems would be linked with shared use roads, including 53 miles which would be designated as connecting routes for the trail network. This alternative would provide a system of designated routes intended to provide a legal, planned, designed, engineered and maintained series of routes for motorized use.

Where unwanted unauthorized or user created routes intersect the designated routes they would be closed, rehabilitated or concealed. This alternative would also reinforce existing closures on closed roads that intersect designated routes. Refer to Chapter 2 for a detailed description of each alternative. The more extensive designated OHV system proposed by this alternative may be more capable of reducing unauthorized use in other areas due to inclusion of more extensive and varied recreational opportunities. This alternative may also be more likely to be of sufficient size to handle expected increases in future use, and thus may have a higher probability of preventing future proliferation of unauthorized or user-created trails.

Open road and trail densities on National Forest system lands would increase in some watersheds as shown in Table 147. Open road densities would exceed Forest Plan guidelines of 3.0 mi/mi2 in General Forest allocation on six of the 31 6th field subwatersheds in the projectarea (Jackson Creek, Elliot Creek, Lower Big Summit Prairie, Porter Creek, Lower Marks Creek and Upper Marks Creek). Road density in one subwatershed would be brought to the 3.0 mi/mi^2 level (Howard Creek). A table of road densities in each of the subwatersheds in included in the Transportation section of this EIS (Table 9). Mixed use by passenger cars, industrial traffic and OHVs would occur on 659 miles of operational maintenance level 2 roads. It is projected that motorized use would increase

approximately 2 to 5 percent per year as the OHV trail system develops and becomes more widely known. Motorized use other than by OHVs would continue to occur on 140 miles of highway legal only (maintenance level 2 to 5) roads. This alternative would likely impact elk to a greater degree than Alternatives 1, 2 or 3. While more road closures or conversions are proposed than the other action alternatives, the design of the trail system impacts more acreage and results in less undisturbed habitat greater than ½ mile from an open road. There would be fewer acres of security habitat compared to the other action alternatives.

Distance banding analysis of the combination of existing open roads (based on operational maintenance level) and proposed trails indicates that there would be a total of 43,085 acres of National Forest lands greater than 800 m (1/2 mile) from an existing road (elk security habitat). This represents approximately 14% of the project area (a 3% reduction compared to existing condition). Of these, 41,132 acres occur in patches greater than 250 acres in size, or 95% of the total security area more than ½ mile from an open road. Security areas in patches greater than 250 acres are distributed across all nine watersheds (and 24 of 31 subwatersheds) within the project area. The subwatersheds that did not contain elk security in patches greater than 250 acres are Drift Canyon (in Lower Beaver Creek), Middle Rock Creek (in Rock Creek), Lower Big Summit Prairie and Porter Creek (in Upper North Fork Crooked River), Jackson Creek and Little Summit Prairie Creek (in Deep Creek), Lower Marks Creek (in Upper Ochoco Creek). In contrast, 129,385 acres (43 percent) of the project area would be within 200 m (660 feet) of an open road or motorized trail. These high-disturbance zone acres are distributed across all nine watersheds (and 30 of 31 subwatersheds) in the project area. Within these areas elk would continue to experience high levels of disturbance from motorized use. It is assumed that lands within the 200 m (660 foot) zone are unavailable for consistent elk use as cover or foraging areas during daylight hours when motorized traffic is more likely to occur.

Rocky Mountain Elk Foundation (RMEF) has mapped elk habitat at a State by State scale. This habitat map may be too coarse of a scale to predict high use areas at the local level. However, the alternatives were compared to the RMEF map, particularly areas identified as “crucial”. Under this alternative, 38 miles of designated routes occur within RMEF’s Crucial Winter Range. This represents 18% of the total designated route miles under this alternative. Assuming a reduction in habitat availability of 200 meters on each side of the route (160 acres per mile), this would translate to a potential reduction of 6,080 acres, or approximately 11 percent of the 53,435 acres of winter crucial habitat mapped within the project area. However, this mapped habitat is coded as summer, winter crucial and winter habitat on the RMEF map, and includes elevations ranging from 3800 feet to over 6,200 feet including all available aspects and slopes (including north facing cliffs and talus slopes). It is also entirely within the Rager Travel Management area where motorized access is limited as described above. The proposed season of OHV use for the trail network is outside of the critical winter period both inside and outside of the Rager TMA under all action alternatives. Therefore, although these routes are within the polygon shown on the RMEF habitat map as crucial winter habitat, the proposed trails would not be open for use by OHVs during the critical winter period. The impact of these trails on elk habitat would be during the summer use period. The entire 301,580 acre project area is coded as summer habitat on the RMEF map regardless of slope, elevation, aspect or terrain features. Using the same assumptions as described above, the 212 miles of trail system (including 53 miles of open roads) could increase impacts to summer habitat on 11 percent of the RMEF mapped summer habitat within the project area.

Potential elk calving and deer fawning habitat was mapped based on areas in proximity (within ¼ mile) to meadows, aspen and other riparian shrub habitats, where such areas occur on terrain with less than 25% slope. Under this alternative 102 miles of designated routes occur within potential elk calving and deer fawning habitat based on this model. Of those 31 miles are on open roads and 70 miles are not on open roads. There is potential for increased traffic on open roads included as part of the OHV trail system as well as on proposed routes that are not on open roads. Assuming a reduction

in effective habitat of 200 meters on each side of the route (160 acres per mile), proposed system routes would impact habitat in potential elk calving areas by 16,320 acres or 14 percent of the 115,540 acres available within the project area. Areas with high concentrations of elk during the calving period based on telemetry data collected by Oregon Department of Fisheries and Wildlife between 1989 and 1994 (ODFW 1998) were avoided when planning for trail placement.

This alternative would have the highest impact to elk compared to Alternatives 1, 2 and 3 because of the extensive trail system it proposes. The designation of new motorized routes would result in a decrease in lands greater than ½ mile from a route. As shown in Table 148, Alternative 4 would result in a reduction in amount and distribution of undisturbed security habitat for elk compared to Alternatives 1, 2, 3 and 5. This alternative would provide a total of 43,085 acres of security habitat. Of those acres 41,132 acres of security habitat occurs in blocks greater than 250 acres in size. Security habitat less than 250 acres in size do not provide the same security cover advantages present in larger security area blocks.

Executive Order 13443: Alternative 4 distance banding analysis showed there are 10,411 acres of National Forest System land greater than one mile from an open motorized route in the project area which would represent high quality security habitat for elk. There are also 43,059 acres (14 percent) of the project area's National Forest lands greater than ½ mile from open motorized route. These areas would provide higher quality hunting areas for hunters that prefer a more primitive experience with less traffic. However these acres would be less accessible for people who are not willing or able to reach them on foot or on horseback. Alternative 4 has the most acres of all action alternatives within 660 feet of a motorized route because of the more extensive trail system which impacts more acres of big game habitat. Under this alternative, 129,390 acres (43 percent) of the project area are within 660 feet (200 m) of an existing road or proposed motorized trail and would be available for hunters that are not willing or able to travel more than 1/8 of one mile off an open road to access hunting areas.

Alternative 5

Disturbance and Off-road Motor Vehicle Access: Alternative 5 would reduce the current pattern of disturbance from unregulated cross-country motor vehicle access, user-created trails, and use of closed roads because of the rehabilitation and concealment proposed at 25 sites on user created routes, 39 sites on decommissioned roads and 121 sites on closed roads. This treatment would reinforce existing closures. However, it would also increase the length of legally open motorized routes by 105 miles. The trails are generally distributed over a larger area than proposed in Alternatives 2 or 3. Implementation of Alternative 5 would provide a moderate system of designated routes with loops, scenic vistas and interconnection of loops which would attract use on the designated system and would reduce use in areas away from the designated system. This should reduce the level of traffic on existing unauthorized or unwanted user-created routes that are not part of the proposed trail network. This alternative would establish a regulated trail network providing approximately 51 miles of new motorized trails and up to 54 miles of roads converted to trails for a total of 135 miles in the designated trail system. The trail systems would be linked with shared use roads, including 30 miles which would be designated as connecting routes for the trail network. This alternative would provide a system of designated routes intended to provide a legal, planned, designed, engineered and maintained series of routes for motorized use. Where unwanted unauthorized or user created routes occur within the OHV Management Area, they would be closed, rehabilitated and/or concealed. This alternative would also reinforce existing closures on closed roads within the OHV Management Area. Refer to Chapter 2 for a detailed description of each alternative. The more extensive and diverse (includes routes for class I, II, III and IV vehicles) designated OHV system proposed by this alternative may be more capable of reducing unauthorized use in other areas due to inclusion of more extensive and varied recreational opportunities compared to Alternative 3, but less than under Alternatives 2 or 4 (except for class IV vehicles). This

alternative may also be more likely to be of sufficient size to handle expected increases in future use, and thus may have a higher probability of preventing future proliferation of unauthorized or user-created trails compared to Alternative 3.

Open road and trail densities on National Forest system lands would increase in some watersheds as shown in Table 147. Open road densities would exceed Forest Plan guidelines of 3.0 mi/mi2 in General Forest allocation on two of the 31 6th field subwatersheds in the project area (Lower Big Summit Prairie and Lower Marks Creek). A table of road densities in each of the subwatersheds in included in the Transportation section of this EIS (Table 9). Mixed use by passenger cars, industrial traffic and OHVs would occur on 661 miles of operational maintenance level 2 roads. It is projected that motorized use would increase approximately 2 to 5 percent per year as the OHV trail system develops and becomes more widely known. Motorized use other than by OHVs would continue to occur on 138 miles of highway legal only (maintenance level 2 to 5) roads. This alternative would likely impact elk to a greater degree than Alternatives 1 or 3, but less than 2 or 4. Physical reinforcement of existing road closures and closure of unwanted and unauthorized routes would occur across the OHV Management Area, resulting in more effective closures and better elk security in these areas. There would be more acres of security habitat (based on proximity to legal motorized routes) compared to Alternatives 2 and 4, but less than in Alternatives 1 or 3.

Distance banding analysis of the combination of existing open roads (based on operational maintenance level) and proposed trails indicates that there would be a total of 44,944 acres of National Forest lands greater than 800 m (1/2 mile) from an existing road (elk security habitat). This represents approximately 15% of the project area (a 2% reduction compared to existing condition). Of these, 42,431 acres occur in patches greater than 250 acres in size, or 94% of the total security area more than ½ mile from an open road. Security areas in patches greater than 250 acres are distributed across all nine watersheds (and 24 of 31 subwatersheds) within the project area. The subwatersheds that did not contain elk security in patches greater than 250 acres are Drift Canyon (in Lower Beaver Creek), Lower Big Summit Prairie and Porter Creek (in Upper North Fork Crooked River), Lower Marks Creek (in Upper Ochoco Creek). In contrast, 124,432 acres (41 percent) of the project area would be within 200 m (660 feet) of an open road or motorized trail. These high-disturbance zone acres are distributed across all nine watersheds (and 30 of 31 subwatersheds) in the project area. Within these areas elk would continue to experience high levels of disturbance from motorized use. It is assumed that lands within the 200 m (660 foot) zone are unavailable for consistent elk use as cover or foraging areas during daylight hours when motorized traffic is more likely to occur.

Rocky Mountain Elk Foundation (RMEF) has mapped elk habitat at a State by State scale. This habitat map may be too coarse of a scale to predict high use areas at the local level. However, the alternatives were compared to the RMEF map, particularly areas identified as “crucial.” Under this alternative, 21.1 miles of designated routes occur within RMEF’s Crucial Winter Range. This represents 16% of the total designated route miles under this alternative. Assuming a reduction in habitat availability of 200 meters on each side of the route (160 acres per mile), this would translate to a potential reduction of 3,376 acres, or approximately six percent of the 53,435 acres of winter crucial habitat mapped within the project area. However, this mapped habitat is coded as summer, winter crucial and winter habitat on the RMEF map, and includes elevations ranging from 3800 feet to over 6,200 feet including all available aspects and slopes (including north facing cliffs and talus slopes). It is also entirely within the Rager Travel Management area where motorized access is limited as described above. The proposed season of OHV use for the trail network is outside of the critical winter period both inside and outside of the Rager TMA under all action alternatives. Therefore, although these routes are within the polygon shown on the RMEF habitat map as crucial winter habitat, the proposed trails would not be open for use by OHVs during the critical winter period. The impact of these trails on elk habitat would be during the summer use period. The entire 301,580-acre project area is coded as summer habitat on the RMEF map regardless of slope, elevation, aspect or

terrain features. Using the same assumptions as described above, the 135 miles of trail system (including 30 miles of open roads) could increase impacts to summer habitat on 1.6 percent of the RMEF mapped summer habitat within the project area.

Potential elk calving and deer fawning areas were mapped based on areas in proximity (within ¼ mile) to meadows, aspen and other riparian shrub habitats, where such areas occur on terrain with less than 25% slope. Under this alternative 69 miles of designated routes occur within potential elk calving and deer fawning habitat based on this model. Of those 21 miles are on open roads and 48 miles are not on open roads. There is potential for increased traffic on open roads included as part of the OHV trail system as well as on proposed routes that are not on open roads. Assuming a reduction in effective habitat of 200 meters on each side of the route (160 acres per mile), proposed system routes could impact habitat in potential elk calving areas by 11,040 acres or 9 percent of the 115,540 acres available within the project area. Areas with high concentrations of elk during the calving period based on telemetry data collected by Oregon Department of Fisheries and Wildlife between 1989 and 1994 (ODFW 1998) were avoided when planning for trail placement.

This alternative would have a moderate impact to elk because of the moderate extent of trail system it proposes compared to Alternatives 1 2, 3, and 4. The designation of new motorized routes would result in a decrease in lands greater than ½ mile from a route. As shown in Table 148, Alternative 5 would result in a reduction in amount and distribution of undisturbed security habitat for elk compared to Alternatives 1 and 3. This alternative would provide a total of 44,944 acres of elk security habitat. Of those acres 42,431 acres of security habitat occur in blocks greater than 250 acres in size. Security habitat less than 250 acres in size do not provide the same security cover advantages present in larger security area blocks.

Executive Order 13443: Alternative 5 distance banding analysis showed there are 10,422 acres of National Forest System land greater than one mile from an open motorized route in the project area which would represent high quality security habitat for elk. There are also 44,944 acres (15 percent) of the project area's National Forest lands greater than ½ mile from open motorized route. These areas would provide higher quality hunting areas for hunters that prefer a more primitive experience with less traffic. However these acres would be less accessible for people who are not willing or able to reach them on foot or on horseback. Alternative 5 has a moderate amount of acres compared to the other action alternatives within 660 feet of a motorized route because of the moderate extent of the trail system. Under this alternative, 124,432 acres (41 percent) of the project area are within 660 feet (200 m) of an existing road or proposed motorized trail and would be available for hunters that are not willing or able to travel more than 1/8 of one mile off an open road to access hunting areas.

Effects Common to All Action Alternatives

***Off-road Motor Vehicle Access*:** Unregulated cross-country motorized travel including user created trails across the project area is expected to be reduced as a result of provision of a designated system of trails and physical closure, concealment, restoration or rehabilitation of unwanted and unauthorized routes. The extent of this relief from unauthorized travel likely depends to some extent on the amount and diversity of opportunities provided. In other words, a small-sized trail system may not be as effective in providing alternative riding areas compared to a more extensive system. On the other hand, some unauthorized use may continue in some areas of the Forest regardless of the provision of a designated system. Within the OHV Management Area, active patrolling, monitoring and closure of unwanted and unauthorized routes would be implemented under the action alternatives. In addition to the provision of alternate riding areas, the action alternatives are expected to result in less motorized disturbance to big game animals in specific locations where existing road closures are reinforced and where unwanted user-created trails are rehabilitated. The increase in law enforcement presence that comes with a designated trail system, may reduce violations such as the use of unauthorized routes in proximity to the trail system and within the OHV Management Area, but is not

likely to directly affect the level of compliance elsewhere in the project area or outside of the project area. However, provision of a managed OHV trail system is expected to attract some of the use from currently unauthorized use areas, which may indirectly improve compliance in areas outside of the OHV Management Area.

Executive Order 13443: There would be no removal of lands within the National Forest System of the project area available for hunting in any action alternative. However, each of the action alternatives proposes a mix of road closures, roads converted to motorized trails, closure/rehabilitation of user created trails, and construction of new trails to provide a designated OHV trail system. This would reduce motorized access to roads that are not open on MVUM through physical reinforcement of existing closures. Some subwatersheds would experience an increased level of motorized access and some subwatersheds would experience lower densities depending on road closures and where new and/or existing trails become part of the designated system. Averaged across all of the watersheds in the project area, motorized densities would be higher as compared to Alternative 1 as shown in Table 147. Hunters with trucks and four-wheel drive vehicles would have less access in closed areas as a result of physical reinforcement of existing the road closures and rehabilitation of unauthorized routes. Although OHV users would still be able to access big game habitats with their OHVs on designated trails and open roads during the open season of use, there is no provision for hunting access or the retrieval of game with OHVs off of designated routes. Conversely, those hunters seeking a higher quality hunting experience with less motorized use may find suitable areas in portions of the project area where cross country and unauthorized travel is expected to decline as a direct result of reinforcement of existing closures and an indirect effect of predicted reduced use of areas that lack an OHV trail system, once a legal designated OHV system is provided elsewhere. Because motorized densities increase compared to Alternative 1 there may be an increase in legal and illegal harvest of deer and elk in proximity to proposed trails.

Cumulative Effects

Implementation of the Travel Management Rule of 2005 was initiated with the signing of the Record of Decision and release of the FEIS for the Travel Management Project; Deschutes and Ochoco National Forests and Crooked River National Grassland in 2011. The Deschutes and Ochoco Travel Management Plan now has a signed decision and implementation of the plan is in effect. Under the Deschutes and Ochoco Travel Management Plan, motorized use is restricted to designated routes, and OHV use is allowed only on designated OHV trail systems and those Maintenance Level 2 roads open for mixed use and selected rock pits designated as open for cross country travel as shown on the MVUM maps. Law enforcement actions would likely encourage compliance through education in the first few years although it is unknown what level of non-compliance may occur initially. After implementation of this OHV trail project along with implementation of the forest-level Travel Management Plan, in the long-term, there would be reduced disturbance due to anticipated restriction of motorized use cross-country, on user created trails and on closed roads.

Refer to the list of past, present and reasonably foreseeable actions in Table 140. The Howard Elliot Johnson, Jackson and Wolf Vegetation Management EISs are currently in the implementation phase and the Canyon and Spears EISs were recently implemented. These projects include projected management acreage that overlaps with the Ochoco Summit Trail System project area. Approximately 81,000 acres of vegetation and fuels management are proposed for treatments including commercial thinning, small diameter thinning and prescribed burning in these projects. The primary effect of these vegetation management projects on big game is related to roads used for access to treatment areas, roads closed as part of these projects, and changes in cover as a result of proposed vegetative treatments. Vegetative treatments may require the construction of temporary roads to access units and extract products. Temporary roads are typically in place for several years and then closed at the completion of all harvest associated activities. Closed roads may also have to be used for haul routes during timber harvest operations. Collectively, these actions would have a

temporary short-term impact on road densities. However, roads analysis that was recently conducted calls for approximately 30 miles of existing open roads to be closed and another 6 miles to be decommissioned within the project area. Some of these recommended road closures are being included in the NEPA process for these vegetation and watershed restoration projects. Further details on these road closure recommendations are described in detail in the Transportation Report.

Alternative 1

The existing condition for Alternative 1 is the result of past and present actions that have contributed to the current condition of motorized use and hiding cover conditions in the project area. This current condition is shaped by previous travel management decisions and land management actions. These actions include commercial timber harvest entries, small tree thinning, prescribed fire, wildfires, wildlife habitat enhancements, water development and protection, and commercial and personal use firewood removal. Fuel and vegetation management actions have left some areas with improved forage conditions and reduced cover. Timber management has left behind a footprint of road systems built to extract wood products. Implementation of Alternative 1 would leave existing routes that are open on the ground in their current condition and enforcement of the new Travel Management Plan would be based largely on user compliance with the Motor Vehicle Use Map (MVUM). Legal use by OHVs would be confined to open roads within the project area, and the presence of legacy roads would be a tempting (though illegal) alternative to staying on the MVUM roads. Travel on roads not shown as open on the MVUM map is likely to continue, though it is not authorized under the Travel Management Plan. However, Legal use by OHVs would be confined to open mixed-use roads and rock pits designated as open for cross country travel within the project area.

All Action Alternatives

The vegetation treatments described above would likely result in a reduction in the amount of big game hiding cover, at least in the short term, and potentially increased human access due to removal of small trees and woody debris. The effects of vegetative treatments on hiding and thermal cover are disclosed in the NEPA documents for those projects and this OHV trail project would result in minimal changes to canopy closure, and therefore acres meeting the criteria for these cover classes. However, this project may affect the availability of these cover areas due to the impact of human disturbance within cover. There is a potential cumulative impact of disturbance to big game animals that may be utilizing hiding cover within vegetation management project areas, from additional disturbance related to use of OHV trails in those areas. Over the short -term increased motorized route densities as compared to the existing condition may combine with the effects of fuel and vegetation management projects and may result in an increase in legal and illegal harvest of deer and elk because of more vehicular access and easier visibility due to reduced understory cover. In addition, effects of human activity and reduction of cover associated with implementation of the vegetation and fuels management projects may combine with effects from proposed establishment of new motorized routes in limiting the amount or effectiveness of security habitat in the short term. In the long-term however, road closures included in some of these vegetation and fuels management projects, and in this project, would reduce the network of open motorized routes within those project areas, potentially reducing the negative impacts from construction of the proposed trails within the project areas where road closures are implemented, especially within the OHV Management Area where active patrols, monitoring, closure and rehabilitation would occur under the action alternatives.

All action alternatives would develop a designated OHV trail system to replace the current unregulated use that is presently occurring. Under implementation of the 2005 Travel Management Rule and the forest-level Travel Management EIS, on-the-ground motorized route densities would decline from the current levels as a result of effectively closing user created trails not included in the designated OHV system, enforcement of existing road closures and prohibiting cross-country travel. Roads Analysis has been conducted for all subwatersheds that overlap the proposed alternatives. The

Roads Analysis process helps to prioritize roads for closure, reinforcement of existing closures or decommissioning. Refer to the Roads Analysis Reports in the Project Record. Implementation of the forest-level Travel Management Plan, in combination with closure reinforcement and restoration proposed under this project would benefit mule deer and elk in the project area because portions of this project area are heavily roaded, with many closed or decommissioned roads that are still receiving motorized use, and there are relatively small percentages of the project area in elk security habitat. Refer to Table 147 and Table 148.

Private land ownership in the project area includes rural ranch and timberland. These lands do provide quality big game habitat because of restricted human access, and slope position which provides productive soils and water availability. In addition agricultural practices on private land often provide highly palatable forage which can serve as an attractant to big game, especially in the fall when upland forage dries out and becomes less palatable. While the industrial timberland acreage has been managed for timber harvest, big game hiding cover and secure habitat acreage is available. The potential for development of an OHV system on National Forest lands to displace elk to private land has been considered in this analysis. Table 149 shows the amount of secure cover (based on distance from motorized routes) available to deer and elk within 2 miles of private land. This measure was used as an estimate of capability to retain elk on federal land and not cause displacement to private land. This analysis assumes that elk would be more likely to find secure cover and not be displaced to private land where forested stands exceeding 40% crown closure occur at a distance of more than ½ mile from a motorized route and where this occurs within 2 miles of private land. As can be seen in the difference between alternatives detected by this measure is very small (up to a 4 percent reduction between Alternatives 1 and 4). This is because of the relatively large network of existing open motorized routes and the abundance of open vegetation such as meadows and scabland that affect the distribution of forested cover within two miles of private land. Alternative 2 shows slightly more (up to 2% more) forested cover in proximity to private land compared to the other action alternatives due to the lack of interconnected loops on the west end in that alternative. These west end loops in Alternatives 3, 4 and 5 are in a forested setting within 2 miles of private land, and thus they affect the amount of undisturbed forested cover in proximity to private land.

Table 149. Comparison of alternatives for hiding and thermal cover (more than ½ mile from open motorized route and within 2 miles of private land).

Cover Type	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Hiding cover (40 to 70% cc)	11,847	11,558	11,465	11,285	11,437
Thermal cover (70+ % cc)	9,197	9,089	8,978	8,915	9,035
Total cover (40 - 100% cc)	21,044	20,647	20,443	20,200	20,472

Table 150 displays a summary of the predicted effects of the proposed alternatives on big game key indicators. No trails or areas are proposed in Winter Range or General Forest Winter Range, so there are not differences in these areas between the alternatives.

Table 150. Summary comparison of key indicators for big game by alternative.

Key Indicators	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
National Forest road and motorized trail density in mi/mi2 averaged for 31 subwatersheds in GF, GFWR and WR combined	1.83	2.09	2.01	2.17	2.06
National Forest road and motorized trail density in mi/mi2 in General Forest averaged across 31 subwatersheds	1.91	2.23	2.13	2.31	2.13
National Forest road and motorized trail density in mi/mi2 in Winter Range + GFWR averaged across 31 subwatersheds (without credit for gate closure mitigations)	1.41	1.41	1.41	1.41	1.41

Table 150. Summary comparison of key indicators for big game by alternative.

Key Indicators	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
National Forest road and motorized trail density in mi/mi2 in Winter Range + GFWR averaged across 31 subwatersheds (with credit for seasonal closure, MVUM)	0.9	0.9	0.9	0.9	0.9
Number of 6th-field subwatersheds with 3.0 miles or more of roads and trails open for motorized use in General Forest	2	4	2	6	2
Acres of National Forest land > than 1 mile from an open motorized route in the project area and percent of project area	10,779 (3.6%)	10,411 (3.5%)	10,411 (3.5%)	10,411 (3.5%)	10,422 (3.5%)
Acres of National Forest land > than 1/2 mile from an open motorized route and percent of project area	49,187 (16.3%)	44,345 (14.7%)	45,118 (15.0%)	43,059 (14.6%)	44,944 (14.9%)
Acres of National Forest land < than 660 feet (200 m) from an open motorized route and percent of project area	115,127 (38.2%)	125,745 (41.7%)	123,036 (40.8%)	129,390 (42.9%)	124,432 (41.3%)
Acres elk security habitat (>1/2 mile from open motorized route) in blocks at least 250 acres in size and percent of project area	47,969 (15.9%)	42,460 (14.1%)	42,514 (14.1%)	41,132 (13.6%)	42,431 (14.1%)
Acres elk security habitat (>1/2 mile from open motorized route) in patches less than 250 acres in size and percent of project area	2,208 (0.7%)	1,914 (0.6%)	2,634 (0.9%)	1,953 (0.6%)	2,513 (0.8%)
Total Elk Security areas regardless of patch size and percent of project area	50,177 (16.6%)	44,374 (14.7)	45,148 (15.0%)	43,085 (14.3%)	44,944 (14.9%)
Miles of trail in RMEF Crucial Winter Range (MAPS)	0	30.8	15.5	37.7	21.1
Miles of trail in calving/fawning habitat not on open roads	0	54.1	44.5	70.4	69.4
Acres of secure cover within 2 miles of private land	21,044	20,647	20,443	20,200	20,472

Viability Assessment for Rocky Mountain Elk and Mule Deer

Background**:** Mule deer and Rocky Mountain elk were chosen as terrestrial management indicator species (MIS) for populations of big game and their habitat (LRMP 4-245). A great deal of research and scientific literature on the Rocky Mountain elk was generated from studies conducted in the Blue Mountains. Research conducted at the Starkey Experimental Forest beginning in the 1980's on the Rocky Mountain elk has defined much of the science and current understanding of elk in the Blue Mountains of Oregon.

Existing Condition: Rocky Mountain elk and mule deer occur in populations across the State of Oregon, and across Ochoco National Forest. Deer and elk may utilize the watershed throughout the year during below normal snow years, but generally use the high elevation areas primarily as summer range, wintering on the lower elevation USFS managed lands and on private lands. Within the Forest boundary, the Ochoco Summit Project Area contains 14,442 acres within the General Forest (GF), 11,083 acres within General Forest Winter Range (GFWR) and 14,442 acres within the Winter Range (WR) LRMP allocations.

The project area lies within one Oregon Department of Fish and Wildlife (ODFW) management zone, the Ochoco Wildlife Management Unit (WMU). The Ochoco WMU contains 47% private lands and 53% public lands. The estimated 2011 population for elk and deer was 3900 elk and 15,400 deer.

The management objective (MO) is the number of elk and deer that ODFW manages for to prevent depletion of big game animals and to provide optimum recreational and aesthetic benefits for the public (quality hunting and wildlife viewing opportunities in the present and in the future). In the Ochoco WMU the MOs are 4,600 elk and 20,500 deer. Mule deer populations have been generally declining across the Western States. This decline is evident in the Ochoco WMU as well. The mule deer MO was met in 1988, but has not been met since. Population estimates within the WMU have decreased from 18,500 in the late 1990s to 15,400 in 2011, but was estimated at 16,000 in 2010. The elk population steadily increased from the 1970s through the early 2000s, exceeded the 4,300 elk target starting in 1999, and has been holding fairly steady (between 3,900 and 4,700 between 2006 and 2012) with a slight downward trend in recent years.

Effects Common to All Alternatives: The potential effects are described in detail above. This project would increase motorized route density and would reduce the effectiveness of security cover within the project area. For these reasons the project may result in localized redistribution of big game, particularly of elk, from less secure locations into more secure locations (at least in the short term). The project does not increase motorized route density in winter range, and does propose reinforcement of closures on unwanted trails and closed roads to ensure consistency with the Ochoco National Forest Plan standards and guidelines for deer and elk.

Conclusion: Both species have a demonstrated harvestable surplus across the State of Oregon and within the Ochoco WMU. Oregon Department of Fish and Wildlife monitors these populations annually and sets harvest levels based on the results of annual monitoring. Given the widespread distribution of these species and their habitat across the Forest and WMU, and the potential effects described above (this project would increase motorized road and trail density, and reduce security habitat) the project's overall direct, indirect and cumulative effects may result in a small negative trend particularly in proximity to routes that are more than ½ mile from existing open roads. However, this impact becomes unmeasurable beyond the one mile distance band from any proposed trails. Given the existing motorized route density, the relatively small change in motorized route density and the presence of demonstrated harvestable surplus populations of elk and mule deer, the continued viability of these species is expected to occur on Ochoco National Forest. A more detailed Viability Assessment for MIS is included as an appendix to this report.

Golden Eagle and Prairie Falcon; Bald Eagle

The bald eagle is discussed in the Threatened Endangered and Sensitive Species section of this report. Please refer to the TES section above for details on the northern bald eagle and the effects determination. The golden eagle and prairie falcon are also listed in the section on Raptors under Other Species in this report. However, they are discussed in detail in this section as they are MIS species.

Golden Eagle

The golden eagle was chosen as a terrestrial management indicator species (MIS) for cliff, talus or cave habitat (LRMP 4-245).

Gilligan et al. (1994) describes the golden eagle as an uncommon to fairly common summer resident in open country east of the Cascade Mountains and a very uncommon summer resident high in the Cascades. Marshall et al. (2003) lists them as common to uncommon year round resident of all counties east of the Cascade Range, with the highest nesting densities in Lake, Harney and Malheur Counties. The golden eagle nests in open large (greater than 30 inches in diameter) live ponderosa pine or cliff ledges that support its 3-10 foot tall nest (Marshall et al. 2003). The Oregon Natural Heritage Information Center ranks golden eagles as S4, Apparently Secure (NatureServe 2009). NatureServe (2009) listed the following as the major threats golden eagles experience: (1) powerline electrocution because wings can span phase-to-phase or phase-to-ground wires (Biosystems Analysis

1989), (2) poison intended for coyotes, (3) occasional shootings, and (4) habitat loss to agriculture and suburban land uses.

Existing Condition: Wildlife observation records list 48 golden eagle sightings across the project area, including 3 nests. The majority of the district records are from wintering birds (October through February). However a number of sightings on the Forest occurred between March and August and these may be associated with nesting territories that have not been discovered. The State database (ODFW, 2007) lists 1 site record within the project area, the area was checked in 2002, 2005, 2006, 2007, 2013 and 2015, no golden eagle nests were located. Two additional nest locations in the district records have been monitored, one was checked in 2006, 2007, 2011 and 2012 and no nest was confirmed. The other nest has been confirmed and was found to successfully fledge young in 2004 and 2005. This nest was checked in 2012, 2014 and 2015 and no sign of occupancy was found. Two nesting territories are being monitored just outside of the project area; they are each four miles or more from any proposed trail under any action alternative.

Viability Assessment for Golden Eagle:

Background: Golden eagles inhabit shrub-steppe, grassland, juniper, and open ponderosa pine, and mixed conifer/deciduous habitats. They forage in a variety of habitat types and successional stages, preferring areas with an open shrub component that provides food and cover for prey. Suitable nesting and foraging habitat can be found in mountains, canyons, and rolling hills. Of 506 occupied nests in Oregon in 1982, 35% were in mature trees and 65% on ledges along rims and cliffs (Isaacs and Opp 1991). Nest trees are typically large live ponderosa pine with sturdy open branching and a trunk dbh >30 in. Golden Eagles have large breeding territories ranging 10-40 sq. mi. Nest territories may contain several alternate nests. They forage on a variety of prey species including: jackrabbit, cottontail, California and Belding's ground squirrels, marmots, woodrats, small mammals, fresh carrion, and a variety of bird species (Marshall 2003). This species has a holartic distribution. In the North America this species breeds from Alaska and Canada south to Central Mexico. In the U. S. it occurs primarily west of the east slope of the Rocky Mountains. In Oregon, golden eagles are common to uncommon year round residents in all counties east of the Cascade Range (Marshall, 2003).

The population trend in Oregon is unknown. In 2011 a state-wide effort was initiated to determine the status of historic nesting territories across the State of Oregon. All known historic golden eagle territories within, or in proximity to, the project area are being surveyed under the state-wide golden eagle inventory and survey program (Isaacs, 2014). Golden Eagles counted during the mid-winter Bald Eagle survey in Oregon for 1992-2001 have varied from 79 to 128 and averaged 97 (Isaacs 2001). The populations of resident golden eagles in the northern part of the Great Basin, particularly in Idaho and Northern Utah, have shown indications of a decline (Marshall, 2003). The Natural Heritage program rank golden eagles as S4, Apparently Secure (NatureServe 2009). NatureServe (2009) listed the following as the major threats golden eagles experience: (1) powerline electrocution because wings can span phase-to-phase or phase-to-ground wires (Biosystems Analysis 1989), (2) poison intended for coyotes, (3) occasional shootings, and (4) habitat loss to agriculture and suburban land uses.

Existing Condition: On the Ochoco National Forest, including Crooked River National Grassland, there were records for 147 historic nesting sites in the state database from the 1990's and earlier. The majority of the nests are associated with extensive rimrock habitat present in Jefferson County, as noted below. Of 147 historic sites forest-wide, only 12 occurred in Crook County. A state-wide inventory of 716 historic golden eagle territories and potential breeding areas (PBAs) was initiated in 2011 based on locations reported through 2010. Between 2011 and 2014 an additional 326 PBAs were discovered state-wide. Of these 902 were surveyed at least once between 2011 and 2014 and are reported in Issaacs, 2015. Three of the 1,042 golden eagle territories and PBAs of record state-

wide occur within this analysis area, none of which have been confirmed to be occupied during surveys conducted between 2011 and 2015.

Of the occupied nests studied by Isaacs and Opp in 1982, 65% were on rock ledges. A forest-level analysis was conducted in 2011 using updated GIS data on rock features. The output from this analysis reflects the majority of rock features with potential nesting habitat. Rock features identified in the GIS data are those that are of sufficient size to be detected from aerial photographs. The rock categories included in estimating potential nesting habitat for this species included the following: rimrock, rock, rock/limestone, rocky knob, talus, talus/rocky knob, talus/rimrock. The GIS data layer is estimated to be 80% accurate in detecting rock features with cliff faces that have any potential as nesting sites. Some small cliffs may have been overlooked in the aerial photo interpretation, and some rock features identified as potentially having cliff habitat, may not be suitable for nesting sites. However, this data is expected to be representative of the majority of suitable nesting substrate and of sufficient accuracy for a comparison of potential rock habitat within the project area and across the landscape at a forest-wide scale. From this analysis it was estimated that at the forest level there are approximately 18,838 acres of rock habitat with potential cliff nesting habitat (2,149 acres within the project area). There are a total of 34 watersheds (5th field HUC) on Ochoco National Forest. Potential cliff nesting habitat is distributed within all 34 of these watersheds, though some watersheds (Crooked River Grassland, Headwaters Deschutes River, Lake Billy Chinook, Lower Metolius River and Willow Creek) have substantially more cliff habitat than other watersheds across the Forest. Rock habitat with potential for cliff nesting species occurs within nine watersheds in the project area, with the majority occurring in Upper Ochoco Creek (578 acres), Rock Creek (388 acres) and Deep Creek (329 acres). Proposed alternatives increase motorized route density within these watersheds. However, rock habitat is not uniformly distributed across each watershed, so increases in motorized route density at a watershed scale do not necessarily reflect a direct increase in potential for disturbance.

Golden eagle nests that are not on cliffs are typically on large ponderosa pine trees or snags in open stands, or on scattered individual large pine trees in otherwise open habitat such as rocky canyons, shrub/steppe or grassland settings. These individual scattered pines may occur in a variety of plant associations including juniper woodland, juniper steppe or xeric ponderosa pine.

Effects Common to All Alternatives: No alternative would modify potential cliff nesting habitat. No alternative would remove scattered large ponderosa pine trees that could serve as nest sites for golden eagles. No alternative would remove trees greater than 21” dbh (that could serve as future nest trees) or snags, other than incidentally for safety along trails or at trailheads or staging areas. All action alternatives exclude roads in proximity to known nests and roosts from the designated OHV system of routes. None of the proposed trail system would occur within ½ mile of any known eagle nest.

Conclusion: This project area is likely to have a relatively minor influence on potential nesting and foraging habitat for golden eagles due to a general lack of extensive low to mid elevation cliff features and limited habitat for primary prey species within proximity to any proposed routes or facilities. For these reasons implementation of any alternative proposed in this project is not likely to affect the viability of this species at the forest-level. A more detailed Viability Assessment for MIS is included as an appendix to this report.

Prairie Falcon

The prairie falcon was chosen as a terrestrial management indicator species (MIS) for cliff, talus or cave habitat (LRMP 4-245). The prairie falcon is also discussed in the section on Raptors under Other Species. Please refer to that section for further details on this species.

Prairie falcons breed throughout the open country east of the Cascades wherever cliffs and outcrops provide opportunities for nesting (Marshall 2003). Prairie Falcons are most common in rimrock

country, where they nest, but may travel great distances in search of prey (Marshall 2003, Birds of Oregon). A combination of rimrock or other outcrops and adjacent open country provides ideal breeding habitat. They winter over much of the breeding range south to Mexico (Marshall 2003).

Existing Condition: District wildlife sighting records list 2 observations within the project area. Private forest and rangeland in the project area are likely to provide suitable habitat for prairie falcons, where cliff or rimrock faces provide nest sites situated within or near open shrub and grassland habitat. Multiple records for this species are associated with privately owned meadowlands within 1 mile of the Forest boundary, more than 2 miles from the project area boundary.

Viability Assessment for Prairie Falcon

This species breeds from C. British Columbia east to N. Dakota, south to Baja California and Texas. They winter over much of its breeding range south to Mexico. They breed throughout the open country east of the Cascades wherever cliffs and outcrops provide opportunities for nesting. Prairie falcons are most common in rimrock country, where they nest, but may travel great distances in search of prey (Marshall, et. al 2003). A combination of rimrock or other outcrops and adjacent open country provides ideal breeding habitat. Cliffs need not be large. Denton (1976) found 59% of nest on cliffs less than 100 ft, some as low as 15 ft. The principal requirement is that the nest site be sheltered from above (Bent 1938, Webster 1976). This appears to reflect a need for shade and possibly protection from predators (Marshall 2003).

Grasslands are the preferred habitat although they also occur in less-productive areas dominated by sagebrush. The principal requirement for foraging appears to be low and sparse vegetation that accommodates their foraging style. Prey most often consists of small mammals, usually ground squirrels (Denton 1976, Haak 1982b).

This species occurs in low density and exhibits wide-ranging habits (Marshall, 2003). Densities of 3.9-8.0 breeding pairs/100square miles were found in Wasco and Wheeler counties (Janes 1975). Lardy (1980) found higher average densities in Malheur Co. (9.8-14.0/100sq.mi.). Populations, including those in Oregon, appear to be stable (White 1994).

Existing Condition: District wildlife sighting records list 2 observations within the project area and no known nests. Private forest and rangeland in the project area are likely to provide suitable habitat for prairie falcons, where cliff or rimrock faces provide nest sites situated within or near open shrub and grassland habitat. Multiple records for this species are associated with privately owned meadow and grasslands within 1 mile of the Forest boundary, more than 2 miles from the project area boundary. Prairie falcon nests have been confirmed at other locations on Ochoco National Forest at low elevation, near the Forest boundary and scattered across Crooked River National Grassland.

A forest-level analysis was conducted in 2011 using updated GIS data on rock features. The output from this analysis reflects the majority of rock features with potential nesting habitat. Rock features identified in the GIS data are those that are of sufficient size to be detected from aerial photographs. The rock categories included in estimating potential nesting habitat for this species included the following: rimrock, rock, rock/limestone, rocky knob, talus, talus/rocky knob, talus/rimrock. The GIS data layer is estimated to be 80% accurate in detecting rock features with cliff faces that have any potential as nesting sites. Some small cliffs may have been overlooked in the aerial photo interpretation, and some rock features identified as potentially having cliff habitat, may not be suitable for nesting sites. However, this data is expected to be representative of the majority of suitable nesting substrate and of sufficient accuracy for a comparison of potential rock habitat within the project area and across the landscape at a forest-wide scale. From this analysis it was estimated that at the forest level there are approximately 18,838 acres of potential cliff nesting habitat (2,149 acres within the project area). There are a total of 34 watersheds (5th field HUC) on Ochoco National Forest. Potential cliff nesting habitat for is distributed within all 34 of these watersheds, though some

watersheds (Crooked River Grassland, Headwaters Deschutes River, Lake Billy Chinook, Lower Metolius River and Willow Creek) have substantially more cliff habitat than other watersheds across the Forest. Rock habitat with potential for cliff nesting species occurs within nine watersheds in the project area, with the majority occurring in Upper Ochoco Creek (578 acres), Rock Creek (388 acres) and Deep Creek (329 acres). Proposed alternatives would increase motorized route density within these watersheds. However, rock habitat is not uniformly distributed across each watershed, so increases in motorized route density at a watershed scale do not necessarily reflect a direct increase in potential for disturbance.

Effects Common to All Alternatives: No alternative would modify potential cliff nesting habitat. There is potential for effects from human disturbance as described above.

Conclusion: This project area is likely to have a relatively minor influence on potential nesting and foraging habitat for prairie falcons due to a general lack of extensive low to mid elevations sheer cliff features within proximity to any proposed routes or facilities. For these reasons implementation of any alternative proposed in this project is not likely to affect the viability of this species on Ochoco National Forest. A more detailed Viability Assessment for MIS is included as an appendix to this report.

Other Wildlife Species (LRMP)

During the preparation of the Ochoco National Forest Land and Resource Management Plan (USDA 1989), a group of wildlife species were identified as Other Species. These species were selected because their well-being was of interest and therefore specific standards were provided. The species listed in Table 151 were listed in the Ochoco National Forest LRMP.

Table 151. Ochoco National Forest Other Species (LRMP).

Ochoco National Forest Other Species (LRMP)	Habitat	Presence Within The Project Area
Antelope	Open country, sagebrush flats	Yes
Raptor Habitat (eagles, hawks, owls, falcons, osprey)	Nest sites/nesting habitat	Yes
Species that use dead and down logs	Snags and logs	Yes
Species that use plant communities	Diversity of PAGs and SS stages	Yes
Species that use springs, bogs and other unique habitat	Seeps, springs, bogs, wetlands,	Yes

Of the other species shown in Table 151, antelope and raptors are described individually in the section below. The species that use dead and down wood are addressed in the section on PCEs under Management Indicator Species (above) and in the section on Landbirds below. Species that use plant communities and unique habitats are described in these sections as well in the section on Raptors. Please refer to all of these sections and the section on General Effects to Wildlife for a more complete discussion of these species.

Antelope (Pronghorn)

The LRMP specifies that habitat for antelope (pronghorn) is to be managed in accordance with ODFW Management Objectives. For the Ochoco WMU the Population trend measured as an index using the number of animals per mile, and it was estimated at 3.1 in 2009 and 2.6 in 2010. This trend index was not surveyed in 2011 or 2012. The kid ratio was estimated at 34 kids per 100 does in 2008, at 43 in 2009, at 36 in 2010 and at 34 in 2011. The buck ratio was estimated at 25 bucks per 100 does in 2008, at 35 in 2009, at 36 in 2010 and at 34 in 2011. Percent rifle success was reported at 67% in 2009, at 73% in 2010 and at 76% in 2011. This project does not substantially alter vegetation that would provide primary pronghorn (antelope) habitat. However, as with other hunted big game

species, pronghorn are likely to respond to traffic whether on an open road or a trail, and to human presence, whether motorized or not. This species has evolved with running swiftly as a primary means of escaping from predators. Thus, disturbances which are perceived as threatening in the eyes of a pronghorn, may generate a fleeing response when such disturbances occur in suitable and occupied pronghorn habitat. Refer to Big Game – Deer and Elk in the section on Management Indicator Species for disclosure of potential impacts to big game from motor vehicle access. These animals select relatively dry and open sagebrush and upland shrub habitat on gentle slopes. To estimate the relative impact of alternatives on potential pronghorn habitat the length of trail on suitable plant association groups (PAGs) was measured in GIS. The total length of trail proposed under each alternative within juniper steppe, juniper woodland and non-forested areas combined is displayed in Table 152. This represents the relative potential for disturbance to pronghorn in their preferred habitat. As can be seen in this table, Alternative 3 has the lowest potential impact to pronghorn of the four action alternatives based on trail system miles within preferred habitat.

Table 152. Comparison of alternatives for length of trail (miles) in potential pronghorn antelope habitat.

Type of Route	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Open Road	No OHV System	16.2	4.9	15.8	11.1
Closed Road	No OHV System	8.1	4.8	9.9	7.6
Decommissioned Road	No OHV System	2.9	1.3	3.4	2.5
“New” Construction	No OHV System	16.3	7.6	19.1	11.2
Total OHV Designated Route Miles	No OHV System	43.5	18.6	48.2	32.4

Raptors

The term raptors refer to birds of prey, those that kill other animals for meat, and which generally have talons and hooked beaks. Existing condition and potential effects to the northern goshawk, Cooper’s hawk, sharp-shinned hawk, red-tailed hawk are discussed in this section along with other hawks and owls. Refer to the Threatened, Endangered and Sensitive Species section for discussion of bald eagles and peregrine falcons. Refer to the Management Indicator Species section for discussion of golden eagles and prairie falcons.

Northern Goshawk

The northern goshawk is the largest member of the accipiter family and is distributed across most of Canada, the northern and western United States, and into Mexico. Reynolds et al. (1978) located goshawk nests in Oregon from 580 meters elevation on the west slopes of the Cascades to 1,860 meters nest site. Reynolds et al. (1992) stated preferred nest stands have a minimum of 40 percent canopy cover and the nest sites within these stands have greater than 60 percent canopy cover. Greenwald et al. (2005) reviewed goshawk nesting data and found that a majority of studies found a selection for stands with greater than 40 percent canopy as suitable goshawk nesting habitat. Vegetation plot data collected from Deschutes National Forest goshawk nest sites showed canopy cover ranging from 49-94 percent (USDA 1993). Foraging areas are typically 4,900-5,900 acres; comprised of a forest mosaic that must support a wide range of suitable prey including ground dwellers or those occurring near the forest floor (Marshall et al. 2003).

Sauer et al. (1996 cited in Wisdom et al. 2000) determined that breeding bird survey data for goshawk was insufficient to determine population trends for any state or physiographic region within the Interior Columbia River Basin because of low detection rates. However, sufficient data was available to indicate a stable trend in numbers between the years 1966-1995 for western North America.

Breeding bird surveys provided insufficient data to determine population trends within any state or physiographic province in the Interior Columbia Basin. However, it is anticipated that goshawk populations on the Deschutes National Forest would decline in response to the loss of habitat due to wildfires over the last 6-8 years. Localized habitat losses have occurred within the project area in the Bridge Creek area. The Oregon Natural Heritage Information Center maintains a list of the most current information available on the distribution and abundance of animals native to Oregon. They rank the northern goshawk population as demonstrably wide-spread, abundant, and secure.

Existing Condition: The wildlife sighting database has numerous documented observations of goshawks in the project area, including 43 nesting territories (26 on the old Lookout Mtn. R.D. and 17 on the old Paulina R.D.). Goshawk surveys using broadcasts of recorded calls have occurred in portions of the project area in conjunction with vegetation management projects over the course of four decades. Most of the systematic survey records were initiated following implementation of the Regional Forester's Plan Amendment #2 (Eastside Screens) in 1995. However, there are records for goshawks in the project area dating back into the 1970s and up to 2015. The level of past survey work conducted to date is dependent on the location and timing of various vegetation management projects within the project area over time. Table 153 displays the recorded survey and reproductive history of each known goshawk nesting territory within the project area.

Table 153. Reproductive history of goshawks within the Ochoco Summit Project Area.

Post Fledgling Area	Year of last confirmed nesting	Year of first nesting record	Number of documented nest trees	Number of documented nest cores	Number of nest attempts with young, years surveyed
LOM 2497	2007	1997	2	1	Active nest 5 of 7 years checked
LOM 1169	2011	1992	4	2	Active nest 5 of 7 years checked
LOM 9902	1999	1999	1	1	Active nest 1 of 4 years checked
LOM 0265	2009	1981	2	1	Active nest 2 of 2 years checked
LOM 1168	2003	1995	3	2	Active nest 2 of 4 years checked
LOM 5108	2009	2004	3	1	Active nest 3 of 3 years checked
LOM 2494	2010	1996	2	1	Active nest 3 of 4 years checked
LOM 0242	1992	1992	1	1	Active nest 1 of 3 years checked
LOM 9603	2003	1996	4	1	Active nest 2 of 2 years checked
LOM 2496	2003	1999	2	1	Active nest 2 of 2 years checked
LOM 0089	2007	2007	1	1	Active nest 1 of 1 years checked
LOM 0253	1992	1922	1	1	Active nest 1 of 1 years checked
LOM 1262	1995	1995	2	1	Active nest 1 of 1 years checked
LOM 1256	1995	1995	2	1	Active nest 1 of 3 years checked

Table 153. Reproductive history of goshawks within the Ochoco Summit Project Area.

Post Fledgling Area	Year of last confirmed nesting	Year of first nesting record	Number of documented nest trees	Number of documented nest cores	Number of nest attempts with young, years surveyed
LOM 1286	2011	1995	2	1	Active nest 2 of 5 years checked
LOM 1271	1995	1955	1	1	Active nest 1 of 2 years checked
LOM 1222	2009	1995	2	1	Active nest 3 of 3 years checked
LOM 1285	1995	1995	2	1	Active nest 1 of 2 years checked
LOM 1219	2009	1995	2	1	Active nest 3 of 4 years checked
LOM 0249	1998	1981	2	2	Active nest 2 of 6 years checked
LOM 5113	2009	2009	1	1	Active nest 1 of 1 years checked
LOM 1172	2009	2009	1	1	Active nest 1 of 1 years checked
LOM 0244	2012	2010	3	1	Active nest 2 of 2 years checked
LOM 5114	2011	2011	2	1	Active nest 1 of 1 years checked
Looney	2015	2014	2	1	Active nest 2 of 2 years checked
Long Prairie	2013	2013	1	1	Active nest 1 of 1 years checked
PAU 3263	2002	1997	2	1	Active nest 2 of 3 years checked
PAU 1846	1989	1989	1	1	Active nest 1of 2 years checked
PAU 3243	1999	1998	1	1	Active nest 1 of 6 years checked
PAU 3270/3271/3427	2004	2001	3	1	Active nest 3 of 3 years checked
PAU 3260/3261/3262	2002	1999	3	1	Active nest 2 of 5 years checked
PAU 3252	2002	1999	2	1	Active nest 2 of 5 years checked
PAU 3256	2002	1998	1	1	Active nest 2 of 3 years checked
PAU 2367/3247/3248	2002	1998	3	2	Active nest 5 of 5 years checked
PAU 3266/3431	2002	2000	2	1	Active nest 3 of 4 years checked
PAU 3259	2002	1998	1	1	Active nest 3 of 5 years checked
PAU 2370/3272/3428	2002	1996	4	2	Active nest 5 of 7 years checked
PAU 2368/3244	2005	1998	2	2	Active nest 4 of 6 years checked

Table 153. Reproductive history of goshawks within the Ochoco Summit Project Area.

Post Fledgling Area	Year of last confirmed nesting	Year of first nesting record	Number of documented nest trees	Number of documented nest cores	Number of nest attempts with young, years surveyed
PAU 3432/3433	2010	2000	3	1	Active nest 3 of 4 years checked
PAU 3251/3438	unknown	unknown	2	1	Active nest 0 of 4 years checked
PAU 3429/3258/3257	2002	1992	3	1	Active nest 3 of 7 years checked
PAU East Wolf	2014	2013	1	1	Active nest 2 of 2 years checked
PAU Keeton	2004	1997	1	1	Active nest 2 of 5 years checked
PAU 3132	1998	1998	2	1	Active nest 1 of 1 years checked

Sharp-shinned and Cooper's Hawks

Sharp-shinned and Cooper's hawks are both ranked S4, Apparently Secure in the state of Oregon

(NatureServe 2009). For sharp-shined hawks small declines may be attributed to loss of preferred young dense forest stands in boreal forest, which has increased in boreal forest due to logging, and pesticides (NatureServe 2009). The use of pesticides on farmlands and loss of habitat are the major threats for Cooper's hawks (NatureServe 2009).

Both species are closely associated with deciduous and mixed coniferous forests, open woodlands, and riparian woodlands. They can occur in large forests but are more likely to be found near forest edges and clearings near lakes or streams. In a study in eastern Oregon, Reynolds (1983) found nesting sharp-shinned hawks to use 25-50 year-old even-aged conifer stands while Cooper's hawks used 30-70 year old even-aged conifer stands with somewhat larger and more widely spaced trees than those stands used by sharp-shins. Reynolds also reported the mean distance between the nearest nesting neighbors was 4.1 km. (2.5 miles) for sharp-shins and 4.7 km (2.8 miles) for Cooper's hawks. Both species are adapted to catch avian prey but each would also capture small mammals, lizards and various large insects and amphibians (Johnsgard 1990). Home range estimates were 1,590 hectares (3,975 acres) for Cooper's hawks and 460 hectares (1,150 acres) for sharp-shin hawks in Oregon (Reynolds 1983). Reynolds et al. (1983) studied accipiter nest sites in eastern Oregon and determined the mean canopy cover for sharp-shinned nests was 68 percent and 64 percent for Cooper's hawks, although the range extends from 20-95 percent for sharp-shins and from 15-100 percent for Cooper's. Both species select nest placement well up in the tree canopy for nest concealment or shading during warm temperatures (Moore and Henny 1983; Reynolds et al. 1983). Dense vegetation provides screening cover and physical protection from predators and predation may account for the high foliage density in the immediate vicinity of the nests of sharp-shins and Cooper's hawks (Reynolds et al. 1982)

Existing Condition: The wildlife sighting database lists 24 sightings and 15 nests for Cooper's hawks and 14 sightings and 3 nests for sharp-shinned hawks within the project area. The sightings came from general observations during other forest management activities as well as during surveys for northern goshawks. There is considerable overlap of habitat for each species and habitat. Formal surveys have not been conducted specifically for either species and reported observations are the results of random observations and responses from conducting northern goshawk surveys.

Red-tail Hawk

Red-tail hawks are widely distributed across North America and winter from southern Canada south into the United States and Central America. Red-tail habitat consists of large snag or deformed trees on forest edges, open country interspersed with forests, and suitable perches (trees, utility poles, outcrops etc.). They are known to use agriculture land, clearcut harvest units, grasslands, woodlands and alpine environments (Marshall et al. 2003). It uses any habitat that has perches to hunt from and open enough to capture its prey on the ground. Small mammals, such as rabbits, hares, and mice provide the bulk of their diet. They are also known to capture birds, reptiles, and amphibians. Red-tails use a wide variety of structures for nests, including trees, utility poles and cliffs (Marshall et al. 2003). They place their nests higher in trees than other raptors, and generally select larger trees or smaller deformed trees where branch structure supports this higher placement. The red-tail hawk has increased in numbers and expanded its range since Euro-American settlement (Marshall et al. 2003). Red-tailed hawks are ranked S5, Secure in Oregon (NatureServe 2009).

Existing Condition: Red-tail hawks are common and widely scattered on the Forest. District wildlife sighting records list numerous red-tail hawk observations and 15 nests scattered across the project area. Private forestlands in the project area are likely to provide suitable habitat for red-tail hawks, where overstory trees provide nest sites situated within open forests and grasslands.

Golden Eagle

Refer to the MIS section for the discussion of golden eagles.

Osprey

Ospreys are good biological indicators of ecosystem health, because they are long-lived and are the top predator of aquatic food webs (USGS 2005). Various fish species comprise 99 percent of their diet. Ospreys dramatically declined in abundance through the mid-1970s, as a side effect of pesticide use, but have since recovered and become a common nesting species along the Columbia and Willamette waterways in western Oregon (USGS 2005). Osprey nesting habitat consists of forests that have large live or dead tree components for nesting near bodies of fish bearing water. They nest within two miles of fish bearing bodies of water and generally nest in larger broken top live trees or snags, but also utilize utility poles, man-made Canada goose nest boxes, channel markers and other manmade structures where natural structures are lacking (Marshall et al. 2003). The primary habitat requirements of osprey include a dependable source of fish that can be captured near the surface and an elevated nesting platform within a few kilometers of their food supply. Ospreys are migratory, typically arriving in the area in April and May and they stay into early autumn until fall migration. While the pair would mate for life, they migrate separately and re-unite at their nest site the following spring. The birds winter in central California south into Central and South America. They are currently ranked as S4 in Oregon, Apparently Secure (NatureServe 2009). NatureServe (2009) listed the following as major threats to ospreys: (1) pesticides, (2) gunshots, (3) steel traps, (4) impact with or electrocution by high-tension wires, and (5) being caught or drowned in nets (Wiemeyer et al. 1980, cited in Henny and Anthony 1989).

Existing Condition: There are 14 recorded sightings and 7 known osprey nests located in the project area or adjacent to it. These are scattered across the project area in proximity to fish bearing streams, ponds and reservoirs. There is not a concentration of nests within the project area like there are along some of the more productive water bodies in Central Oregon.

Some of the nesting ospreys occupy territories that include high recreational use or residential areas, such as near Walton Lake Campground, Allen Creek Reservoir and Marks Lake. Other pairs have nests in more remote locations such as along the North Fork of the Crooked River and at various small ponds. It is assumed that where there is high recreational use in osprey territories, nests have either been abandoned or if in use, ospreys have become tolerant or habituated to the activity

Prairie Falcon

Refer to the MIS section for the discussion of prairie falcons.

Other Hawks

Other species of hawks are found in the project area, particularly during migration. Some occupy habitat in the area during nesting season, while others may winter in the area or pass through during spring and fall migration.

Existing Condition: District wildlife sighting records list 3 observations and 1 nest for American kestrel; 3 observations of northern harrier; 2 peregrine falcon sightings; 2 rough-legged hawks scattered within the project area. Private forestlands in the project area are likely to provide suitable habitat for these raptors that prefer open country dominated by open forest or shrub and grassland habitat.

Long-eared Owl

Existing Condition: District wildlife sighting records list 2 records of long-eared owl within the project area. Private forestlands in the project area are not as likely to provide suitable habitat for long-eared owls, as this species tends to select very dense stands with an abundance of dwarf mistletoe in Douglas fir, where they are adjacent to open forests, shrublands and grasslands.

Great-horned Owl

Existing Condition: District wildlife sighting records list 20 records of great horned owls, including 1 nest scattered across the project area. Private forestlands in the project area are likely to provide suitable habitat for this species where old hawk nests, hollow trees, caves or buildings provide nest sites situated within a mosaic of open forest or woodland mixed with open areas.

Great Gray Owl

Existing Condition: District wildlife sighting records list 3 records of great gray owl observations in the project area, in the vicinity of Lookout Mountain and one active nest was confirmed near Little Hay Creek in 2011. Subsequently the nest tree was illegally cut down by woodcutters. The replacement nest site has not been determined yet, but great gray owls continue to be observed in the project area between Deadman Creek and Bandit Springs. This species finds suitable nesting habitat where dense stands of timber with broken-topped soft snags occur adjacent to open grassy areas with abundant small mammals (gophers and voles). These conditions are present in portions of the project area.

Other Owls

Existing Condition: District wildlife sighting records list 4 observations and 1 nest for barred owl; 2 records of boreal owl; two records of flammulated owl; 14 northern pygmy owl records; and 4 northern saw-whet owl records scattered across the project area. These species select from a variety of habitat types from low elevation woodlands to high elevation subalpine forests. The proejct area does contain a variety of habitat types capable of supporting a variety of owl species. Private forestlands in the project area are likely to provide suitable habitat for flammulated, pygmy and saw-whet owls, but are less likely to have suitable habitat for boreal owls, which typically reside in high elevation stands where spruce and lodgepole pine area common.

Effects to Raptors

There is conflicting science when assessing the human disturbance effects on raptors. Gunnison National Forest Travel Management Plan, USDA (2001) and Hamann et al. (1999) suggested in both their literature reviews that sensitivity occurs near nest sites and mainly effects eggs or young. Direct activities, such as noise from vehicles, could disturb these species during nesting and foraging and

may negatively affect them. These species may be sensitive to prolonged OHV use adjacent to their nest (USDA 2001 and Hamann et al. 1999). USDA (2001) and Hamann (1999) also found prolonged disturbance during nesting season may result in nest and young abandonment and increased stress levels. Both findings suggest possible recreational disturbances affect raptors by causing parents to desert young or eggs, unprotected egg or nestling exposure to weather, avian nest predation, nestling may leave the nest prematurely (USDA 2001 and Hamann 1999), and on cliffs and accidental recreation caused destruction of nests, e.g. pushing nests of cliffs (Hamann et al. 1999). Also, cross-country travel could lead to disturbance that disrupts pair-bonding, causing exposure of eggs or young to inclement weather and increases adult energy expenditures (Hamann 1999). A more recent study by Grubb et. al (2012) found that noise associated with log truck traffic near nests of northern goshawks had little disturbance effect to birds at the nests being studied. Summers et. al (2011) reported that traffic noise is not the main cause of negative relationships between bird species richness and abundance and proximity to roads.

Some studies have found that walking straight to a birds' nest (including raptors) is more disruptive than vehicle or OHV use (Lee 1981; Skagen 1980; Holmes et al. 1993; Burger and Gochfeld 1991; Gill et al. 1996). Specifically, in a northern goshawk and Cooper's hawk study conducted by Lee (1981), female goshawk did not show signs of agitation or flushing from snowmobiles until the riders stopped and got off their machines. In another observation, Lee (1981) found that female hawks did not flush from nests when motorcycles passed by. These and other occasions are examples why Lee (1981) concluded hawks may become habituated to moving machines. In addition, lee (1981) also stated hawks may tolerate "disturbances", hikers, snowmobiles, motorcycles, and horseback riders, so they can keep territories that meet resource needs.

Flecher at al. (1999) conducted a raptor study in Colorado riparian corridors, which included some with recreation trails. They found red-tailed hawk abundance was similar from the controlled sites to the trail sites. They concluded red-tailed hawks seem to tolerate human activity along the recreational trails. Janes (1984) in a red-tail study in Wasco County, Oregon reported that normal human activity did not affect red-tailed hawk reproductive success. He also concluded that the presence of dwellings or frequently travelled roads and the locations of nests near roads had no significant effects and that compensation for normal human activities was not necessary for estimates of reproductive success. Additionally, raptors have been known to use small two-track roads and trails that experience low use and have existing canopy cover on the sides as foraging habitat (Flecher at al. 1999, St. Pierre 2008). Some avian scavengers prefer to use these types of open areas because vegetation may hide potential predators while they are feeding (Skagen et al. 1991).

Ospreys nest around lakes with high human activity, e.g. fishing, boating, OHV use, snowmobile use, camping, hiking, biking, and bird viewing, but still can be sensitive to the recreational disturbances, especially in remote areas (Hamann 1999; Poole 1981). During recreation seasons, ospreys have been known to keep territories with low level of human activity (Levenson and Koplin 1984). The more remote the nest location is the higher probability of an osprey is to flush (Reese 1991). Ospreys often flush when disturbed on the nest causing increase risk during hatching and raising young. The adult osprey expels needed energy in flight and leaving the egg or nestling prone to weather and predation (Reese 1991). Also, user created routes can decrease habitat by providing increased access to snags and other deadwood for firewood harvest (USDA 2001), which could affect osprey habitat.

Direct and Indirect Effects Common to All Alternatives

Existing and potential disturbance from vehicle use on roads and motorized trails and the associated fragmentation (edge effect) was modeled. The assumption was disturbance would continue within the road effect zone (660 feet or 200 meters each side of roads or motorized trails) for the OHV travel system described in each alternative. Decreased habitat quality, reduced reproductive potential, and avoidance of the road effect zone are potential effects as a result of habitat alteration physically or due

to disturbance. The acres within the 660 foot disturbance band (200 m) displayed in Table 135 are based on additional trail placement, but do not reflect improvements from mitigations. Disturbance would decrease beyond the road or motorized trail effect zone for each alternative and as a result, habitat quality and amount would increase in areas more distant from motorized routes. Disturbance associated with motorized use would decrease in areas where existing road closures are reinforced and user-created trails are rehabilitated and under the action alternatives. However, studies have shown that human activity near a nest site, e.g. walking around or stopping vehicles, has more of an effect than OHV use, riding by a nest (Lee 1981; Skagen 1980; Holmes et al 1993; Burger and Gochfeld 1991; Gill et al. 1996). The action alternatives would not prohibit foot or other non-motorized traffic on routes closed to OHV use, so disturbance from non-motorized recreation use may continue to occur in areas where OHVs are excluded.

Table 154 illustrates the amount of potential disturbed and undisturbed habitat for the northern goshawk, Cooper's hawk, sharp-shined hawk, and the golden eagle. The increase in undisturbed acreage and reduction in disturbed acres is directly related to the change in roads and trails open for motorized use.

Alternative 1- No Action

The current level of disturbance to raptors, whether they are habituated or not would continue until the Travel Management Rule is implemented (see Cumulative Effects). Several studies have suggested that walking straight to a bird nest (including raptors) is more disruptive than vehicle or OHV use (Lee 1981; Skagen 1980; Holmes et al. 1993; Burger and Gochfeld 1991; Gill et al. 1996). The majority of the existing open road network in the project area has been in place for several years or more, and some level of habituation to motorized traffic has probably occurred for nesting red-tailed hawks since 8 nests are documented in the project area in proximity to open roads.

People traveling off roads, though not likely to occur early in the nesting season in the majority of the project area due to elevation and snowpack, is a fairly common occurrence in much of the project area in the middle and late in the nesting season as snowpack recedes and firewood cutting season opens. The exceptions would be vegetation management actions that may be under contract such as timber sales and pre-commercial thinning contracts where snowplowing may occur to access treatment units. Although the occurrence of people on foot increases substantially during the big game archery season, these activities start after the critical period of raptor nesting season (prior to fledging).

Action Alternatives

There are 0.25 miles of designated trail system within 660' of hawk nests on existing roads in Alternative 2. There are also designated trail segments within ¼ mile of osprey nests as follows: 0.6 miles in Alternative 2; 0.5 miles in Alternative 3; and 0.5 miles in Alternative 4. Within ¼ mile of goshawk nests there are 3.0 miles in Alternative 2; 1.5 miles in Alternative 3 and 2.8 miles in Alternative 4. The length of trail system within raptor buffers and the route type (open road, closed road, decommissioned road, new construction) are displayed in Table 154.

Table 154. Raptor nest buffer impacts within the Ochoco Summit project area.

Raptor Species	Buffer Radius	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Goshawk	¼ mile	0	3.0 miles total: 1.3 new, .3 closed rd, 1.4 open rd	1.5 miles total: .9 new, .3 closed rd, .3 open rd	2.8 miles total: 1.5 new, .3 closed, 1.0 open rd	1.8 miles total: 1.2 new, 3 closed, 3 open rd
Osprey	¼ mile	0	0.6 miles total:	0.5 miles total:	0.5 miles total:	0.5 miles total: 0.5 new

Table 154. Raptor nest buffer impacts within the Ochoco Summit project area.

Raptor Species	Buffer Radius	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
			0.6 new	0.5 new	0.5 new	
Other Raptor	660’	0	0.25 miles total: 0.25 new	0	0	0

For each of the action alternatives the amount of undisturbed habitat changes due to the opening up of trails on closed roads, construction of new trails, closing of roads and user created trails, and defining which roads and trails would become part of the trail system. Studies have shown that human activity near a nest site, e.g. walking around or stopping vehicles, has more of an effect than OHV use, riding by a nest (Lee 1981; Skagen 1980; Holmes et al 1993; Burger and Gochfeld 1991; Gill et al. 1996). For this reason construction and maintenance activities would be restricted seasonally where in proximity to active raptor nests as shown in Table 155.

Table 155. Seasonal restrictions on trail construction and maintenance for active nest sites.

Species	Buffer Distance	Restriction Period
Northern Bald Eagle	½ mile line-of-sight or ¼ mile not line-of-sight	January 1 to August 31
Golden Eagle	1/2 mile	February 1 to August 15
Prairie Falcon	¼ mile	March 1 to August 1
Osprey	¼ mile	April 1 to August 1
Goshawk	¼ mile	March 1 to August 31
Other Raptors	660 feet (10 chains)	March 1 to August 1

Although new trail construction has potential to remove snags with potential for nesting by osprey and red-tailed hawk, a very limited amount would be removed, compared to the snags available on a landscape basis. Only those that are within the tread of the trail, leaning toward the trail, or within striking distance of a staging area or trailhead would be felled. Due to the very limited circumstance and scope of snag felling operations and control of where motorized activity would occur, action alternatives would have a negligible effect to osprey and red-tailed hawk.

Cumulative Effects

With implementation of the Travel Management Rule, Travel Management in combination with the action alternatives should result in a decrease of disturbed habitat when compared to Alternative 1. This would be the result of the combined effect of existing road closure reinforcement and rehabilitation of user-created trails in combination with implementation of the forest-level Travel Management Plan. Motorized travel would be limited to designated motorized routes and potential for users to forge new routes into existing known or unknown nest sites off of mixed-use roads and designated trails would be reduced particularly in areas where unwanted user created trails are closed or rehabilitated as part of the action alternatives (within the OHV Management Area).

Recent, ongoing and planned vegetation management projects that overlap the project area (Spears, Canyon, HEJ, Zane, Deep, Jackson, Gap, Black Mountain and Wolf; see Table 7) are designed to return many forested stands back to sustainable conditions that can withstand appropriate disturbance processes. These projects would mostly reduce the density of understory trees and apply prescribed fire where appropriate, with the objective of maintaining large trees on the landscape. Implementation of these large scale projects include several years of activity involving multiple timber sales, stewardship projects, force account project work and service contracts. The planned projects would reduce the amount of dense structured forested stands the goshawk, Cooper’s hawk and sharp-shinned hawk prefer for nesting. However, ongoing and planned vegetation management projects include mitigation measures such as no harvest nest buffers and seasonal restrictions on disturbing activities, and portions of each of these project areas would remain unharvested, which

could provide suitable nesting stands for these species. Consequently, there should be no reduction in the numbers of goshawk, Cooper's or sharp-shinned home ranges that can be supported across the current project area. The understory thinning prescribed in each project could make stands more valuable for goshawk foraging by (1) by creating unobstructed flight corridors used by goshawks to obtain forest-associated prey; (2) by releasing trees to grow to produce large diameter trees for nest sites; and (3) by improving vigor in the herbaceous understory that supports potential prey species (Reynolds et al. 1992, cited in Wisdom 2000). These activities were consistent with Wisdom et al. (2000) who listed several issues, strategies, and management practices pertaining to northern goshawks in the Interior Columbia Basin assessment (USDA/USDI 2000).

Mitigation measures planned for active and proposed vegetation management projects include protection of active nest sites by application of a seasonal restriction for timber harvest and post-sale activities, as well as potentially disturbing non-commercial treatments. This should reduce potential for additive effects to occur during the nesting season. Because large diameter trees would be maintained in each project, nesting habitat would be provided for osprey, golden eagles and red-tailed hawks. Because prescribed burning tends to reduce soft snag abundance and reduce tree density, less nesting habitat would be available for great gray and other forest dwelling owls in treated areas. On the other hand, species that prefer to forage in open areas such as great-horned owl and red-tailed hawk would benefit from commercial thinning. This project would have very little direct effect on existing or potential nesting habitat due to the small scale of impact to the vegetation and supporting land base compared to what is available at the landscape scale. It is not expected that implementation of the Ochoco Summit OHV project in conjunction with overlapping or adjacent vegetation management actions would lead to a change in populations of raptors across the project area because suitable habitat would be provided at the landscape scale with little change resulting from this project, and as shown in Table 135, the action alternatives result in less than a 5% increase in area within 200m (660 feet), and less than 2% increase in lands less than ½ mile from motorized routes. In addition, proposed closures offer better access management, including some existing routes in proximity to known raptor nests.

Land Birds

The Migratory Bird Treaty Act of 1918 (MBTA) implements various treaties and conventions between the U.S., Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. The U.S. Fish and Wildlife Service (FWS) is the lead federal agency for managing and conserving migratory birds in the United States. The BLM and USFS have implemented management guidelines that direct migratory birds to be addressed in the NEPA process. In January 2001, President Clinton issued an executive order on migratory birds, directing federal agencies to avoid or minimize negative impacts of their actions on migratory birds, and to take active steps to protect birds and their habitat. A Memorandum of Understanding (MOU) between the U. S. Fish and Wildlife Service and the U. S. Forest Service was signed in 2008 to conserve migratory birds, including habitat restoration and enhancement, prevention of pollution affecting birds, and incorporation of migratory bird conservation into the planning process: 1) when developing, amending or revising management plans for national forests and grasslands, and 2) 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. For this project analysis species of management concern are evaluated based on those species listed by USFWS as "Birds of Conservation Concern" and those species listed as "Focal Species" in the Conservation Strategy for Landbirds in the Northern Rocky Mountains of Eastern Oregon and Washington (Altman, 2000).

Birds of Conservation Concern

The "Birds of Conservation Concern 2002" (BCC) revised in 2008 identifies species, subspecies, and populations of all migratory and resident birds not already listed under the Endangered Species Act of

1973 that represent the highest conservation priorities and are in need of additional conservation actions. While all of the bird species included in the BCC are priorities for conservation action, the list makes no finding with regard to whether they warrant consideration for ESA listing. The goal is to prevent or remove the need for additional ESA bird listings by implementing proactive management and conservation actions.

Bird Conservations Regions (BCRs) were developed based on similar geographic parameters. The map below displays all the BCRs in North America. Only two BCRs overlap the Ochoco Summit OHV Project Area: BCR 9 (Great Basin) and BCR 10 (Northern Rockies). Table 156 displays Birds of Conservation Concern species associated with BCR 9 and BCR 10 along with their preferred habitat and whether suitable habitat is present in the project area. A coastal species (yellow-billed loon) is not expected to occur within the project area is not included in the table and will not be discussed further in this document.

The Great Basin (BCR 9) is a large and complex region that includes the Northern Basin and Range, Columbia Plateau, and the eastern slope of the Cascade Range. This area is dry due to its position in the rainshadow of the Cascade Range and the Sierra Nevada. Grasslands, sagebrush, and other xeric shrubs dominate the flats and lowlands, with piñon-juniper woodlands and open ponderosa pine forests on higher slopes. Lodgepole pine/sub-alpine fir forests occur at higher elevations on north-facing slopes. Several substantial lowland wetlands are extremely important to shorebirds, including breeding American Avocet; Black-necked Stilt; and Willet, migrating Wilson's Phalarope, and other water birds, notably Eared Grebe. The region is also important for breeding Mountain Plover and Snowy Plover. Most of North American breeding White-faced Ibis and California Gulls nest in marshes and lakes scattered across the region. The Great Salt Lake and adjacent marshes host large numbers of American White Pelican, Cinnamon Teal, Northern Pintail, Redhead, Tundra Swan, and other waterfowl and many species of migrant shorebirds. Sage Grouse, Sage Sparrow, Sage Thrasher, and Brewer's Sparrow are priority land birds of lowlands, with White-headed Woodpecker, Flammulated Owl, and Cassin's Finch leading the list of characteristic birds of the region's pine forests.

The Northern Rockies (BCR 10) includes the Northern Rocky Mountains and outlying ranges in both the United States and Canada, and also the intermountain Wyoming Basin and Fraser Basin. The Rockies are dominated by a variety of coniferous forest habitats. Drier areas are dominated by ponderosa pine, with Douglas fir and lodgepole pine at higher elevations and Engelman spruce and subalpine fir even higher. More mesic forests to the north and west are dominated by western larch, grand fir, western red cedar, and western hemlock. High priority forest birds include the Flammulated Owl, Lewis' and Black-backed Woodpecker, Olive-sided Flycatcher, Townsend's Warbler, Rufous Hummingbird, Black Swift, and Blue Grouse. Barrow's Goldeneye, Harlequin Duck, and Trumpeter Swan breed in high-elevation lakes and streams. The Wyoming Basin and other lower-lying valleys are characterized by sagebrush shrubland and shrub-steppe habitat, much of which has been degraded by conversion to other uses or invasion of non-native plants. High priority birds include Sage Grouse, Ferruginous Hawk, Brewer's Sparrow, and Sage Thrasher.

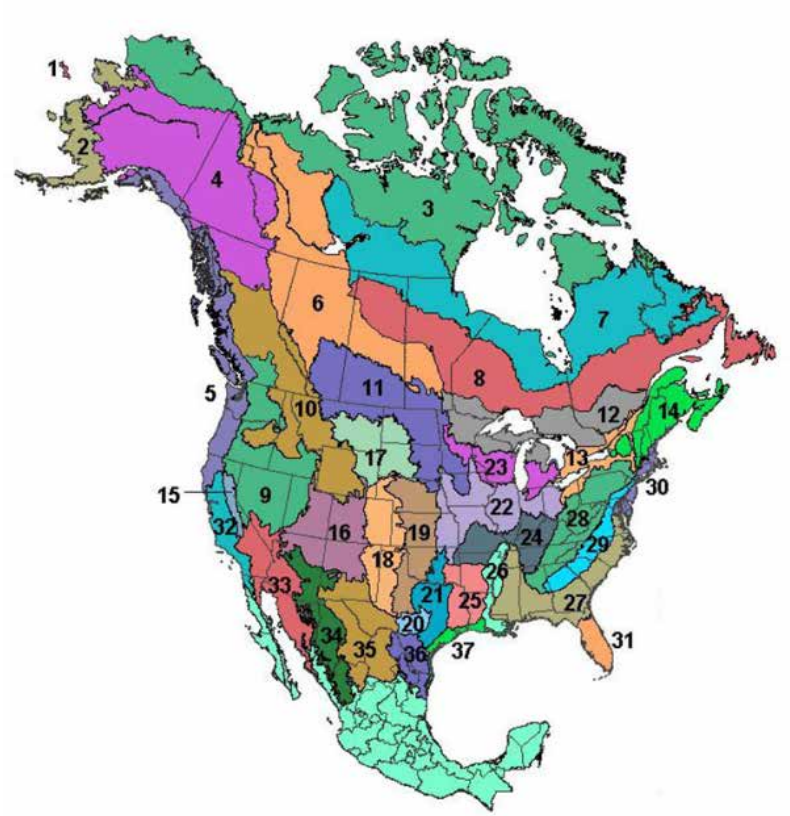


Figure 18. Bird Conservation Regions.

Table 156. Bird Conservation Regions 9 and 10 (combined) 2008 list.

Bird Species	Preferred Habitat	Habitat in Ochoco Summit Trail System Project Area
Greater Sage Grouse (Columbia Basin DPS) (a)	Sagebrush dominated rangelands with bunchgrass/forb understory, and limited or no tree cover	Yes
Eared Grebe (nb)	Nests near shore on small freshwater lakes and reservoirs with emergent vegetation	Yes
Bald Eagle	Nests in large conifers usually near lakes, reservoirs or rivers	Yes
Ferruginous Hawk	Sagebrush-shrub steppe or bunchgrass prairie and low tree density	Yes
Swainson's Hawk	Open country, prairies and irrigated farmland	Yes
Golden Eagle	Elevated cliff or open grown tree nest sites in open country	Yes
Peregrine Falcon (b)	Cliffs or rock pinnacles with ledges or caves	Yes
Yellow Rail	Marshes with shallow water 4,100 to 5,000 ft elevation	No
Snowy Plover (c)	Dry, open, sandy beaches, alkali flats or salt ponds	No
Long-billed Curlew	Open grassland areas	Yes
Marbled Godwit (nb)	Grassy meadows near lakes and ponds, migrant (irregular E. OR)	No
Upland Sandpiper	Montane meadows 1,000 to 3,000 acres at 3,400 to 5060 ft. elevation surrounded by pine	Yes

Table 156. Bird Conservation Regions 9 and 10 (combined) 2008 list.

Bird Species	Preferred Habitat	Habitat in Ochoco Summit Trail System Project Area
Yellow-billed Cuckoo (w. U.S. DPS) (a)	Large expanses of dense riparian forest/cottonwoods	No
Flammulated Owl	Ponderosa pine forests with open understory and patches of saplings or shrubs	Yes
Black Swift	Cliffs associated with waterfalls	No
Calliope Hummingbird	Open mountain meadows, open young forests, meadow edges, and riparian areas	Yes
Lewis's Woodpecker	Open forests with brushy understory, dead and down wood	Yes
Williamson's Sapsucker	Open ponderosa pine and mixed forests with snags	Yes
White-headed Woodpecker	Mature, open ponderosa pine forests with snags	Yes
Willow Flycatcher (c)	Breeding habitat is dense shrubs and/or tall herbaceous vegetation especially riparian willow thickets	Yes
Olive-sided Flycatcher	Open conifer forests and edges with scattered tall trees and snags	Yes
Loggerhead Shrike	Open country with scattered juniper trees, tall shrubs	Yes
Pinyon Jay	Juniper, juniper-ponderosa pine transition, and ponderosa pine edge with sagebrush or juniper	Yes
Sage Thrasher	Big sagebrush, shrublands of greasewood, shadscale and rabbitbrush.	Yes
Virginia's Warbler	High elevation, steep shrublands, juniper or mountain mahogany woodlands, SE Oregon	No
Green-tailed Towhee	Vigorous shrub stands with high shrub species diversity on mountainsides and high plateaus	Yes
Brewer's Sparrow	Sagebrush shrublands, clearings with shrubs in coniferous forests	Yes
Black-chinned Sparrow	Dry slopes and rocky hillsides, sagebrush steppe, desert shrub	Yes
Sage Sparrow	Semi-open sagebrush up to 6,800 ft elevation	Yes
McCown's Longspur	Dry sparse prairies Great Plains, rare in Oregon and Washington	No
Tricolored Blackbird	Large expanses of cattails, bulrush, willow or tules	No
Black Rosy-Finch	Bare rock outcrops, cliffs and talus above timberline, rare in Oregon (SE Oregon)	No
Cassin's Finch	Open, mature forests and woodlands, coniferous or aspen	Yes
(a) ESA candidate, (b) ESA delisted, (c) non-listed subspecies or population of Threatened or Endangered species, (d) MBTA protection uncertain or lacking, (nb) non-breeding in this BCR		

Landbird Strategic Plan

The Oregon and Washington Chapter of Partners in Flight (PIF) was formed in 1992 and has prepared a series of publications aimed at assisting private, state, tribal and federal agencies in managing for landbird populations. The Landbird Strategic Plan (January 2000) is to maintain, restore, and protect habitats necessary to sustain healthy migratory and resident bird populations to achieve biological objectives. The primary purpose of the strategic plan is to provide guidance for the Landbird Conservation Program and to focus efforts in a common direction. On a more local level, individuals from multiple agencies and organizations within the Oregon-Washington Chapter of Partners in

Flight participated in developing five publications for conserving landbirds in this region (Oregon and Washington). The strategy identifies conditions and habitat attributes important to landbird communities, describing the desired landscape based on habitat relationships of a select group of species (focal species). By describing habitat requirements and managing for the needs of focal species that are representative of important components in a functioning ecosystem, many other species and elements of biodiversity will also be conserved. A Conservation Strategy for Landbirds in the Northern Rocky Mountains of Eastern Oregon and Washington was published in May 2000 (Altman, 2000) is one of five plans that cover all priority habitats for landbirds in Oregon and Washington. This strategy covers the geographic area of this project and has been used since its development in planning and project analysis on Ochoco National Forest.

This project area falls within the Northern Rocky Mountains Planning Unit and the Blue Mountains Subprovince. This strategy emphasizes ecosystems and important habitat conditions and features used by landbirds, rather than individual species. However, species were selected in the conservation strategy to represent habitat types or features considered at risk. As focal species, each of the species listed in Table 157 provide a focus for describing desired conditions and attributes of priority habitats. Establishment of conditions favorable to focal species will also likely benefit a wider group of species with similar habitat requirements. Consistency with the Altman habitat recommendations are disclosed for those species listed in this section. Table 157 shows the focal species for the habitats that occur within the project area.

Table 157. Priority habitat features and associated focal species for Northern Rocky Mountains Planning Unit, Blue Mountains Subprovince.

Habitat	Habitat Feature (Conservation Focus)	Focal Species
Dry Forest (Ponderosa Pine and Ponderosa Pine/ Douglas-fir/ Grand Fir	Large patches of old forest with large trees and snags	White-headed woodpecker
	Old forest with interspersion of openings and dense thickets	Flammulated owl
	Open understory with regenerating pines	Chipping sparrow
	Patches of burned old forest	Lewis's woodpecker
Mesic Mixed Conifer (Late Successional)	Large snags	Vaux's swift
	Overstory canopy closure	Townsend's warbler
	Structurally diverse, multi-layered forest	Varied thrush
	Dense shrub layer in forest openings or understory	MacGillivray's warbler
	Edges and openings created by wildfire	Olive-sided flycatcher
Riparian Woodland	Large snags	Lewis' woodpecker
	Canopy foliage and structure	Red-eyed vireo
	Understory foliage and structure	Veery
Riparian Shrub	Willow/alder shrub patches	Willow flycatcher
Unique Habitats	Subalpine Forest	Hermit thrush
	Montane Meadows (wet/dry)	Upland sandpiper
	Steppe Shrublands	Vesper sparrow
	Aspen	Red-naped sapsucker
	Alpine	Gray-crowned rosy finch

The following species have not been documented to occur and there is no suitable habitat present in the project area: red-eyed vireo. Gray-crowned rosy finches have been reported to occur outside of the project area, such as along Mountain Creek. However, this species is known to breed in an alpine, subalpine and tundra habitats in Alaska and Canada, though they are sometimes observed wintering in

Central Oregon. They are not expected to breed within the project area, and this project does not propose to authorize OHV use during the winter season, therefore there would be no overlap between proposed OHV trail use and wintering finches. For this reason this species will not be further discussed in this document. One upland sandpiper was recorded on private land meadows within the project area in 1987. No subsequent records for this species were found for this project area. None of these species are listed in "Common Birds of the Ochoco Region – All birds of the Ochoco Region except ultra rarities and vagrants" (USFS, 2001). Some of the species listed on Table 157 are covered in other sections of this document either as an individual species or group of species. Existing habitat conditions and potential impacts to the bald eagle, Lewis's woodpecker, white-headed woodpecker and the upland sandpiper have been discussed in the Threatened, Endangered, and Sensitive wildlife species section. The red-naped sapsucker is included in the PCE section under Management Indicator Species and flammulated owl is discussed in the Raptor section under Other Species. Please refer to those sections for detailed discussion for those species. The focal species with potential to be found in the project area, which were not discussed in previous sections of this document as discussed below.

The remaining focal species identified from the lists with the potential to be found within the project area are listed in "Common Birds of the Ochoco Region" as follows: Abundance ranking 1 (abundant), chipping sparrow; ranking 2 (common), vesper sparrow and MacGillivray's warbler; ranking 2 to 3 (common to occasional), Townsend's warbler; ranking 2 to 4 (common to uncommon), ranking 3 (occasional) Vaux's swift and hermit thrush; ranking 3 to 4 (occasional to uncommon), varied thrush; ranking 4 to 5 (uncommon to rare), olive-sided flycatcher, willow flycatcher and veery. Many of the abundance rankings vary seasonally since many of these birds migrate annually. Each of these species is discussed in detail in the section on Individual Landbird Focal Species below

General Effects to Land Birds (All Species)

This section addresses landbirds in general including Birds of Conservation Concern. Focal Species are addressed individually in the next section of this report. The literature is available which discusses vehicle and trail impacts to songbirds in general, also known as passerine species. Impacts known to affect songbirds are noise and distance from roads and trails. For example, noise can affect avian species by masking mating songs or communication calls (Konish 1970, Marler et al. 1973, Klump et al. 1986, Reynolds et al. 1992, Wollerman 1998 in AMEC 2005, and AMEC 2005). Species cannot hear territory calls, mating calls, or low frequency noise from predators with increased background noise from vehicles (Klump et al. 1984, Reijen and Foppen 1994, Montana TWS 1999, and Erbe et al. 1999 in AMEC 2005). Studies also found that the further away from the road or trail the more abundant the passerine species are (Sauvajot 1998, Miller et al. 1998, Forman 1998 and Barton and Holms 2006).

Romain-Bondi (2009) stated the common wildlife response to increased human activity is avoidance or displacement. The roads and trails may not provide enough protection/cover from predators and may not provide foraging and roosting areas for wildlife. Other variables that may impact wildlife include, but are not limited to noise, dust, speed, soil compaction, and possible harassment of wildlife (Romain-Bondie 2009, Ouren, 2007). The selection of Alternative 1 would result in no change in motorized use in the project area. However, assuming some species displacement or individuals or pairs may occur, a disturbance buffer analysis was conducted as shown in Table 158. It was assumed all open roads are being used and a 200 m (660 feet) zone of disturbance was applied to each side of the motorized routes. This analysis showed 38 percent of the project area is within the disturbance zone although it is unknown if this level of disturbance is resulting in reduced nesting success in the project area. With Alternative 1 the existing open and closed roads and user created trails would be expected to continue having motorized use. Refer to the noise impacts discussion in the General Wildlife section of this Chapter. Based on a 200 meter (660 ft) distance band analysis on each side of an open road, approximately 115, 127 acres may be impacted by noise from open roads. However,

this buffer may overestimate effects to this species based on the Ingerlfinger and Anderson (2004) study showing reduced species density within 100 meters (330 ft) from a roadside. On the other hand, the open road analysis does not include unauthorized use of closed, decommissioned or user created routes. In many cases traffic on these unauthorized routes may occur infrequently enough that the noise would not disrupt reproductive behavior or survival of passerine birds.

Among the open roads, there are multiple high speed paved or gravel roads with traffic volumes of ten or more motorized vehicles per day within the project area during nesting season. Nesting habitat 100 meters (330 feet) from these roads would likely experience similar disturbance levels Ingerlfinger and Anderson (2004) found in their study. While road volume does increase during the hunting seasons beginning in mid-August, the increase occurs after the nesting period for local passerine species.

A 200 meter (660 feet) each side road and trail disturbance zone was modeled to determine the area with potential noise disturbance for the entire project area. Due to the fact that the majority of motorized routes under any alternative are on or in proximity to existing open roads, there is only about a 5% difference in the amount of area within this disturbance zone between the action alternatives and a 6 to 11% difference between the action alternatives and the no action alternative. Results from the disturbance zone analysis across the project project area are displayed in Table 158. The addition of proposed trails to the existing network of open roads resulted in an increase in disturbance area of 3 to 5% across the project area. Under Alternatives 2, 3, 4 and 5, the percentage of the project area within 200 m (660 feet) of an open motorized route is 42%, 41%, 43% and 41%, respectively.

Table 158. Acres within 200 m (660') of any open road or trail.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
115,127	125,745	123,036	129,390	124,432

Alternatives 2, 3, 4 and 5 would designate an official OHV trail system. Unauthorized roads and trails not designated as part of the system within the OHV Management Area would be closed for motorized vehicle use. Improvement of existing road closures, and blockage of unauthorized and user created trails could result in improvement to local passerine species habitat by reduction of motorized disturbance along those routes that are closed. This potential improvement is not reflected in Table 158, as the disturbance band analysis was based on open system roads and did not include breached closures, user created routes and other unauthorized travel routes such as horse trails and non-system roads. With a new trail system in place, OHV use is projected to increase 2 to 5 percent per year for a period of time; open roads may also experience an increase in traffic volume. The area within 200 m of a designated open road or trail should not increase as this level of use increases, but the intensity of disturbance on the designated network is expected to increase as the level of use increases.

Individual Species of Landbird Focal Species

This project would have very little direct effect on existing or potential nesting habitat of any of these landbird focal species, or the suite of species that they represent, due to the small scale of impact to the vegetation and supporting land base compared to what is available at the landscape scale in the vegetation type where each species is most likely to be found. The potential reduction of habitat types under each action alternative was estimated by determining how many miles of new trail (not on an existing road) would be created in each habitat type, and how many acres would need to be cleared for trail creation. Also, acres that would need to be cleared, or that may be impacted in association with staging areas were estimated (the assumption is up to 5 acres per staging area could be impacted). These acre estimates are summarized in Table 159.

Table 159. Direct impacts to habitat of landbird focal species.

	Land Bird Species

Alternative Effects to Focal Landbird Habitats		Chipping Sparrow	Vaux's Swift; Townsend's Warbler	Varied Thrush; MacGillivray's Warbler	Olive-sided Flycatcher; Hermit Thrush	Veery; Willow Flycatcher	Vesper Sparrow
		Habitat Type					
		Ponderosa Pine	Grand Fir	Riparian Hardwood	All Forested PAGs	Alder/ Willow	Grassland, Meadow, Steppe/ Shrubland
Alternative 2	**Acres Cleared for New Trail**	16	40	.4	68	.22	17
	Acres Cleared for Staging Area	30	5	0	35	0	5
	Total Acres of Habitat Reduced	46	45	.4	103	.22	22
Alternative 3	**Acres Cleared for New Trail**	8	28	.2	46	.15	6
	Acres Cleared for Staging Area	15	5	0	20	0	0
	Total Acres of Habitat Reduced	23	33	.2	66	.15	6
Alternative 4	**Acres Cleared for New Trail**	19	55	.4	90	.22	21
	Acres Cleared for Staging Area	30	5	0	35	0	5
	Total Acres of Habitat Reduced	49	60	.4	125	.22	26
Alternative 5	**Acres Cleared for New Trail**	8	34	.2	52	.09	12
	Acres Cleared for	10	5	0	15	0	5

	Staging Area						
	Total Acres of Habitat Reduced	18	39	.2	67	.09	17
*Assumes vegetation clearing width of 6' for class I and IV; 8' for class II; 4' for class III for trail (not on open roads)							

Chipping sparrow: In central Oregon chipping sparrows can be found in open coniferous forests or stands of trees interspersed with grassy openings or low foliage and are found in good numbers in central Oregon in juniper, ponderosa pine, and lodgepole pine forests (Marshall et al. 2003). They are associated with higher elevations are summer residents preferring open habitats with a shrub or regenerating pine component. Chipping sparrows occupy successional habitats after logging or burning because of an affinity for open, older stands of western mixed conifer forest (DeGraaf and Rappole 1995).

The current NatureServe Conservation Status Rank for chipping sparrows in Oregon is a S4, 'apparently secure', and National 5, 'secure' and Global 5 'secure (2009). Breeding bird surveys have shown that population declines of chipping sparrows have averaged 3.9 percent annually in Oregon due to a decrease in fire to maintained open woodlands but also due to cowbird brood parasitism and competition with house sparrows and house finches (Marshall et al. 2003). Chipping sparrows are known to occur on both Lookout Mountain and Paulina Ranger District, including locations within the project area for this project. Habitat for the chipping sparrow includes open canopied stands of lodgepole pine, ponderosa pine, Douglas-fir grand fir with tree diameters 10-15 inches or larger, especially where patches of regenerating pine seedlings and saplings are present. Such habitat is present in patches across the project area. There are numerous records from Breeding Bird Surveys on Paulina Ranger District (including BBS station #9-15, and 17-22 within or adjacent to the project area.

Direct and Indirect Effects – Alternative 1 (chipping sparrow): The selection of Alternative 1 would result in no change in the existing amount of roads and user-created trails that are being used for motorized access. Where this species occurs within 660 feet of a road or motorized trail some level of masked communication may be occurring to individuals or pairs particularly the closer they are to motorized routes. However, it is currently unknown how this may manifest itself into nesting success or if changes in habitat conditions such as availability of snags and open forested stands or edges is more critical to the species. This alternative would not result in any removal of snags or trees capable of providing nesting habitat.

Effects Common to All Action Alternatives (chipping sparrow): This project would have very little direct effect on existing or potential nesting habitat due to the small scale of impact to the vegetation and supporting land base compared to what is available at the landscape scale in the ponderosa pine PAGs, where this species is most likely to be found. Increases in motorized use above the open road network in ponderosa pine PAGs would be as follows: Alternative 2 includes 11.7 miles of Class I trail not on open road, 2.4 miles of Class II trail not on open road and 6.8 miles of Class III trail not on open road; Alternative 3 includes 2.6 miles of Class I trail not on open road and 11.3 miles of Class III trail not on open road; Alternative 4 includes 16.7 miles of Class I trail not on open road, 2.1 miles of Class II trail not on open road and 6.6 miles of Class III trail not on open road; Alternative 5 includes 1.2 miles of Class I trail not on open road, 1.3 miles of Class II trail not on open road, 5.7 miles of Class III trail not on open road and 0 miles of Class IV trail not on open road . With estimated trail construction and clearing widths this amount of trail would have a potential direct effect on ponderosa pine PAG vegetation of approximately 16 acres under Alternative 2, 8 acres under Alternatives 3 and 5, 19 acres under Alternative 4. A limited amount of clearing around

staging areas would also occur in ponderosa pine stands. It is expected that soil and/or vegetation on up to 5 acres at each staging area would be directly affected. Where this occurs in ponderosa pine, this would bring the anticipated direct reduction in potential nesting habitat for chipping sparrows to 46 acres under Alternative 2, 23 acres under Alternative 3, 49 acres under Alternative 4, or 18 acres under Alternative 5. Refer to Table 159.

Alternatives 2, 3, 4 and 5would designate an official OHV trail system. Selected unauthorized roads and trails not designated as part of the system would be closed for motorized vehicle use. Improvement of existing road closures, and blockage of unauthorized and user created trails could result in improvement to chipping sparrow habitat by reduction of motorized disturbance along those routes that are closed. This potential improvement is not reflected in Table 158, as the disturbance band analysis was based on open system roads and did not include breached closures, user created routes and other unauthorized travel routes such as horse trails and non-system roads. With a new trail system in place, OHV use is projected to increase 2 to 5 percent per year for a period of time; open roads may also experience an increase in volume. The area within 200 m of a designated open road or trail should not increase over time, but the intensity of disturbance on the designated network is expected to increase as the level of use increases.

Cumulative Effects (chipping sparrows): This project alone would have very little direct effect on existing or potential nesting habitat due to the small scale of impact to the vegetation and supporting land base compared to what is available at the landscape scale in the ponderosa pine PAGs, and in comparison to the much larger vegetation management projects that overlap the project area. The Spears, Canyon, HEJ, Deep, Jackson, Wolf, Gap and Black Mountain Vegetation Management projects propose a variety of activities to increase the dominance of open forest conditions in ponderosa pine PAGs. Chipping sparrows are associated with open forest conditions, and all recent vegetation management projects that propose commercial thinning (stand density reduction) should result in improved habitat in the long run. In the short term, however, where underburning is prescribed, habitat for this species would likely be reduced, as the reduction of the regenerating pine in the understory is often the target of the prescribed fire treatment. All vegetation management projects in the project area include prescribed burning. These actions would reduce the amount of shrub and sapling habitat in the treatment units in the short term. Although Project Design Features in the NEPA documents and burn plan prescriptions usually call for the retention of untreated patches for the nesting birds, small mammal habitat, and big game forage, these actions would reduce the amount of chipping sparrow habitat as a result of burning. Short term reduction of understory shrub and pine regeneration is a trade-off for the benefit of long term resiliency of the stands as a whole, as well as for the reduction in fuel loading and subsequent risk of loss to high intensity wildfire. Depending on the prescribed fire return interval some of the shrubs would regenerate and provide nesting habitat until prescribed fire is applied again. While some nesting habitat would be removed, the application of fire would more closely mimic natural disturbance events that occurred in ponderosa pine plant associations. Nesting habitat would still be retained across the landscape (in some stands not selected for vegetative treatments in these NEPA documents) and within treatment units (although potentially in smaller patches depending on burn conditions and the resulting mosaic due to variable fire intensity). As described above the anticipated direct reduction in potential nesting habitat for chipping sparrows is 46 acres under Alternative 2, 23 acres under Alternative 3, 49 acres under Alternative 4, or 18 acres under Alternative 5. Within a project area of more than 300,000 acres and with multiple projects affecting potential habitat at a scale of hundreds or thousands of acres, the direct impact of this project on nesting habitat is relatively minute and the cumulative impact on habitat is negligible at the landscape scale.

Chipping sparrow habitat on adjacent private and BLM managed land likely contributes toward local populations of this species. Management of open conditions in ponderosa pine is commonly practiced on BLM and private land within and adjacent to the project area. Therefore, it is likely that

forest land in the project area which is managed by private land owners and BLM would provide nesting habitat for chipping sparrow. Given the current NatureServe Conservation Status Rank for chipping sparrows in Oregon is a S4, 'apparently secure,' and National 5, 'secure' (2009), it is not expected that implementation of the Ochoco Summit OHV project in conjunction with overlapping or adjacent vegetation management actions would lead to a change in rankings from NatureServe for the chipping sparrow for the reasons stated above.

All action alternatives would designate an OHV trail system available for use, while implementation of the forest-level travel management plan would prohibit cross country travel and/or use of closed roads. Some user created trails not used for the designated system would be closed and rehabilitated. This would result in an increase in the amount of undisturbed nesting habitat in selected areas under all action alternatives. While chipping sparrows may still be subjected to motorized disturbance during the nesting season (May – July), increased levels of undisturbed nesting habitat would be available as compared to the existing condition where closed roads and non-motorized trails are currently receiving motorized use, and where cross country travel is occurring. Thus, proposed closures and rehabilitation of user created trails, in combination with implementation of the forest-level travel management plan should result in improved amounts of undisturbed nesting habitat in the long run

Vaux's swift: The Vaux's swift is associated with large snags in mesic mixed conifer forests. It is an aerial insectivore typically associated with late-successional forest and dependent on very large, hollow snags for nests and roosts. The best variables to predict Vaux's swift occurrence is the number of snags greater than 20 inches dbh and the number of trees with conks of Indian paint fungus (Bull and Beckwith, 1993). Conservation issues listed in the landbird plan include loss of large snags during intensive forest management and insufficient recruitment of large snags through harvest rotations. Habitat objectives include retention and development of snags greater than 27 inches dbh and 82 feet in height in different stages of decay, including hollow snags. Recommended conservation measures include retention of broken topped trees, especially those over 40' inches dbh, large snag retention and recruitment of replacement snags (large live trees with defect).

The current NatureServe Conservation Status Rank for Vaux's swift is Global G5 'secure', National N5B 'secure, breeding' and Oregon S5 'secure' (2009). Breeding bird surveys have shown state-wide population increases for Vaux's swift of 3.7 percent annually in Oregon (1966-1999), while Sharp (1992) estimated a 8.9% decrease on National Forests during the 1980's. The decline was attributed to harvest of late seral coniferous forests and conversion of stands of late seral grand fir dominated stands to early seral stands dominated by ponderosa pine which do not develop hollow tree structure as readily as grand fir does (Marshall et al. 2003). Vaux's swifts have been recorded on Paulina Ranger District, but not within the project area.

<u>Direct and Indirect Effects – Alternative 1 (Vaux's swift)</u>: The selection of Alternative 1 would result in no change in the existing amount of roads and user-created trails that are being used for motorized access. Where this species occurs within 660 feet of a road or motorized trail, some level of masked communication may be occurring to individuals or pairs particularly the closer they are to motorized routes. However, it is currently unknown how this may manifest itself into nesting success or if changes in habitat conditions such as availability of snags and open forested stands or edges is more critical to the species. This alternative would not result in any removal of snags or trees capable of providing nesting habitat.

<u>Effects Common to All Action Alternatives (Vaux's swift)</u>: This project would have very little direct effect on existing or potential nesting habitat due to the small scale of impact to the vegetation and supporting land base compared to what is available at the landscape scale. Since this species is associated with hollow trees, which are most common in late-seral grand fir sites, potential impacts to this species was based on impacts to grand fir PAGs. Increases in motorized use above the open road

network in grand fir PAGs would be as follows: Alternative 2 includes 23.1 miles of Class I trail not on open road, 6.0 miles of Class II trail not on open road and 28.0 miles of Class III trail not on open road; Alternative 3 includes 18.3 miles of Class I trail not on open road and 25.0 miles of Class III trail not on open road; Alternative 4 includes 45.5 miles of Class I trail not on open road, 4.4 miles of Class II trail not on open road and 26.6 miles of Class III trail not on open road; Alternative 5 includes 23.4 miles of Class I trail not on open road, 3.4 miles of Class II trail not on open road, 20.9 miles of Class III trail not on open road and 4.3 miles of Class IV trail not on open road. With estimated trail construction and clearing widths this amount of trail would have a potential direct effect on grand fir PAG vegetation of approximately 40 acres under Alternative 2, 28 acres under Alternative 3, 55 acres under Alternative 4, or 34 acres under Alternative 5. A limited amount of clearing around staging areas would also occur in grand fir stands. It is expected that soil and/or vegetation on up to 5 acres at each staging area would be directly affected. This would bring the anticipated direct reduction in potential nesting habitat for Vaux's swift to 45 acres under Alternative 2, 33 acres under Alternative 3, 60 acres under Alternative 4, or 39 acres under Alternative 5. Refer to Table 159.

Alternatives 2, 3, 4 and 5 would designate an official OHV trail system. Selected unauthorized roads and trails not designated as part of the system would be closed for motorized vehicle use. Improvement of existing road closures, and blockage of unauthorized and user created trails could result in improvement to Vaux's swift habitat by reduction of motorized disturbance and access for snag cutters along those routes that are closed. This potential improvement is not reflected in Table 158, as the disturbance band analysis was based on open system roads and did not include breached closures, user created routes and other unauthorized motor vehicle travel routes such as horse trails and non-system roads. With a new trail system in place, OHV use is projected to increase 2 to 5 percent per year for a period of time; open roads may also experience an increase in volume. The area within 200 m of a designated open road or trail should not increase over time, but the intensity of disturbance on the designated network is expected to increase as the level of use increases. Snag felling associated with trail maintenance would be very limited on an annual basis to only those that are leaning over or across the trail system.

Cumulative Effects (Vaux's swift): This project would have very little direct effect on existing or potential nesting habitat due to the small scale of impact to the vegetation and supporting land base compared to what is available at the landscape scale in the grand fir PAGs. The Spears, Canyon, HEJ, Deep, Jackson, Wolf, Gap and Black Mountain Vegetation Management projects propose a variety of activities to increase the dominance of open forest conditions and ponderosa pine in the overstory. To achieve this grand fir in the understory is targeted for removal. These projects could adversely impact potential nesting habitat where removal of understory grand fir occurs over large areas, or where existing hollow trees and snags are susceptible to ignition during prescribed burning. All recent vegetation management projects that propose commercial thinning (stand density reduction) should result in improved habitat in the long run where treatments stimulate the development of large trees in the future if some grand fir and defective Douglas fir is retained for future hollow tree and snag recruitment. In the short term, however, where prescribed fire is implemented on grand fir sites in such a way that hollow trees are not retained, then habitat for this species would likely be reduced. Large snags and hollow trees are not targeted for removal, though they may unintentionally ignite during burning operations. All vegetation management projects in the project area include prescribed burning. Project Design Features in the NEPA documents and burn plan prescriptions usually call for the retention of untreated patches, existing large snags, down logs and large trees of all condition classes. The incidental loss of individual large hollow trees and snags is an incidental occurrence in prescribed burns and is a trade-off for the benefit of long term resiliency of the stands as a whole, as well as for the reduction in fuel loading and subsequent risk of loss to high intensity wildfire. While some nesting habitat would be removed, the application of fire would more closely mimic natural disturbance events that occurred in across the landscape, especially in the

drier plant associations. Nesting habitat would still be retained across the landscape (in unmanaged stands not selected for vegetative treatments in these NEPA documents) and within treatment units individually or in patches depending on burn conditions and the resulting fire mosaic.

All action alternatives would designate an OHV trail system available for use, while implementation of the forest-level travel management plan would prohibit cross country travel and/or use of closed roads. Some user created trails not used for the designated system would be closed and rehabilitated. This would result in an increase in the amount of undisturbed nesting habitat in selected areas under all action alternatives. While Vaux's swifts may still be subjected to motorized disturbance during the nesting season (May – July), increased levels of undisturbed nesting habitat would be available as compared to the existing condition where closed roads and non-motorized trails are currently receiving motorized use, and where cross country travel is occurring. Thus, proposed closures and rehabilitation of user created trails, in combination with implementation of the forest-level travel management plan should result in improved amounts of undisturbed nesting habitat in the long run

Townsend's warbler: The Townsend's warbler is associated with overstory canopy closure and understory structure in mesic mixed conifer forests. It foraged preferentially in grand fir and to a lesser extent larch and avoids ponderosa pine and Douglas-fir in northeastern Oregon. It has also shown a positive association with larger tracts of closed canopy forests than in stands with more perimeter (edge). Conservation issues listed in the landbird plan include loss of habitat where restoration of historic dry forest conditions return current stands of mixed forest to open pine dominated stands. Habitat objectives include where ecologically appropriate, retain patches of mixed conifer forest at least 100 acres in size, with greater than 50% crown closure and with late successional conditions (mature and old-growth forest) dominate by grand fir or Douglas-fir. Recommended conservation measures include designation of unmanaged or lightly managed areas where overstory canopy closure is emphasized.

The current NatureServe Conservation Status Rank for Townsend's warbler is Global G5, 'secure', National N5B 'secure, breeding' and NNRN 'not ranked, nesting' and Oregon S4 'apparently secure' (2009). The Townsend's warbler has greatly increased in abundance in the Blue Mountains as a result of fire suppression and subsequent increases in understory Douglas-fir and grand fir (Marshall et al. 2003). Townsend's warblers are known to occur on both Lookout Mountain and Paulina Ranger District, including locations within the project area for this project (including BBS station #9, 11-13, 21 and 22).

<u>Direct and Indirect Effects – Alternative 1 (Townsend's warbler)</u>: The selection of Alternative 1 would result in no change in the existing amount of roads and user-created trails that are being used for motorized access. Where this species occurs within 660 feet of a road or motorized trail some level of masked communication may be occurring to individuals or pairs particularly the closer they are to motorized routes. However, it is currently unknown how this may manifest itself into nesting success or if changes in habitat conditions such as availability of snags and open forested stands or edges is more critical to the species. This alternative would not result in any removal of snags or trees capable of providing nesting habitat.

<u>Effects Common to All Action Alternatives (Townsend's warbler)</u>: This project would have very little direct effect on existing or potential nesting habitat due to the small scale of impact to the vegetation and supporting land base compared to what is available at the landscape scale. Increases in motorized use above the open road network within mesic mixed conifer forest sites (grand fir PAGs) would be as follows: Alternative 2 includes 23.1 miles of Class I trail not on open road, 6.0 miles of Class II trail not on open road and 28.0 miles of Class III trail not on open road; Alternative 3 includes 18.3 miles of Class I trail not on open road and 25.0 miles of Class III trail not on open road; Alternative 4 includes 45.5 miles of Class I trail not on open road, 4.4 miles of Class II trail not on open road and 26.6 miles of Class III trail not on open road; Alternative 5 includes 23.4 miles of

Class I trail not on open road, 3.4 miles of Class II trail not on open road, 20.9 miles of Class III trail not on open road and 4.3 miles of Class IV trail not on open road. With estimated trail construction and clearing widths this amount of trail would have a potential direct effect on grand fir PAG vegetation of approximately 40 acres under Alternative 2, 28 acres under Alternative 3, 55 acres under Alternative 4, or 34 acres under Alternative 5. A limited amount of clearing around staging areas would also occur in grand fir stands. It is expected that soil and/or vegetation on up to 5 acres at each staging area would be directly affected. This would bring the anticipated direct reduction in potential nesting habitat for Vaux's swift to 45 acres under Alternative 2, 33 acres under Alternative 3, 60 acres under Alternative 4, or 39 acres under Alternative 5. Refer to Table 159.

Alternatives 2, 3, 4, and 5would designate an official OHV trail system. Selected unauthorized roads and trails not designated as part of the system would be closed for motorized vehicle use. Improvement of existing road closures, and blockage of unauthorized and user created trails could result in improvement to Townsend's warbler habitat by reduction of motorized disturbance along those routes that are closed. This potential improvement is not reflected in Table 158, as the disturbance band analysis was based on open system roads and did not include breached closures, user created routes and other unauthorized travel routes such as horse trails and non-system roads. With a new trail system in place, OHV use is projected to increase 2 to 5 percent per year for a period of time; open roads may also experience an increase in volume. The area within 200 m of a designated open road or trail should not increase over time, but the intensity of disturbance on the designated network is expected to increase as the level of use increases.

Cumulative Effects (Townsend's warbler): This project would have very little direct effect on existing or potential nesting habitat due to the small scale of impact to the vegetation and supporting land base compared to what is available at the landscape scale in the grand fir PAGs. The Spears, Canyon, HEJ, Deep, Jackson, Wolf, Gap and Black Mountain Vegetation Management projects propose a variety of activities to increase the dominance of open forest conditions and ponderosa pine, larch and Douglas-fir in the overstory. To achieve this understory grand fir is targeted for removal. These projects could adversely impact potential nesting habitat where removal of understory grand fir occurs over large areas, or where grand fir is effectively removed from the dominant tree species composition and where closed canopy stands are converted to open stands. Recent vegetation management projects that propose commercial thinning (stand density reduction) may allow for improved habitat in the long run where treatments stimulate the development of large trees in the future and where understory trees are able to respond to the thinning by attaining increase growth for recruitment of future multiple canopy layering. In the short term, however, these projects are generally implemented in such a way that grand fir trees are not retained at a density that would favor Townsend's warblers within treated units and habitat for this species would likely be reduced. While some nesting habitat would be removed, the application of thinning and fire would more closely mimic natural disturbance events that occurred in across the landscape historically, especially in the drier plant associations. Nesting habitat would still be retained across the landscape (in unmanaged stands not selected for vegetative treatments in these NEPA documents) and within treatment units individually or in patches depending on burn conditions and features of the resulting fire mosaic.

All action alternatives would designate an OHV trail system available for use, while implementation of the forest-level travel management plan would prohibit cross country travel and/or use of closed roads. Some user created trails not used for the designated system would be closed and rehabilitated. This would result in an increase in the amount of undisturbed nesting habitat in selected areas under all action alternatives. While Townsend's warblers may still be subjected to motorized disturbance during the nesting season (May – July), increased levels of undisturbed nesting habitat would be available as compared to the existing condition where closed roads and non-motorized trails are currently receiving motorized use, and where cross country travel is occurring. Thus, proposed

closures and rehabilitation of user created trails, in combination with implementation of the forest-level travel management plan should result in improved amounts of undisturbed nesting habitat in the long run.

Varied thrush: The varied thrush is associated with structurally diverse, multi-layered canopy conditions in mesic mixed conifer forests. It is an omnivore that gleans understory debris in dense, older, mesic mixed conifer stands, especially in wet sites with closed canopy above 3000' elevation. Conservation issues listed in the landbird plan include loss of structural complexity, canopy layering and organic matter on the forest floor due to forest management practices. Several studies indicate that this species is area sensitive and avoids edges (McGarigal and McComb, 1995, Manuwal and Pearson, 1997). Habitat objectives include retaining blocks of late successional forest at least 75 acres in size; retention of patches with high canopy closure (greater than 60%), and with multiple tree layers with mixed species composition including at least 25% deciduous vegetative cover for dense leaf litter. Recommended conservation measures include maintaining large tracts of forested stands to reduce the amount of edge and fragmentation; conduct thinning from below to enhance diversity in forest structure, to enhance survival of suppressed and intermediate trees, and to promote growth; conduct thinning in conjunction with underplanting where necessary to increase tree layering and species diversity; and retaining or planting native berry and fruit producing shrubs in the understory.

The current NatureServe Conservation Status Rank for varied thrush is G5 globally 'secure', N5 nationally 'secure' and Oregon S4 'apparently secure' (2009). Breeding and wintering abundance varies cyclically every 2 to 5 years. Though the overall population trend is declining in Oregon, Washington and Northern California, its status east of the Cascades is unknown (Marshall et al. 2003). Varied thrushes are known to occur on both Lookout Mountain and Paulina Ranger District, including locations within the project area for this project.

<u>Direct and Indirect Effects – Alternative 1 (varied thrush)</u>: The selection of Alternative 1 would result in no change in the existing amount of roads and user-created trails that are being used for motorized access. Where this species occurs within 660 feet of a road or motorized trail, some level of masked communication may be occurring to individuals or pairs particularly the closer they are to motorized routes. However, it is currently unknown how this may manifest itself into nesting success or if changes in habitat conditions such as availability of snags and open forested stands or edges is more critical to the species. This alternative would not result in any removal of snags or trees capable of providing nesting habitat.

<u>Effects Common to All Action Alternatives (varied thrush)</u>: This project would have very little direct effect on existing or potential nesting habitat due to the small scale of impact to the vegetation and supporting land base compared to what is available at the landscape scale. Due to its affinity for deciduous woodland and accumulations of deciduous litter, this species was evaluated based on impacts to riparian hardwood habitat including alder, willow, cottonwood and aspen. Increases in motorized use above the open road network in riparian woodland habitats would be as follows: Alternative 2 includes 0.5 miles of Class I trail not on open road, 0.0 miles of Class II trail not on open road and 0.0 miles of Class III trail not on open road; Alternative 3 includes 0.2 miles of Class I trail not on open road and 0.2 miles of Class III trail not on open road; Alternative 4 includes 0.5 miles of Class I trail not on open road, 0.0 miles of Class II trail not on open road and 0.0 miles of Class III trail not on open road; Alternative 5 includes 0.1 miles of Class I trail not on open road, and 0.1 miles of Class III trail not on open road. There are no miles in these habitats in the Class II or IV systems. With estimated trail construction and clearing widths this amount of trail would have a potential direct effect on riparian woodland vegetation of approximately 0.4 acres under Alternative 2, 0.2 acres under Alternative 3, 0.4 acres under Alternative 4, or 0.2 acres under Alternative 5. None of the staging areas are in riparian woodland habitats so staging areas would not increase the impact on nesting habitat for this species. Refer to Table 159.

Alternatives 2, 3, 4 and 5 would designate an official OHV trail system. Selected unauthorized roads and trails not designated as part of the system would be closed for motorized vehicle use. Improvement of existing road closures, and blockage of unauthorized and user created trails could result in improvement to varied thrush habitat by reduction of motorized disturbance along those routes that are closed. This potential improvement is not reflected in Table 158, as the disturbance band analysis was based on open system roads and did not include breached closures, user created routes and other unauthorized travel routes such as horse trails and non-system roads. With a new trail system in place, OHV use is projected to increase 2 to 5 percent per year for a period of time; open roads may also experience an increase in volume. The area within 200 m of a designated open road or trail should not increase as level of use increases, but the intensity of disturbance on the designated network is expected to increase as the level of use increases.

Cumulative Effects (varied thrush): The Spears, Canyon, HEJ, Deep, Jackson, Wolf, Gap and Black Mountain Vegetation Management projects propose a variety of activities to improve cover of riparian shrub vegetation. These projects would not adversely impact potential nesting habitat in well-established thickets of riparian shrubs. This OHV project would avoid impacts to established riparian hardwood thickets or other riparian vegetation. This project would have very little direct effect on existing or potential nesting habitat due to the small scale of impact.

All recent vegetation management projects that propose commercial thinning and or riparian hardwood protection should result in improved habitat in the long run. In the short term, however, where prescribed fire is prescribed habitat for this species would likely be reduced where the underburn treatment top kills riparian hardwoods which are not fire tolerant. However, subsequent resprouting is likely to increase stand vigor if the sprouts are protected from grazing and/or mechanical damage. All vegetation management projects in the project area include riparian hardwood enhancement treatments. These actions should improve the amount of riparian hardwood habitat in the treatment units. The closure of unwanted routes (user created trails, breached road closures, etc.) proposed under the action alternatives may improve the recovery of riparian vegetation that is currently being impacted by uncontrolled recreational traffic. Thus, there is a positive cumulative effect of the action alternatives and past, present and reasonably foreseeable riparian hardwood improvement projects in the long run. While some nesting habitat may be impacted in the short term within during trail construction and implementation of route closures, and initially during rehabilitation efforts in riparian areas, nesting habitat would still be retained across the landscape in the short term and should be increased in the long term.

All action alternatives would designate an OHV trail system available for use, while implementation of the forest-level travel management plan would prohibit cross country travel and/or use of closed roads. Some user created trails not used for the designated system would be closed and rehabilitated. This would result in an increase in the amount of undisturbed nesting habitat in selected areas under all action alternatives. While varied thrushes may still be subjected to motorized disturbance during the nesting season (May – July), increased levels of undisturbed nesting habitat would be available as compared to the existing condition where closed roads and non-motorized trails are currently receiving motorized use, and where cross country travel is occurring. Thus, proposed closures and rehabilitation of user created trails, in combination with implementation of the forest-level travel management plan should result in improved amounts of undisturbed nesting habitat in the long run

MacGillivray's warbler: The MacGillivray's warbler is an indicator for dense shrub layer in forest openings or understory in mesic mixed conifer forests. This species is more common in open-canopy stands and regenerating forests than in closed canopy stands and are positively associated with wood shrubs up to 15 ft in height. In grand fir forests of the Blue Mountains, they are associated with well-developed understories of shrubs, seedlings and saplings. Habitat objectives include where ecologically appropriate manage stands to tree canopy cover and herbaceous ground cover to less than 25% each, and dense understory shrub cover of greater than 40% and 270 stems/acre (including

shrubs, seedlings and saplings). Recommended conservation measures include grazing management to achieve habitat objectives described above.

The current NatureServe Conservation Status Rank for MacGillivray's warbler is G5 globally 'secure', N5B nationally 'secure, breeding' and Oregon S4 'apparently secure' (2009). According to Marshall et al. (2003) loss of riparian habitat and forest management practices that are intended to return stand conditions to open understory may have, or are likely to result in local population declines east of the Cascades. Breeding bird surveys have shown conflicting population trends between states and regions within the Oregon range depending on trends in forest practices that provide or remove shrubland habitat. Grazing, fire and herbicide treatments have also been identified as threats to this species (Marshall et al. 2003). MacGillivray's warblers have been recorded in every county in Oregon, and breeds throughout the Blue Mountains (Marshall et al. 2003). There are records for this species on Ochoco National Forest in the vicinity of Mt. Pisgah, which is within the project area for this project, and along the Barnhouse Breeding Bird Survey Route, some of which is in this project area.

Direct and Indirect Effects – Alternative 1 (MacGillvray's warbler): The selection of Alternative 1 would result in no change in the existing amount of roads and user-created trails that are being used for motorized access. Where this species occurs within 660 feet of a road or motorized trail some level of masked communication may be occurring to individuals or pairs particularly the closer they are to motorized routes. However, it is currently unknown how this may manifest itself into nesting success or if changes in habitat conditions such as availability of snags and open forested stands or edges is more critical to the species. This alternative would not result in any removal of snags or trees capable of providing nesting habitat.

Effects Common to All Action Alternatives (MacGillvray's warbler): This project would have very little direct effect on existing or potential nesting habitat due to the small scale of impact to the vegetation and supporting land base compared to what is available at the landscape scale. Due to its affinity for deciduous woodland and accumulations of deciduous litter, this species was evaluated based on impacts to riparian hardwood habitat including alder, willow, cottonwood and aspen. Increases in motorized use above the open road network in riparian woodland habitats would be as follows: Alternative 2 includes 0.5 miles of Class I trail not on open road, 0.0 miles of Class II trail not on open road and 0.0 miles of Class III trail not on open road; Alternative 3 includes 0.2 miles of Class I trail not on open road and 0.2 miles of Class III trail not on open road; Alternative 4 includes 0.5 miles of Class I trail not on open road, 0.0 miles of Class II trail not on open road and 0.0 miles of Class III trail not on open road; Alternative 5 includes 0.1 miles of Class I trail not on open road, and 0.1 miles of Class III trail not on open road. There are no miles in these habitats in the Class II or IV systems. With estimated trail construction and clearing widths, this amount of trail would have a potential direct effect on riparian woodland vegetation of approximately 0.4 acres under Alternative 2, 0.2 acres under Alternative 3, 0.4 acres under Alternative 4, or 0.2 acres under Alternative 5. None of the staging areas are in riparian woodland habitats so staging areas would not increase the impact on nesting habitat for this species. Refer to Table 159.

Alternatives 2, 3, 4, and 5 would designate an official OHV trail system. Selected unauthorized roads and trails not designated as part of the system would be closed for motorized vehicle use. Improvement of existing road closures, and blockage of unauthorized and user created trails could result in improvement to varied thrush habitat by reduction of motorized disturbance along those routes that are closed. This potential improvement is not reflected in Table 158, as the disturbance band analysis was based on open system roads and did not include breached closures, user created routes and other unauthorized travel routes such as horse trails and non-system roads. With a new trail system in place, OHV use is projected to increase 2 to 5 percent per year for a period of time; open roads may also experience an increase in volume. The area within 200 m of a designated open

road or trail should not increase as level of use increases, but the intensity of disturbance on the designated network is expected to increase as the level of use increases.

Cumulative Effects (MacGillivray's warbler): The Spears, Canyon, HEJ, Deep, Jackson, Wolf, Gap and Black Mountain Vegetation Management projects propose a variety of activities to improve cover of riparian shrub vegetation. These projects would not adversely impact potential nesting habitat in well-established thickets of riparian shrubs. This OHV project would avoid impacts to established riparian hardwood thickets or other riparian vegetation. This project would have very little direct effect on existing or potential nesting habitat due to the small scale of impact.

All recent vegetation management projects that propose commercial thinning and or riparian hardwood protection should result in improved habitat in the long run. In the short term, however, where prescribed fire is prescribed habitat for this species would likely be reduced where the underburn treatment top kills riparian hardwoods which are not fire tolerant. However, subsequent resprouting is likely to increase stand vigor if the sprouts are protected from grazing and/or mechanical damage. All vegetation management projects in the project area include riparian hardwood enhancement treatments. These actions should improve the amount of riparian hardwood habitat in the treatment units. The closure of unwanted routes (user created trails, breached road closures, etc.) proposed under the action alternatives may improve the recovery of riparian vegetation that is currently being impacted by uncontrolled recreational traffic. Thus, there is a positive cumulative effect of the action alternatives and past, present and reasonably foreseeable riparian hardwood improvement projects in the long run. While some nesting habitat may be impacted in the short term within during trail construction and implementation of route closures, and initially during rehabilitation efforts in riparian areas, nesting habitat would still be retained across the landscape in the short term and should be increased in the long term.

All action alternatives would designate an OHV trail system available for use, while implementation of the forest-level travel management plan would prohibit cross country travel and/or use of closed roads. Some user created trails not used for the designated system would be closed and rehabilitated. This would result in an increase in the amount of undisturbed nesting habitat in selected areas under all action alternatives. While MacGillivray's warblers may still be subjected to motorized disturbance during the nesting season (May – July), increased levels of undisturbed nesting habitat would be available as compared to the existing condition where closed roads and non-motorized trails are currently receiving motorized use, and where cross country travel is occurring. Thus, proposed closures and rehabilitation of user created trails, in combination with implementation of the forest-level travel management plan should result in improved amounts of undisturbed nesting habitat in the long run.

Olive-sided flycatcher: The olive-sided flycatcher inhabits montane and northern coniferous forests up to 3,000 meters in elevation, especially in burned-over forest areas with tall standing dead trees (DeGraaf and Rappole 1995). In Oregon this flycatcher is a summer resident that breeds in low densities throughout coniferous forests. The olive-sided flycatcher is an aerial insectivore that prefers forest openings or edge habitats where forest meets meadows, timber harvest units, rivers, bogs or marshes (Marshall et al. 2003). The current NatureServe Conservation Status Rank for the olive-sided flycatcher in Oregon is a S3B, 'breeding vulnerable', National 4B, 'breeding apparently secure' and Global G4 'apparently secure' (2009). NatureServe (2010) stated that fire suppression throughout the breeding range has limited the acreage of available habitat. It also reports that the species is "apparently secure" globally although at risk from deforestation on wintering grounds in Central and South America.

This flycatcher is considered a contrast species using old forests for nesting and either openings or gaps in old forests for foraging. Large trees and snags are preferred habitat elements for the olive-sided flycatcher (Romain-Bondi 2009). They are positively associated with recent burns (Hejl 1994

cited by Wisdom et al. 2000). They are listed as uncommon (spring, summer) to rare (fall) in Common Birds of the Ochoco Region and no records were found for this species in the project area.

Direct and Indirect Effects – Alternative 1 (olive-sided flycatcher): The selection of Alternative 1 would result in no change in the existing amount of roads and user-created trails that are being used for motorized access. Where this species occurs within 660 feet of a road or motorized trail, some level of masked communication may be occurring to individuals or pairs particularly the closer they are to motorized routes. However, it is currently unknown how this may manifest itself into nesting success or if changes in habitat conditions such as availability of snags and open forested stands or edges is more critical to the species. This alternative would not result in any removal of snags or trees capable of providing nesting habitat.

Effects Common to All Action Alternatives (olive-sided flycatcher): Because this species is not tied to specific forest types or tree species (plant associations), the impact to this species was based on impacts to forested PAGs as a whole (ponderosa pine, Douglas-fir, grand fir and subalpine fir). Increases in motorized use in forested PAGs above the open road network would be as follows: Alternative 2 includes 32.2 miles of Class I trail not on open road, 11.6 miles of Class II trail not on open road and 19.2 miles of Class III trail not on open road; Alternative 3 includes 30.0 miles of Class I trail not on open road and 42.6 miles of Class III trail not on open road; Alternative 4 includes 78.5 miles of Class I trail not on open road, 9.0 miles of Class II trail not on open road and 35.1 miles of Class III trail not on open road; Alternative 5 includes 33.8 miles of Class I trail not on open road, 5.4 miles of Class II trail not on open road, 39.2 miles of Class III trail not on open road and 4.3 miles of Class IV trail not on open road. With estimated trail construction and clearing widths, this amount of trail would have a potential direct effect on forested PAG vegetation of approximately 68 acres under Alternative 2, 46 acres under Alternative 3, 90 acres under Alternative 4, or 52 acres under Alternative 5. A limited amount of clearing around staging areas would also occur in forested stands. It is expected that soil and/or vegetation on up to 5 acres at each staging area could be directly affected. This would bring the anticipated direct reduction in potential nesting habitat for this species to 103 acres under Alternative 2, 66 acres under Alternative 3, 125 acres under Alternative 4, or 67 acres under Alternative 5. Refer to Table 159.

All action alternatives would designate an OHV trail system available for use increasing the amount of disturbance where closed routes are opened, or new routes constructed to accommodate the designated system. Some existing user created trails and unauthorized routes not needed for the designated system would be closed and rehabilitated which could benefit this species by limiting access to snag cutters. These closures would help to offset the increases in the amount of disturbed nesting habitat caused by new or reopened routes. The net changes displayed in Table 158 reflect the increases due to new and reopened routes, but do not reflect the reductions due to closures and rehabilitation, as the location and extent of unauthorized and user created routes is not fully understood. Snag felling associated with trail maintenance would be very limited on an annual basis to only those that are leaning over or across the trail system. With a new trail system in place, OHV use is projected to increase 2 to 5 percent per year for a period of time; open roads may also experience an increase in volume. The area within 200 m of a designated open road or trail would not increase as the level of use increases but the intensity of disturbance would increase as the level of use increases.

Cumulative Effects (olive-sided flycatcher): This project alone would have very little direct effect on existing or potential nesting habitat due to the relatively small scale of impact to the vegetation and supporting land base compared to what is available at the landscape scale in the forested PAGs, and in comparison to the much larger vegetation management projects that overlap the project area. The Spears, Canyon, HEJ, Deep, Jackson, Wolf, Gap and Black Mountain Vegetation Management projects propose a variety of activities to increase the dominance of open forest conditions in forested PAGs. Olive-sided flycatchers are associated with open forest conditions, and all recent vegetation

management projects that propose commercial thinning (stand density reduction) should result in improved habitat for this species both in the short term and in the long run.

Thinning to improve forest health and reduce wildland fire risk would tend to benefit nesting habitat for olive-sided flycatchers by reducing the risk of large tree loss that the species nests in. In addition, vegetation management projects would not intentionally remove snag habitat except for safety concerns to forest workers. Snag retention would also be beneficial to the species. All vegetation management projects in the project area include thinning and prescribed burning to improve the long term resiliency of the stands as a whole, as well as for the reduction in fuel loading and subsequent risk of loss to high intensity wildfire. The application of fire would more closely mimic natural disturbance events that occurred in the drier forest types and would improve habitat for this species within treated areas.

All action alternatives would designate an OHV trail system available for use, while implementation of the forest-level travel management plan would prohibit cross country travel and/or use of closed roads. Some user created trails not used for the designated system would be closed and rehabilitated. This would result in an increase in the amount of undisturbed nesting habitat in selected areas under all action alternatives. While olive-sided flycatchers may still be subjected to motorized disturbance during the nesting season (May – July), increased levels of undisturbed nesting habitat would be available as compared to the existing condition where closed roads and non-motorized trails are currently receiving motorized use, and where cross country travel is occurring. Thus, proposed closures and rehabilitation of user created trails, in combination with implementation of the forest-level travel management plan should result in improved amounts of undisturbed nesting habitat in the long run.

Olive-sided flycatcher habitat on adjacent private and BLM managed land likely contributes toward local populations of this species. Management of open conditions in ponderosa pine and dry mixed conifer stands is commonly practiced on BLM and private land within and adjacent to the project area. Therefore, it is likely that forest land in the project area which is managed by private land owners and BLM would provide long-term nesting habitat for this species. Given that the current NatureServe Conservation Status Rank for olive-sided flycatcher for Oregon is a S3B, 'breeding vulnerable', and National 4B, 'breeding apparently secure' (2009), it is not expected that implementation of the Ochoco Summit OHV project in conjunction with overlapping or adjacent vegetation management actions would lead to a change in rankings from NatureServe for the olive-sided flycatchers because of better access management through designation of routes, closure of unwanted routes and forest management which improves habitat for this species

Veery: The veery is associated with understory foliage and structure in riparian woodlands. In the Blue Mountains hawthorne, dogwood and willow are listed as important. Though black hawthorne is listed as encountered in the Blue and Ochoco Mountains (USFS, 1992), it is an uncommon species and generally limited in distribution on Ochoco National Forest. Dogwood and willow are widely distributed across riparian habitats within the project area.

The current NatureServe Conservation Status Rank for veery is Global G5 'secure', National N5B 'secure, breeding' and Oregon S4?B 'apparently secure, inexact numeric rank, breeding' (2009). According to Marshall et al. (2003) the Ochoco Mountain breeding colonies have remained relatively small and isolated for at least 30 years, and that population trends for breeding birds in Oregon remain relatively unknown. Breeding bird surveys have shown that this species is an uncommon breeder at low to middle elevations in the Blue Mountains, where sufficient riparian thickets exist, and that they are uncommon and local in Crook County (Marshall et al. 2003). Sightings of veery have been recorded on Lookout Mountain Ranger District in the vicinity of Ochoco Ranger Station, which is within the project area for this project. They are listed as uncommon (spring, summer) to rare (fall) in Common Birds of the Ochoco Region.

Direct and Indirect Effects – Alternative 1 (veery): The selection of Alternative 1 would result in no change in the existing amount of roads and user-created trails that are being used for motorized access. Where this species occurs within 660 feet of a road or motorized trail, some level of masked communication may be occurring to individuals or pairs particularly the closer they are to motorized routes. However, it is currently unknown how this may manifest itself into nesting success or if changes in habitat conditions such as availability of snags and open forested stands or edges is more critical to the species. This alternative would not result in any removal of snags or trees capable of providing nesting habitat.

Effects Common to All Action Alternatives (veery): Alternatives 2, 3, 4 and 5would designate an official OHV trail system. Selected unauthorized roads and trails not designated as part of the system would be closed for motorized vehicle use. Improvement of existing road closures, and blockage of unauthorized and user created trails could result in improvement veery habitat by reduction of motorized disturbance along those routes that are closed. This potential improvement is not reflected in Table 158, as the disturbance band analysis was based on open system roads and did not include breached closures, user created routes and other unauthorized travel routes such as horse trails and non-system roads. OHV use is projected to increase 2 to 5 percent per year with the new system and open roads may also experience an increase in volume. The area within 200 m of a designated open road or trail should not increase, but the intensity of disturbance on the designated network is expected to increase as the level of use increases. This project would have very little direct effect on existing or potential nesting habitat due to the small scale of impact to the vegetation and supporting land base compared to what is available at the landscape scale.

Increases in motorized use above the open road network in alder or willow special habitats would be negligible. The length of proposed trail not on open roads in alder/willow is as follows: Alternative 2 includes 0.3 miles of Class I trail not on open road; Alternative 3 includes 0.3 miles of Class III trail not on open road; Alternative 4 includes 0.3 miles of Class I trail not on open road; Alternative 5 includes 0.2 miles of Class III trail not on open road. There are no miles in these habitats in the Class I, II or IV systems. With estimated trail construction and clearing widths this amount of trail would have a potential direct effect on alder/willow vegetation of approximately 0.22 acres under Alternative 2, 0.15 acres under Alternative 3, 0.22 acres under Alternative 4, or 0.09 acres under Alternative 5. Staging areas are not in alder or willow habitat. Refer to Table 159.

Cumulative Effects (veery): The Spears, Canyon, HEJ, Deep, Jackson, Wolf, Gap and Black Mountain Vegetation Management projects propose a variety of activities to improve cover of riparian shrub vegetation. These projects would not adversely impact potential nesting habitat in well-established thickets of riparian shrubs. This OHV project would avoid impacts to established riparian hardwood thickets or other riparian vegetation. This project would have very little direct effect on existing or potential nesting habitat due to the small scale of impact.

All recent vegetation management projects that propose commercial thinning and or riparian hardwood protection should result in improved habitat in the long run. In the short term, however, where prescribed fire is prescribed habitat for this species would likely be reduced where the underburn treatment top kills riparian hardwoods which are not fire tolerant. However, subsequent resprouting is likely to increase stand vigor if the sprouts are protected from grazing and/or mechanical damage. All vegetation management projects in the project area include riparian hardwood enhancement treatments. These actions should improve the amount of riparian hardwood habitat in the treatment units. The closure of unwanted routes (user created trails, breached road closures, etc.) proposed under the action alternatives may improve the recovery of riparian vegetation that is currently being impacted by uncontrolled recreational traffic. Thus, there is a positive cumulative effect of the action alternatives and past, present and reasonably foreseeable riparian hardwood improvement projects in the long run. While some nesting habitat may be impacted in the short term within during trail construction and implementation of route closures, and initially during

rehabilitation efforts in riparian areas, nesting habitat would still be retained across the landscape in the short term and should be increased in the long term.

All action alternatives would designate an OHV trail system available for use, while implementation of the forest-level travel management plan would prohibit cross country travel and/or use of closed roads. Some user created trails not used for the designated system would be closed and rehabilitated. This would result in an increase in the amount of undisturbed nesting habitat in selected areas under all action alternatives. While veery may still be subjected to motorized disturbance during the nesting season (May – July), increased levels of undisturbed nesting habitat would be available as compared to the existing condition where closed roads and non-motorized trails are currently receiving motorized use, and where cross country travel is occurring. Thus, proposed closures and rehabilitation of user created trails, in combination with implementation of the forest-level travel management plan should result in improved amounts of undisturbed nesting habitat in the long run.

Willow flycatcher: Marshall et al. (2003) describe the willow flycatcher as a relatively late-arriving migrant to Oregon that is associated with shrub-dominated habitats, especially riparian willow thickets. Breeding habitat is characterized by dense shrubs and/or tall herbaceous plants with scattered openings of shorter herbaceous vegetation. Marshall's et al. (2003) book Birds of Oregon displays a map showing locations of willow flycatchers by county. In the project area reproductive potential ranges from none to probable, with no confirmed nesting. Three requirements for willow flycatcher habitat are large meadow size, water and willows (Sanders and Flett 1989). Nest sites tend to be in shrubs or other shrub-level vegetation within a few feet of the ground. Territories tend to be small approximately one acre. Diets have not been studied in Oregon but the species is an aerial insectivore that feeds primarily on the wing and occasionally gleans (Sedgewick 2000 cited in Marshall et al. (2003). Factors indicated as a conservation concern include loss and degradation of the quality of riparian shrub habitats from altered hydrologic regimes, disturbance, and loss of habitat from overgrazing, and cowbird parasitism. Proposed conservation strategies are to increase width of riparian shrub zones through plantings, discourage aggregations of livestock near riparian areas, and eliminate willow cutting and herbicide use in the riparian zone. The current NatureServe Conservation Status Rank for willow flycatcher in Oregon is a S4, 'apparently secure', National NNR, 'unranked nationally' and Global G5T5 'secure' both at the species level and at the Oregon/Nevada subspecies level, (2009).

Nesting habitat consists of riparian areas with the presence of dense willow clumps, or other shrubbery, and uplands. Nesting uplands are low elevation valleys to high mountain areas in early seral stages of high conifer dominated stands (Marshall et al. 2003). The project area contains very limited acreage of dense willow thickets. However, there are a few pockets with well-established willows along meadow edges in or near Big Summit Prairie and Little Summit Prairie. Records of willow flycatchers within the Ochoco Summit OHV project area or elsewhere on Lookout Mountain or Paulina Ranger Districts were not found, though this species has been recorded in low numbers on the Barnhouse Breeding Bird Survey route. They are listed as uncommon (spring) to rare (summer, fall) in Common Birds of the Ochoco Region.

<u>Direct and Indirect Effects – Alternative 1 (willow flycatcher)</u>: The selection of the no action alternative would result in a continuation of the current condition of uncontrolled motorized use in riparian areas. While it is currently unknown if the species is currently present in the project area, potentially suitable nesting habitat does exist in pockets and patches along creeks flowing into Big Summit and Little Summit Prairies. Cutting of willows or compaction from roads, trails and campsites could reduce nesting habitat in these areas. Human activity generally occurs from June through October for camping, fishing, firewood cutting and hunting. It is unknown how this amount of recreational activity may be impacting habitat use by willow flycatchers if they are present. It is assumed that recreational impacts within the riparian zone would continue to occur although the species has not known to be present in the project area.

Effects Common to All Action Alternatives (willow flycatcher): Implementation of Alternatives 2, 3, 4, or 5 would allow OHV use on designated roads and trails within the project area and would physically block selected unauthorized routes from continued motorized use. The selection of any of these alternatives would allow designed trails to be located and constructed in areas to avoid impacts to riparian and wetland or to include project design to prevent impacts to riparian habitat. Where unauthorized routes are closed, or where existing roads are converted to narrow trails, vegetative recovery would be encouraged through planting and/or placement of protective barriers such as fences, boulders or other traffic control devices. The majority of new trails for the system would generally come from unimproved roads, fire lines, snowmobile trails and/or skid roads associated with past timber sales minimizing new disturbance. Most of these are located in areas which were selected in order to minimize impacts to riparian vegetation. Where crossing over of riparian vegetation would occur mitigation measures are prescribed to limit impacts to riparian vegetation.

Increases in motorized use above the open road network in alder or willow special habitats would be negligible. The length of proposed trail not on open roads in alder/willow is as follows: Alternative 2 includes 0.3 miles of Class I trail not on open road; Alternative 3 includes 0.3 miles of Class III trail not on open road; Alternative 4 includes 0.3 miles of Class I trail not on open road; Alternative 5 includes 0.2 miles of Class III trail not on open road. There are no miles in these habitats in the Class I, II or IV systems. With estimated trail construction and clearing widths this amount of trail would have a potential direct effect on alder/willow vegetation of approximately 0.22 acres under Alternative 2, 0.15 acres under Alternative 3, 0.22 acres under Alternative 4, or 0.09 acres under Alternative 5. Staging areas are not in alder or willow habitat. Refer to Table 159.

Cumulative Effects (willow flycatcher): The Spears, Canyon, HEJ, Deep, Jackson, Wolf, Gap and Black Mountain Vegetation Management projects propose a variety of activities to improve cover of riparian shrub vegetation. These projects would not adversely impact potential nesting habitat in well-established thickets of riparian shrubs. This OHV project would avoid impacts to established willow thickets or other riparian vegetation. This project would have very little direct effect on existing or potential nesting habitat due to the very small scale of impact to the riparian vegetation.

All recent vegetation management projects that propose commercial thinning and or riparian hardwood protection should result in improved habitat in the long run. In the short term, however, where prescribed fire is prescribed habitat for this species would likely be reduced where the underburn treatment top kills riparian hardwoods which are not fire tolerant. However, subsequent resprouting is likely to increase stand vigor if the sprouts are protected from grazing and/or mechanical damage. All vegetation management projects in the project area include riparian hardwood enhancement treatments. These actions should improve the amount of riparian hardwood habitat in the treatment units. The closure of unwanted routes (user created trails, breached road closures, etc.) proposed under the action alternatives may improve the recovery of riparian vegetation that is currently being impacted by uncontrolled recreational traffic. Thus, there is a positive cumulative effect of the action alternatives and past, present and reasonably foreseeable riparian hardwood improvement projects in the long run. While some nesting habitat may be impacted in the short term within during trail construction and implementation of route closures, and initially during rehabilitation efforts in riparian areas, nesting habitat would still be retained across the landscape in the short term and should be increased in the long term.

All action alternatives would designate an OHV trail system available for use, while implementation of the forest-level travel management plan would prohibit cross country travel and/or use of closed roads. Some user created trails not used for the designated system would be closed and rehabilitated. This would result in an increase in the amount of undisturbed nesting habitat in selected areas under all action alternatives. While willow flycatchers may still be subjected to motorized disturbance during the nesting season (May – July) increased levels of undisturbed nesting habitat would be available as compared to the existing condition where closed roads and non-motorized trails are

currently receiving motorized use, and where cross country travel is occurring. Thus, proposed closures and rehabilitation of user created trails, in combination with implementation of the forest-level travel management plan should result in improved amounts of undisturbed nesting habitat in the long run.

Potential habitat for willow flycatchers does occur on adjacent private and BLM managed land. If this species is present in the project area it is most likely to occur in those willow thickets adjacent to drainages flowing into Big Summit or Little Summit Prairies. Therefore, it is likely that habitat on adjacent land would contribute toward local populations of this species if it is present in the project area. Management of livestock in riparian pastures does occur in these habitat patches, as does management of flood irrigation canals. These activities may impact individuals if they are present during the season of livestock grazing or canal maintenance. However, the majority of these patches have remained intact during recent years, and thus it is likely that riparian shrub patches in the project area, which are managed by private land owners and BLM would provide long-term nesting habitat for willow flycatchers if they are present. Given the current NatureServe Conservation Status Rank for willow flycatchers in Oregon is a S4, 'apparently secure', and National 5, 'secure' (2009), it is not expected that implementation of the Ochoco Summit OHV project in conjunction with overlapping or adjacent vegetation or range management actions would lead to a change in rankings from NatureServe for the willow flycatcher. This is because this project avoids potential nesting habitat and provides better access management through designation of routes and closure of unwanted routes. Therefore, there are no anticipated cumulative effects.

Hermit thrush: The hermit thrush is a summer resident preferring mid to high elevation mature and old growth forests. It breeds in mature forests of all types especially those with a shaded understory of brush and small trees ranging from aspen groves to juniper woodlands to moderately open coniferous forests. Gilligan et al. (1994) described the Hermit thrush as a fairly common summer resident in the Cascade, Siskiyou and Blue Mountains and uncommon in the Coast Range of Oregon. Hermit thrushes nest on the ground, in brush or small trees. It is an opportunistic ground forager, feeding on insects and an occasional reptile or amphibian (Marshall et al. 2003). During the winter months, they are rarely seen east of the Cascades and tend to winter in the west-side lowlands and foothills along the coast. There appear to be no serious conservation problems at this time (Marshall et al. 2003). The current NatureServe Conservation Status Rank for hermit thrushes in Oregon is a S4, 'apparently secure', National N5, 'secure' and Global G5 'secure' (2009).

Though hermit thrush was identified as a focal species for subalpine forest as a unique habitat, this species may include all forested PAGs with tree diameters exceeding 10-15 inches with a dense canopy within Ochoco National Forest. Virtually all of the suitable habitat for this species in the project area is on National Forest System lands within the grand fir (mixed conifer), Douglas-fir and ponderosa pine PAGs. Within the Ochoco Summit proejct area suitable habitat is present all along the Ochoco Mountains, with nesting habitat located on Coyle Butte, Round Mountain, Lookout Mountain, Slide Mountain, Indian Butte, Mt. Pisgah, East Point, Peterson Point, Buck Point, Bear Mountain and all the moderate to high elevation, north and east facing, forested slopes in between. Limited surveys have occurred on the project area, though there are numerous records from Breeding Bird Surveys on Paulina Ranger District (including BBS station #9-12, 14, and 19-22 within or adjacent to the project area).

<u>Direct and Indirect Effects – Alternative 1 (hermit thrush)</u>: The selection of Alternative 1 would result in no change in the existing amount of roads and user-created trails that are being used for motorized access. Where this species occurs within 660 feet of a road or motorized trail, some level of masked communication may be occurring to individuals or pairs particularly the closer they are to motorized routes. However, it is currently unknown how this may manifest itself into nesting success or if changes in habitat conditions such as availability of snags and open forested stands or edges is

more critical to the species. This alternative would not result in any removal of snags or trees capable of providing nesting habitat.

Effects Common to All Action Alternatives (hermit thrush): Because this species is not tied to specific forest types or tree species (plant associations) the impact to this species was based on impacts to forested PAGs as a whole (ponderosa pine, Douglas-fir, grand fir and subalpine fir). Increases in motorized use in forested PAGs above the open road network would be as follows: Alternative 2 includes 32.2 miles of Class I trail not on open road, 11.6 miles of Class II trail not on open road and 19.2 miles of Class III trail not on open road; Alternative 3 includes 30.0 miles of Class I trail not on open road and 42.6 miles of Class III trail not on open road; Alternative 4 includes 78.5 miles of Class I trail not on open road, 9.0 miles of Class II trail not on open road and 35.1 miles of Class III trail not on open road; Alternative 5 includes 33.8 miles of Class I trail not on open road, 5.4 miles of Class II trail not on open road, 39.2 miles of Class III trail not on open road and 4.3 miles of Class IV trail not on open road. With estimated trail construction and clearing widths this amount of trail would have a potential direct effect on forested PAG vegetation of approximately 68 acres under Alternative 2, 46 acres under Alternative 3 90 acres under Alternative 4, or 52 acres under Alternative 5. A limited amount of clearing around staging areas would also occur in forested stands. It is expected that soil and/or vegetation on up to 5 acres at each staging area would be directly affected. This would bring the anticipated direct reduction in potential nesting habitat for this species to 103 acres under Alternative 2, 66 acres under Alternative 3 or 125 acres under Alternative 4, or 67 acres under Alternative 5. Refer to Table 159.

The level of sensitivity specifically to hermit thrushes to motorized disturbance is currently unknown although general impacts of OHV use to wildlife including birds may be displacement, avoidance, and/or habitat fragmentation. Species may move away from OHV trail/routes and play or staging areas due to human presence or resulting habitat changes. Ouren et al (2007) found that OHV use can diminish nesting shrub habitat of birds and small mammals by driving over bushes resulting in breaking or killing the brush. All action alternatives would designate an OHV trail system available for use increasing the amount of disturbance where closed routes are opened, or new routes constructed to accommodate the designated system. Some existing user created trails and unauthorized routes not needed for the designated system would be closed and rehabilitated. These closures would help to offset the increases in the amount of disturbed nesting habitat caused by new or reopened routes. The net changes displayed in Table 158 reflect the increases due to new and reopened routes, but do not reflect the reductions due to closures and rehabilitation, as the location and extent of unauthorized and user created routes is not fully understood. Alternatives 2, 3, 4, and 5would designate an official OHV trail system. Selected unauthorized roads and trails not designated as part of the system would be closed for motorized vehicle use. Improvement of existing road closures, and blockage of unauthorized and user created trails could result in improvement to hermit thrush habitat by reduction of motorized disturbance along those routes that are closed. This potential improvement is not reflected in Table 158, as the disturbance band analysis was based on open system roads and did not include breached closures, user created routes and other unauthorized travel routes such as horse trails and non-system roads. OHV use is projected to increase 2 to 5 percent per year with the new system and open roads may also experience an increase in volume. The area within 200 m of a designated open road or trail should not increase, but the intensity of disturbance on the designated network is expected to increase as the level of use increases. This project would have very little direct effect on existing or potential nesting habitat due to the small scale of impact to the vegetation and supporting land base compared to what is available at the landscape scale.

Cumulative Effects (hermit thrush): The Spears, Canyon, HEJ, Deep, Jackson, Wolf, Gap and Black Mountain Vegetation Management projects propose a variety of activities to improve forest resiliency and to reduce risk of loss of forested stands to future large scale or high intensity disturbance. These activities would tend to decrease canopy layering and complexity. The resulting reduction in the

vertical structure of the forest canopy could have negative impacts to a species that shows a positive association with closed canopy stands with areas of dense understory shrubs and small trees. Collectively, the vegetation projects that propose tree density reduction would decrease nesting habitat for the hermit thrush.

All vegetation management projects in the project area include prescribed burning and precommercial thinning. These actions would reduce the amount of shrub and sapling habitat in the treatment units. While prescribed fire is proposed in these projects, prescribed burning often occurs in mosaic pattern of variable low to moderate intensity with unburned patches within treatment units. Likewise, understory thinning prescriptions usually include retention of small untreated patches. Depending on the return interval for prescribed fire, some of the treated stands may return into a dense stand with understory and shrubs favored by this species and provide nesting habitat for hermit thrushes. Although Project Design Features in the NEPA documents and burn plan prescriptions usually call for the retention of untreated patches for the nesting birds, small mammal habitat, and big game forage, these actions would reduce the amount of hermit thrush habitat as a result of burning or understory thinning. Short term reduction of understory shrub and pine regeneration is a trade-off for the benefit of long term resiliency of the stands as a whole, as well as for the reduction in fuel loading and subsequent risk of loss to high intensity wildfire. While some nesting habitat would be removed, the application of fire would more closely mimic natural disturbance events that occurred in ponderosa pine plant associations. Nesting habitat would still be retained across the landscape (in unmanaged stands not selected for vegetative treatments in these NEPA documents) and within treatment units although in smaller patches depending on cutting prescriptions and burn conditions, and the resulting mosaic of variable thinning and prescribed fire intensity. This would be consistent with the strategy proposed by Altman (2000) to retain tracks of forest unmanaged or lightly managed to insure structural diversity in mixed conifer forests.

Collectively, these projects have the potential to impact individuals or pairs of hermit thrushes, but would not adversely affect the local population because of mitigation measures and available habitats not subject to proposed vegetation management activities. The current NatureServe Conservation Status Rank for hermit thrushes in Oregon (2010) also shows it is ranked S4, 'apparently secure', and Nationally as a 5, 'secure' and it is highly unlikely the this OHV project in addition to the vegetation management projects would lead to a change in ranking by NatureServe.

All action alternatives would designate an OHV trail system available for use, while implementation of the forest-level travel management plan would prohibit cross country travel and/or use of closed roads. Some user created trails not used for the designated system would be closed and rehabilitated. This would result in an increase in the amount of undisturbed nesting habitat in selected areas under all action alternatives. While hermit thrushes may still be subjected to motorized disturbance during the nesting season (May – July), increased levels of undisturbed nesting habitat would be available as compared to the existing condition where closed roads and non-motorized trails are currently receiving motorized use, and where cross country travel is occurring. Thus, proposed closures and rehabilitation of user created trails, in combination with implementation of the forest-level travel management plan should result in improved amounts of undisturbed nesting habitat in the long run.

Vesper sparrow: The Vesper sparrow is associated with steppe-shrubland habitat. It can be found in a variety of habitat types including grassland, sagebrush, fallow fields, montane meadows, juniper steppe, cropland, open woodlands and openings in forest habitat such as clearcuts. Habitat objectives include where ecologically appropriate initiate actions in steppe-shrublands to maintain or provide a mosaic of steppe and shrubland habitat with less than 10% tree cover. Recommended conservation measures include eliminating or restricting human access and livestock grazing in steppe shrublands that have been degraded.

The current NatureServe Conservation Status Rank for vesper sparrows is a G5T3 Global 'secure', but with the Oregon subspecies ranking as 'vulnerable', National N5B, N5N 'secure, breeding and non-breeding' for the species, but NNR 'unranked' for the Oregon subspecies. The federal status US ESA ranking of SC, 'species of concern' applies to the Oregon subspecies. The conservation status ranking in Oregon is S4B 'apparently secure, breeding' for the species, but S2B, S2N for the Oregon subspecies 'imperiled, breeding and non-breeding' (2009). Breeding bird surveys have shown that population trends in Oregon have been relatively stable long-term (1966-1996), but declining in the short-term (1980-1996). Declines are attributed to a variety of factors including agricultural conversion of grasslands and shrub-steppe habitat, changes in agricultural practices and trampling of ground nests. (Marshall et al. 2003). Records for vesper sparrows were not found on either Lookout Mountain or Paulina Ranger District. However, they are listed as common in spring, summer and fall in "Common Birds or the Ochoco Region" which includes birds from Crook, Jefferson and Wheeler Counties including expansive areas of sagebrush steppe, desert shrubland and grassland where this species is most likely to be found.

Direct and Indirect Effects – Alternative 1 (Vesper sparrow): The selection of Alternative 1 would result in no change in the existing amount of roads and user-created trails that are being used for motorized access. Where this species occurs within 660 feet of a road or motorized trail, some level of masked communication may be occurring to individuals or pairs particularly the closer they are to motorized routes. However, it is currently unknown how this may manifest itself into nesting success or if changes in habitat conditions such as availability of snags and open forested stands or edges is more critical to the species. This alternative would not result in any removal of snags or trees capable of providing nesting habitat.

Effects Common to All Action Alternatives (Vesper sparrow): Alternatives 2, 3, 4, and 5would designate an official OHV trail system. Selected unauthorized roads and trails not designated as part of the system would be closed for motorized vehicle use. Improvement of existing road closures, and blockage of unauthorized and user created trails could result in improvement to vesper sparrow habitat by reduction of motorized disturbance along those routes that are closed. This potential improvement is not reflected in Table 158, as the disturbance band analysis was based on open system roads and did not include breached closures, user created routes and other unauthorized travel routes such as horse trails and non-system roads. OHV use is projected to increase 2 to 5 percent per year with the new system and open roads may also experience an increase in volume. The area within 200 m of a designated open road or trail should not increase, but the intensity of disturbance on the designated network is expected to increase as the level of use increases. This project would have very little direct effect on existing or potential nesting habitat due to the small scale of impact to the vegetation and supporting land base compared to what is available at the landscape scale.

Increases in motorized use above the open road network in grassland, meadow or sage/scab special habitat were used to predict impacts to Vesper sparrow. Impacts to such grass and shrub dominated habitats would be as follows: Alternative 2 includes 8.8 miles of Class I trail not on open road, 8.1 miles of Class II trail not on open road and 6.6 miles of Class III trail not on open road; Alternative 3 includes 2.3 miles of Class I trail not on open road and 3.9 miles of Class III trail not on open road; Alternative 4 includes 15.2 miles of Class I trail not on open road, 7.4 miles of Class II trail not on open road and 2.5 miles of Class III trail not on open road; Alternative 5 includes 3.1 miles of Class I trail not on open road, 6.1 miles of Class II trail not on open road and 8.2 miles of Class III trail not on open road. There are no miles in these habitats in the Class IV system. With estimated trail construction and clearing widths this amount of trail would have a potential direct effect on grassland, meadow and steppe shrubland vegetation of approximately 17 acres under Alternative 2, 6 acres under Alternative 3, 21 acres under Alternative 4, or 12 acres under Alternative 5. Staging areas would not occur in meadows, grasslands or sage/scab habitat other than on existing disturbed sites. Refer to Table 159.

Cumulative Effects (Vesper sparrow): The Spears, Canyon, HEJ, Deep, Jackson, Wolf, Gap and Black Mountain Vegetation Management projects propose some measures to restore open conditions in meadow, grassland or upland shrub habitat such as removal of encroaching conifers or prescribed burning. These projects would not adversely impact potential nesting habitat in the long run, though some individuals may be impacted during implementation. This OHV project would avoid impacts to established meadow or grassland vegetation through inclusion of design elements such as armoring, surfacing, puncheons or turnpikes. This project would have very little direct effect on existing or potential nesting habitat due to the very small scale of impact to the grassland or shrub/steppe vegetation.

All recent vegetation management projects that propose treatments to restore open conditions in meadow or upland shrub habitat should result in improved habitat in the long run. In the short term, however, where prescribed fire is prescribed habitat for this species may be reduced where the underburn treatment removes standing herbaceous cover or top kills shrubs. However, subsequent resprouting is likely to increase stand vigor after a recovery period of about 1 to 5 years, depending on the species involved. All vegetation management projects in the project area include upland shrub and meadow enhancement treatments such as prescribed burning. These actions should improve the amount of grass and shrub habitat in the treatment units in the long term. The closure of unwanted routes (user created trails, breached road closures, etc.) proposed under the action alternatives may improve the recovery of this vegetation that is currently being impacted by uncontrolled recreational traffic. Thus, there is a positive cumulative effect of the action alternatives and past, present and reasonably foreseeable rangeland and upland habitat improvement projects in the long run. While some nesting habitat may be impacted in the short term during implementation of trail construction and route closure, and initially during rehabilitation efforts in some areas, nesting habitat would still be retained across the landscape in the short term and should be increased in the long term.

All action alternatives would designate an OHV trail system available for use, while implementation of the forest-level travel management plan would prohibit cross country travel and/or use of closed roads. Some user created trails not used for the designated system would be closed and rehabilitated. This would result in an increase in the amount of undisturbed nesting habitat in selected areas under all action alternatives. While vesper sparrows may still be subjected to motorized disturbance during the nesting season (May – July), increased levels of undisturbed nesting habitat would be available as compared to the existing condition where closed roads and non-motorized trails are currently receiving motorized use, and where cross country travel is occurring. Thus, proposed closures and rehabilitation of user created trails, in combination with implementation of the forest-level travel management plan should result in improved amounts of undisturbed nesting habitat in the long run.

Botany

This section includes a summary of the Botany specialist's report and Biological Evaluation; the entire report is incorporated by reference and is filed in the Ochoco Summit Trail System project record, located at the Ochoco National Forest, Prineville, Oregon.

Introduction

This section describes expected effects of the Ochoco Summit Trail System project proposed action and alternatives upon botanical resources. Included is the Biological Evaluation for proposed, endangered, threatened, and sensitive plant species, analysis of effects on special plant habitats, and analysis of effects of non-native invasive plants.

Threatened, Endangered and Sensitive Plants

Regulatory Framework

Direction for managing habitats for all existing native and desired non-native plants in order to maintain viable populations of species comes from Forest Service Manual 2600 (USFS 1995, WO Amendment 2600-95-7). Sensitive plants receive management emphasis to ensure viability and to preclude trends toward endangerment that would result in the need for federal listing (Forest Service Manual 2672.1). A biological evaluation is conducted to review Forest Service programs and activities for possible effects on endangered, threatened, proposed, or sensitive species, as required in Forest Service Manual 2672.4.

The desired future condition for sensitive species analyzed in this report is to ultimately remove them from the U.S. Fish and Wildlife Service's Species of Concern list, and from the Regional Forester's Sensitive Species list. Ensuring that habitat is of good quality and well distributed with viable, increasing populations within the Ochoco National Forest can contribute to this effort. The LRMP does not specifically identify a desired future condition for sensitive plant species. It does address riparian areas, which provide important habitat for many sensitive species within the Ochoco Summit Trail System Project Area. The LRMP states that most of the riparian areas will be in excellent condition within 50 years, characterized by vigorous stands of forbs, grasses, and grass-like species on stable stream banks.

Analysis Methods

There are no federally listed proposed, threatened or endangered plant species that occur on the Ochoco National Forest. There is no habitat recognized as essential for listed or proposed plant species recovery under the Endangered Species Act; this analysis is therefore limited to species included on the Regional Forester's Sensitive Species List (herein referred to as sensitive species throughout the report) for the Ochoco National Forest. Sensitive species will be grouped by habitat into riparian, scabland, and forest species. Design criteria that protect sensitive plants as described in Chapter 2 of the EIS will be taken into account when determining effects. The analysis area for sensitive plants includes the project area boundary as designated by the District Ranger (see maps in Chapter 2 of the EIS). Effects of the proposal will be measured by:

- Acres of sensitive plant populations impacted by proposed trails
- Number of sensitive plant populations within ¼ mile of proposed trails
- Acres of sensitive plant habitat impacted by proposed trails

Information was integrated in part through GIS mapping to portray spatial relationships among sensitive plants and their habitat, and the proposed trail system. Spatial and tabular data for inventoried sites of sensitive plants were taken from the Natural Resource Inventory System (NRIS) database. To compare the alternatives for effects from motorized travel on trails, GIS was used to calculate the number of acres under each alternative.

Effects of new trail construction and re-construction of revegetated closed roads will be analyzed for short-term effects of less than 10 years. Use is expected to continue on all trails for the long term, >10 years.

Assumptions

- Areas open to motorized recreation have a higher risk of impacting vegetation, including special habitats.
- All forms of motorized vehicles are lumped together in the botany analysis, regardless of class of vehicle.

- Areas that are seasonally closed were analyzed as open because there can be impacts to native plants and native plant habitats regardless of when the area is open. If the area is not 100% closed all year long then it is considered open.
- A primary assumption related to cumulative effects is that the reduction of motorized access off designated routes and modification of motorized access for dispersed camping has a beneficial effect.

Pre-field Review

The pre-field review consisted of checking existing records for documented occurrences, determining probability of additional occurrences for any proposed, endangered, threatened, or sensitive species, and if additional surveys are needed. The pre-field review incorporated the following:

- USFWS list of Proposed, Endangered and Threatened Plant Species (USFWS 2015);
- Regional Forester's (R-6) Sensitive Plant Species List (USDA 2015);
- Oregon Biodiversity Information Center (formerly Oregon Natural Heritage Program) Rare, Threatened and Endangered Species List (ORBIC 2013);
- The Natural Resource Inventory System (NRIS) database for the Ochoco National Forest;
- Other literature and information.

Of the 38 sensitive plant species documented or suspected of occurring on the Ochoco National Forest and the Crooked River National Grassland, 15 have been documented in or near the analysis area, or have potential habitat that has not been surveyed. Species that occur in the project area or have enough suitable habitat to support a viable population are listed in Table 160 in bold type. These species will be analyzed in detail in this report. Resources used to identify potential sensitive plant habitat were aerial photographs, vegetation maps, as well as personal knowledge of the analysis area.

The Regional Forester's sensitive species list was updated in July, 2015; the analysis included here is based on the 2015 list (USDA Forest Service 2015). However, the most current species list would be reviewed during project implementation planning; habitat would be evaluated, and surveys conducted according to project design criteria as needed.

Table 160. Summary of Prefield Review for Sensitive Plants in the Ochoco Summit Project Area.

Species	Habitat	Probability of Occurrence	Rationale
Achnatherum hendersonii **Henderson's needlegrass**	**Sagebrush scablands**	**High**	**Habitat Present**
Achnatherum wallowaensis **Wallowa needlegrass**	**Sagebrush scablands**	**High**	**Habitat Present**
Astragalus diaphanus var. *diurnus* South Fork John Day kentrophyta	Basalt gravel barrens along South Fork John Day River.	Low	Outside doc. range
Astragalus peckii Peck's milkvetch	Sage/juniper/lodgepole pumice/coarse soils	Low	Outside doc. range
Astragalus tegetarioides **bastard milkvetch**	**Sage steppe/ponderosa pine forest**	**Moderate**	**Habitat Present**
Botrychium ascendens **ascending moonwort**	**Wet meadows, springs, seeps**	**High**	**Habitat Present**

Table 160. Summary of Prefield Review for Sensitive Plants in the Ochoco Summit Project Area.

Species	Habitat	Probability of Occurrence	Rationale
Botrychium crenulatum **crenulate moonwort**	**Wet meadows, springs, seeps**	**High**	**Habitat Present**
Botrychium montanum **mountain moonwort**	**Wet meadows, springs, seeps**	**High**	**Habitat Present**
Botrychium paradoxum **twin-spike moonwort**	**Wet meadows, springs, seeps**	**High**	**Habitat Present**
Calochortus longebarbatus **var.** ***peckii*** **Peck's mariposa lily**	**Vernally moist meadows, streambanks**	**High**	**Habitat Present**
Carex diandra lesser panicled sedge	Sphagnum bog, lakeshores	Low	No Habitat
Carex lasiocarpa **var.** ***americana*** **slender sedge**	**Very wet sedge meadows, along lakes/streams**	**Moderate**	**Habitat Present**
Carex retrorsa **retrorse sedge**	**Swamps, marsh, meadows, along lakes, streams**	**Moderate**	**Habitat Present**
Cheilanthes feei Fee's lip fern	Basalt cliffs but occasionally limestone	Low	Specialized Habitat present
Cyperus lupulinus ssp. *lupulinus* Great Plains flatsedge	Riparian edge but dry hackberry, wheatgrass	Low	No Habitat
Elatine brachysperma short-seeded waterwort	Muddy shores, shallow pools	Low	No Habitat
Eleocharis bolanderi **Bolander's spikerush**	**Seasonally wet; low sage/Sandberg in basalt**	**Moderate**	**Habitat Present**
Eremothera pygmaea Raven dwarf suncup	Low elev plains/washes w/ coarse soil or gravel	Low	No Habitat
Eriogonum cusickii **Cusick's buckwheat**	**Juniper/big sage and low sage scabland**	**Moderate**	**Habitat Present**
Erythranthe inflatula disappearing monkeyflower	Sage/juniper vernally moist streambanks	Low	No Habitat
Heliotropium curassavicum salt heliotrope	Moist to dry, saline soils	Low	No Habitat
Lipocarpha aristulata aristulate liptocarpa	Low elevation, silty, below high water along banks	Low	No Habitat
Lomatium ochocense **Ochoco lomatium**	**Sagebrush scablands**	**Moderate**	**Habitat Present**
Muhlenbergia minutissima annual dropseed	Weathered lava soils in riparian	Low	No Habitat
Penstemon peckii Peck's penstemon	Stream banks Disturbed areas	Low	Outside doc. range
Phemeranthus spinescens (Talinum spinescens) spiny fameflower	Sagebrush scablands	Low	No Habitat
Potamogeton diversifolius waterthread pondweed	Lakes, ponds, including created habitat	Low	Specialized Habitat present
Pyrola dentata **toothleaf pyrola**	**Mixed conifer and ponderosa forests, burn areas**	**Moderate**	**Habitat Present**
Rorippa columbiae Columbia yellowcress	Wet meadows, moist plains, streams	Low	No Habitat
Rotala ramosior lowland toothcup	Sand and silt below high water, Low elevation	Low	No Habitat

Table 160. Summary of Prefield Review for Sensitive Plants in the Ochoco Summit Project Area.

Species	Habitat	Probability of Occurrence	Rationale
Salix wolfii Wolf's willow	Riparian	Low	No Habitat
Thelypodium eucosmum arrow leaf thelypody	Dry slopes in vernal drainages	Low	Outside doc. range
Utricularia minor lesser bladderwort	Lowland and montane fens, sedge meadows	Low	No Habitat
Non vascular species	**Habitat**	**Probability of Occurrence**	**Rationale**
Encalypta brevipes	Occurs on soil in crevices on cliffs	Low	Specialized Habitat present
Enthosthodon fasicularis	Grasslands, rock outcrops, seasonally wet seeps and springs	Low	Specialized Habitat present
Schistidium cinclidodonteum	Wet or dry rocks or in soil on rock crevices along intermittent streams	Low	Specialized Habitat present
Tortula mucronifolia **mucronleaf tortula moss**	**Riparian *Populus* and montane *Abies***	**Moderate**	**Habitat Present**
Texosporium sancti-jacobi woven spore lichen	Often old root clumps, scat, or rocks	Low	Outside doc. range

Management for sensitive species comes from a variety of sources, including:

- *Calochortus longebarbatus var. peckii* is managed with guidance from the Conservation Strategy for the Ochoco National Forest (Dewey 2011).
- *Achnatherum hendersonii* and *A. wallowaensis* are managed with guidance from a Conservation Assessment for the Ochoco National Forest (Dewey 2013).
- *Botrychium* species are managed with guidance from a Conservation Strategy for 13 Moonwort species (Ahlenslager and Potash 2007).
- Species fact sheets provided by the Interagency Special Status Sensitive Species program website (http://www.fs.fed.us/r6/sfpnw/issssp).

Species that will not be carried through the analysis

Those species in **Error! Reference source not found.** that are listed as "Low" do not have potential habitat, are geographically unlikely to occur within the project area, or only occur in specific habitats that would not be affected by the proposed activities. These species will not be carried further in the analysis.

Encalypta brevipes and *Cheilanthes feei* occur on cliffs and will not be impacted by proposed trails in this project (analysis of cliff and rock outcrop habitat is provided in the Special Plant Habitats section in this EIS). *Astragalus diaphanus* var. *diurnus* is a narrow endemic confined to hills above the South Fork John Day River, located well outside the project area. Finally, *Potamogeton diversifolius* is an aquatic plant that could occur in the project area, but the project design would protect lakes and ponds from potential impacts.

Field surveys

Surveys for vascular sensitive plants in the project area have been conducted as early as 1980, continuing to the present. Populations of sensitive and rare plants are recorded in the NRIS database; surveys are done by the Limited Focus and Intuitive Control survey methods. Surveys for sensitive nonvascular plant occurred in riparian areas thought to be high probability habitat from 2004 to 2009. Additional surveys for newly listed bryophytes have occurred from 2011 – 2015 in high-probability

habitats for various projects across the Forest. Records containing information on survey routes, surveyor, and results are in the Lookout Mountain and Paulina Ranger District files at the Ochoco National Forest office in Prineville, Oregon. All routes on existing roadbeds, regardless of whether the road is open, closed, or decommissioned, are considered previously disturbed and covered with past NEPA analysis. No surveys would be necessary. Any trail proposed in this project that involves new construction will be surveyed for sensitive plants before disturbance takes place and the route is designated for use. This includes user-created trails, snowmobile routes, and other areas not previously surveyed.

Determination of Effects

Existing Condition

The Ochoco Summit Trail System Project area comprises 301,580 acres within three watersheds. This boundary extends far beyond the actual area affected by the proposed trail system; it takes in the eastern portion of Lookout Mountain Ranger District and the western portion of the Paulina Ranger District. The area has a wide variety of suitable sensitive plant habitat throughout. Elevation ranges from 4,040 feet to 6,926 feet at Lookout Mountain, and corresponding precipitation from 13" to 31" annually (majority receives 21 inches). Human use has affected the project area. Impacts such as deep soil compaction and construction of roads are effectively permanent. Other effects such as erosion, dropping water tables due to stream entrenchment, livestock grazing, and activities such as fire suppression and recreational use are likely to continue, which may limit opportunities for achieving desired conditions. The Bailey Butte wildfire on Lookout mountain district which occurred in the summer of 2014 may also impact sensitive plant species by consuming established vegetation making the landscape more vulnerable to invasive weeds and slowing the recovery of desired conditions.

The following is a short description of plant species on the 2011 Region 6 Sensitive Species list that may be affected by the Ochoco Summit Trail System project[6].

Species Associated with Riparian Habitats

MOONWORT OR GRAPE FERN
***Botrychium ascendens* W.H. Wagner** Upward-lobed moonwort
Status: Natural Heritage Program: G2G3/S2
ORBIC: List 1
R-6 Sensitive Species List
***Botrychium crenulatum* W.H. Wagner** Crenulate grape-fern
Status: Natural Heritage Program: G3/S2
ORBIC: List 1
R-6 Sensitive Species List
***Botrychium montanum* W.H. Wagner** mountain moonwort
Status: Natural Heritage Program: G3/S2
ORBIC: List 2
R-6 Sensitive Species List
***Botrychium paradoxum* W.H. Wagner** two-spike moonwort
Status: Natural Heritage Program: G2/S1
ORBIC: List 1
R-6 Sensitive Species List

[6] Abbreviations:

G-Natural Heritage global rank S-Natural Heritage state rank

1-Critically imperiled globally or in Oregon, 2-Imperiled globally or in Oregon 3- Rare, threatened or uncommon throughout range or in Oregon 4-Not rare, apparently secure in range or in Oregon 5-Widespread and secure throughout range or in Oregon

Botrychium, moonworts, are considered rare species that have wide, scattered distributions, but occur in small isolated populations (Zika, Brainerd, & Newhouse, 1995). They are scattered throughout the western United States and into Canada. Oregon Biodiversity Information Center (ORBIC, 2013) places B. ascendens, B. crenulatum, and B. paradoxum on List 1, meaning they are critically imperiled in Oregon because of extreme rarity, and are vulnerable to extirpation.

Since the habitat requirements of moonworts are similar, with several species often occurring together in genus clusters, they will be considered as one group for this analysis. Moonworts are found in a great variety of sites from marsh to xeric open meadows, seeps, and springs, to lightly shaded forested riparian areas. Research suggests that moonworts are early successional species that may require natural disturbance to stay ahead of successional changes (Zika et al., 1995). They reproduce by spores, similar to ferns, and are known to be mycorrhizal. Host plants and growth requirements are still unknown. Moonworts are particularly difficult to locate due to their diminutive stature, and the fact that they can spend several years in the gametophyte stage, without aboveground expression; apparently drawing reserves from host plants from which they have mycorrhizal connections.

Maintaining suitable habitat appears to be the key to continued viability. Along with disturbance that directly damages populations and habitat, hydrological changes are probably the most potentially damaging to Botrychium populations. While existing plants may have the capacity to survive droughty periods, establishment of new plants requires ample moisture. Because effects to Botrychium spp. are closely linked to effects on riparian habitat, effects of the proposed trail system are largely tied to the effects described in the hydrology resource report for this project.

PECK'S MARIPOSA LILY

***Calochortus longebarbatus* S. Watson var *peckii* Ownbey**
Status: Natural Heritage Program: G4T3/S3
ORBIC: List 4
R-6 Sensitive Species List

Peck's mariposa lily is a restricted local endemic. Populations occur in Crook, Wheeler and Harney Counties. It is a sterile triploid, which reproduces exclusively through asexual reproduction by the production of bulblets that form in leaf axils at or below ground level (Fredricks 1989). The primary habitat of the plant occurs within open meadows and partially shaded to open riparian edges along seasonal and perennial streams. Significant variation of expression in belowground populations makes inventory and monitoring of the species difficult (Croft, et al. 1997); species that reproduce vegetatively do not flower every year.

SEDGE SPECIES (Carex sp.)

***Carex lasiocarpa* Ehrh. var. *americana* Fernald** slender sedge
Status: Natural Heritage Program: G5T5/S2
ORBIC: List 2
R-6 Sensitive Species List
***Carex retrorsa* Schwein** retrorse sedge
Status: Natural Heritage Program: G5/S1
ORBIC: List 2
R-6 Sensitive Species List

The sedges listed above are suspected of occurring on the Ochoco National Forest and may occur in the project area. These listed *Carex* species are all on the ORBIC list 2 (2013), which includes species considered to be threatened with extirpation from the State of Oregon. These species occupy moist to very wet environments and are found over a wide geographic range in Oregon, as well as other states and across Canada.

OTHER RIPARIAN SPECIES

***Eleocharis bolanderi* A.Gray** Bolander's spike rush

Status: Natural Heritage Program: G4/S2
ORBIC: List 2

Eleocharis bolanderi, Bolander's spikerush, is a densely tufted, grass-like perennial that grows in seasonally moist meadows and channel edges in grass steppe-scablands, from foothills to moderate elevations in the mountains. Habitat is present in the project area. It is on ORBIC list 2 (2013). *E. bolanderi* in Oregon was known only from historic records (1940s) until it was located in Lake and Wallowa counties in 2002-2004 (ORBIC 2013). It also occurs in other eastern Oregon counties, as well as Idaho, California, Nevada, Utah, and Colorado.

Eleocharis species are difficult to identify and they are resilient species that form rhizomatous clumps. Because of a more extensive root system and ability to reproduce without seed, rhizomatous species have a higher tolerance for grazing (Mack and Thompson 1982). Habitat is present in the project area.

SPECIES ASSOCIATED WITH SCABLAND HABITATS

***Achnatherum hendersonii* Vasey** Henderson's needlegrass

Status: Natural Heritage Program: G3/S2
ORBIC: List 1

***Achnatherum wallowaensis* Maze & K.A.Robson** Wallowa needlegrass

Status: Natural Heritage Program: G2G3/S2S3
ORBIC: List 1

***Eriogonum cusickii* M.E. Jones** Cusick's buckwheat

Status: Natural Heritage Program: G2/S2
ORBIC: List 1

***Lomatium ochocense* Helliwell & Constance ex Helliwell Ochoco** lomatium

Status: Natural Heritage Program: G2/S2
ORBIC: List 1
R-6 Sensitive Species List

Henderson's ricegrass and Wallowa ricegrass were split from one former species *Oryzopsis hendersonii* and named *Achnatherum hendersonii* and *Achnatherum wallowensis*, which are now described as needlegrasses (Maze and Robson 1996). These perennial grasses are regional endemic species. Both species are on the ORBIC (2013) list 1and are considered threatened with extinction throughout their entire range. These species are distributed sporadically in central and northeastern Oregon on rocky, shallow, scabland soils known as lithosols, associated with *Artemesia rigida*, *Poa secunda*, and *Danthonia unispicata*. Both needlegrass species are documented on the Ochoco National Forest, but all populations within the project area are a single species, *Achnatherum hendersonii*. Permanent plots have been established for 10 populations within the project area and baseline demography data has been collected. The greatest threats to these populations is habitat degradation caused by physical disturbance such as OHV's, and other vehicles damaging soil biocrust and the invasion of non-native invasive annuals such as ventenata and medusahead (Farris-Lopez, 2013).

Eriogonum cusickii, also known as Cusick's buckwheat, is on the ORBIC list 1. In Oregon it has been documented in Harney and Lake Counties with occurrences in Crook and Deschutes

counties which may have been misidentifications. Its habitat is sage scablands and big sage habitat *(Artemisia tridentata).*

Lomatium ochocense, or Ochoco lomatium, is an endemic species discovered in 1994, and described in 2010 (Helliwell, 2010). It is restricted to basaltic scablands on shallow lithosols. It is on ORBIC List 1. There is one known site on the Ochoco National Forest and it is located near the southeastern edge of the project area; several more sites are located to the south on BLM lands.

SPECIES ASSOCIATED WITH FOREST HABITATS

***Astragalus tegetarioides* M.E. Jones bastard kentrophtya**
Status: Natural Heritage Program: G3/S3
ORBIC: List 1
R-6 Sensitive Species List

***Pyrola dentata* Sm. Toothleaf pyrola**
Status: Natural Heritage Program: G4/S2?
ORBIC: List 2
R-6 Sensitive Species List

Astragalus tegetarioides, bastard kentrophtya, is associated with upland forest habitats. It is currently on ORBIC List 1. This species occurs in openings, swales, and canyon bottoms in ponderosa pine forests and open stands of low and big sagebrush (*Artemisia arbuscula* and *A. tridentata*). Bastard kentrophtya is usually found on volcanic soils in openings of shrublands and dry ponderosa pine forests. The most common associated plants are *Artemisia arbuscula*, *Poa sandbergii*, *Festuca occidentalis* and *Phlox hoodii*. Specific ecological requirements are not well known for this species, but one documented population on the Ochoco National Forest is located on an old skid road below ponderosa pine and occupies approximately 14.2 acres. This population is situated in the southern extent of the project area. It is the northernmost documented population in its range which is primarily in the John Day drainage and therefore is important for species viability.

Toothleaf pyrola has been considered a part of the *Pyrola picta* species complex but recent molecular work has resulted in renewed recognition of toothleaf pyrola as a distinct species (Jolles & Wolfe 2012). Toothleaf pyrola is a facultative mycoheterotroph, meaning that it relies, at least in part, on mycorrhizal relationships for carbon-based energy. It is found in a range of forested habitats, from dense mixed-conifer forest to sunny, rocky slopes at elevations ranging (in the east slope Cascades) from 3,200 to 4,800 feet. The species is widely distributed throughout mountainous regions of Oregon and other western states.

Only one collection of toothleaf pyrola has ever been documented from the Ochoco Mountains, dating from 1918 (OSC Herbarium). Toothleaf pyrola was added to the sensitive plant species list in 2015. Therefore, there have been no targeted surveys for this plant on the Ochoco National Forest. While toothleaf pyrola may be relatively uncommon within the Blue Mountains ecoregion (including the Ochoco Mountains), it has been observed to be very abundant, particularly on ultramafic or serpentine substrates, in the Siskiyous ecoregion of southwestern Oregon (Clint Emerson, pers. comm.). This has led to a recent recommendation to move this species to ORBIC list 4, which would result in its removal from the Regional Forester's sensitive plant list when the list is next updated.

SPECIES WITH VARIABLE HABITAT

***Tortula mucronifolia* Schwagr.**mucronleaf tortula moss

Status: Natural Heritage Program: G5/S2
ORBIC: list 2

Tortula mucronifolia, or mucronleaf tortula moss, is on ORBIC List 2. In Oregon, it has been documented in Harney, Jackson, and Wheeler Counties, and throughout the Northern Hemisphere, Africa, and New Zealand. This moss is found on a variety of habitats, ranging from 5000-7000 feet. In Oregon, documented sites include vegetation types ranging from riparian aspen in a high elevation southeast Oregon site, to white fir in Southwest Oregon. Given the variety of vegetation types that can provide habitat for this species, habitat is present in the analysis area. The species fact sheet describes conservation considerations that include managing known sites and surveying for new sites until more information is known about this species in the northwest (Christy 2006). In 2005 and 2007, surveys were completed throughout the Ochoco NF for sensitive lichen and moss species. No *Tortula mucronifolia* was found. It may not occur on the Ochoco NF.

Quantity and diversity of documented sensitive species is high within the project area. Table 161 lists the known total acreage of sensitive species in the project area. Populations often are made up of separate occurrences called subpopulations that may be up to ¼ mile away from each other, usually connected by suitable habitat. Therefore, spatially, the populations are spread out on the landscape

Table 161. Populations of sensitive species that occur, or are likely to occur, within the Ochoco Summit project area.

Species	Known number of populations in the project area	Acres
Species associated with riparian habitat		
Ascending moonwort	1	0.2
Scalloped moonwort	16	27
Mountain moonwort	10	3.2
Peculiar moonwort	1	0.2
Peck's mariposa lily	149	2,772
Species associated with scabland habitat		
Henderson's needlegrass	26	144
Ochoco lomatium	1	0.5
Species associated with other habitats		
Bastard ketrophyta	1	14.1
Total	**205**	**2961.2**

Native vegetation in the project area has been influenced by human activities and associated changes within the last one hundred and fifty years. Most notable changes include eroded stream channels and loss of meadow and riparian habitats due to lowered water tables as a result of road construction, logging, livestock grazing, loss of beaver, and fire exclusion (USDA Forest Service, 1999). The density of fire intolerant conifers has increased, while the density of understory vegetation (grasses and shrubs) has decreased due to fire exclusion and grazing (Agee, 1993; Arno, 2000; Miller & Rose, 1999; USDA Forest Service, 1999). As a result of human influences, conditions include a decline in species diversity and biomass of available forage, increased threats from non-native invasive plants, and decline in overall landscape health.

Environmental Effects

General Effects of OHV Use on Vegetation Common to all Alternatives

Direct effects occur from physical damage to vegetation from crushing and breaking of plants as vehicles drive over them (Wilshire, Shipley, & Nakata, 1978). Plant foliage and stems can be damaged and plants uprooted by vehicles, so that actual plant damage may occur over an area much larger than the track width. Indirect effects of vehicles on vegetation include undercutting of root systems as vehicle paths are enlarged by erosion (Wilshire, Nakata, Shipley, & Prestegaard, 1978). Other indirect effects from off-highway vehicle use include the proliferation of exotic plant species and a higher frequency of fire (Lovich & Bainbridge, 1999). Effects of these impacts include alteration or destruction of macro- and micro-vegetation elements, establishment of annual plant

communities dominated by exotic species, destruction of soil stabilizers, soil compaction, and increased erosion.

The severity of damage to vegetation from vehicles is related to the amount of use that a given area is receiving from OHV use. As the number of vehicle passes increases, an increase in the impact to vegetation is also seen (Adams et al., 1982; Bolling & Walker, 2000). Such impacts have been shown to reduce the cover of native vegetation in OHV areas (Bolling & Walker, 2000). When rare plants are present in OHV areas, motorized use can detrimentally impact plant populations by reducing the number and cover of individual plants (Groom, McKinney, Ball, & Winchell, 2007). There are some known, mapped trails within the project area that receive repeated use. Table 162 lists the user-created trail system being used by Central Oregon Motorcycle and ATV Club (COMAC) and the associated sensitive plant locations within travel routes. Currently it is estimated that off road vehicles have affected approximately 2.5 miles of sensitive plant populations (those listed as closed roads or trails in the table).

Table 162. COMAC routes within sensitive plant populations.

Species	Length	Vehicle Type	Maintenance Level
Peck's mariposa lily	6,724 feet	ATV & Shared use	Open road
Peck's mariposa lily	11,571 feet	ATV & Motorcycle	Closed road
Peck's mariposa lily	1,640 feet	ATV & Motorcycle	User-created trail
Silverskin lichen	353 feet	All	Open road

This is a direct effect from tires crushing plant material, but also to soil properties. Even a few passes of a vehicle can compact soil, and repeated use leads to severely compacted and disturbed soils. Such soil compaction can lead to a considerable reduction in vegetation cover, with native plant establishment impaired (Adams et al., 1982; Bolling & Walker, 2000; Lovich & Bainbridge, 1999; Wilshire, Shipley, & Nakata, 1978). Soil compaction can also increase the potential for non-native, invasive plants to displace native vegetation (Lovich & Bainbridge, 1999; Prose, Metzger, & Wilshire, 1987).

The dirt and dust associated with OHV roads and trails can also affect the trailside vegetation (Brooks & Lair, 2005). Dust accumulation on plants can impair crucial plant functions such as photosynthesis and transpiration, which can lead to reduced plant growth, recruitment, cover, and survivorship (Walker & Everett, 1987).

Direct and Indirect Effects– TES Plants –Alternative 1

Alternative 1 is the No Action Alternative; no trail system would be designated, and no staging or associated camping areas would be developed. Prior to 2011, the current management policy was that most areas within the project area were open to off-road travel by motorized vehicles. This policy changed with the signed Record of Decision for the Travel Access Management Project, which became effective December 2011. This decision prohibits all motorized access outside of designated roads, trails and areas. Dispersed camping is allowed within 300' of roads. The majority of vehicle use occurs on roads, however there is evidence of significant unauthorized off-road use by ATVs (personal observation, Farris-Lopez). In the Ochoco Summit project area as a whole there is a low level of off-road use by antler hunters and some amount of willful "mud bogging" in sensitive areas such as meadows and riparian areas (personal observation, Farris-Lopez). There are also several sensitive scabland habitats that have ATV tracks across them. The amount of designated open road use is expected to continue as the popularity of OHV use continues to increase and the population of Prineville and the surrounding area continues to increase.

Riparian Habitat Species

The No Action Alternative would result in a biological evaluation determination of "No Impact" for all riparian sensitive species because under this alternative there are no proposed activities in riparian habitat.

OHV use in Oregon has increased 2.5 to 5.6% per year in the last decade (Skelton pers. comm.), and it would not be unreasonable to assume that parts of the Ochoco Summit project area has also received some increase in use. New rules regulating OHV use to designated roads would presumably decrease further off-road impacts to sensitive plant species. Some amount of illegal off-road use is expected to continue, especially on the Lookout Mountain Ranger District. It is estimated that currently there are minor impacts to Peck's mariposa lily, sedges, and moonwort populations and habitat. Tortula moss is unlikely affected presently due to the specific habitat requirements of rock outcrops and *Populus* species dominated riparian areas.

Of the riparian sensitive species, Peck's mariposa lily has the widest ecological amplitude, occurring on a wide variety of habitat types. The project area contains approximately 46% of the global population of Peck's mariposa lily. Direct impacts to the plants are from crushing of the basal leaf. Repeated damage or loss of the basal leaf each year can reduce the life of an individual by limiting the amount of photosynthate available for bulb renewal (Fiedler, 1987). Indirect effects can occur as a result of changes in the microclimate of streams and meadows in the long-term due to streambank disturbance, soil compaction, and vegetation changes. Peck's mariposa lily appears to require a particular moisture regime. The requirements of this condition are not well known due to lack of study, however observations show that altering the hydrology of stream channels is one of the largest threats to the species (Fredricks, 1989). As stated above, the closing of the Ochoco NF to OHV travel except where designated will reduce these effects. This regulation, along with no new designation of trails under Alternative 1 would result in no impacts on Peck's mariposa lily.

Effects to moonwort, sedges, and riparian moss habitat occur from direct crushing of plants and through changes in microclimate. Some moonwort populations are directly adjacent to open roads, such as the crenulate moonwort sites along the 42-430 and 4270 roads, and do have some traffic within the wet spring areas, and this use is expected to continue in Alternative 1. Repeated removal of the sporangia (by crushing from tires, or sediment wash from roadsides) before dispersal could reduce reproductive potential over time (Beatty, Jennings, & Rawlinson, 2003). Habitat modification from changed hydrology patterns is more likely to affect moonwort populations. These species occupy rare, ecologically diverse habitats, and rely on mycorrhizal fungi for water and nutrients. This mycorrhizal relationship is very sensitive to changes in soil moisture, changes in temperature and humidity, or light regime (Potash, 1998).

Sensitive species that occur along perennial streams - retrorse, slender and wooley sedges, as well as mosses, are vulnerable to direct effects from crushing of plants from OHV traffic or camping activities. Again, effects to habitat are due to changes in stream hydrology and also to soil properties. Even a few passes of a vehicle can compact soil, and repeated use leads to severely compacted and disturbed soils. Such soil compaction can lead to a considerable reduction in vegetation cover, with native plant establishment impaired (Adams et al., 1982; Bolling & Walker, 2000; Lovich & Bainbridge, 1999; Wilshire, Shipley, & Nakata, 1978). Soil compaction can also increase the potential for non-native, invasive plants to displace native vegetation (Lovich & Bainbridge, 1999; Prose et al., 1987).

The current amount of specific damage to riparian sensitive species populations and habitat by OHV use is unknown, and is expected to decline as new travel rules are enforced in the future. Local OHV clubs (COMAC) have been using an un-authorized trail system that includes 254 miles of trail. The COMAC routes, which include all types of travel routes, from open roads and user created trails, are adjacent and within sensitive plant populations. Of the COMAC trails, 2.52 miles are directly within

populations; see Table 3 above. The portion of use that is not on open roads would stop under the new travel management regulations.

Effects to riparian sensitive species would remain unchanged under Alternative 1 (no action) because there are no new proposed roads or trails resulting in no additional impacts to sensitive species from Alternative 1.

Scabland Species

The No Action Alternative would result in a biological evaluation determination of "No Impact" for all scabland sensitive species because no new routes would be designated as open to OHV travel.

Henderson's and Wallowa needlegrass are small bunchgrasses that occurs on shallow scablands with little vegetation; the greatest potential for impacts comes from soil disturbance. Roads and trails through these clay soils can cause changes in microclimate surrounding individual needlegrass plants, interrupt moisture flow, and reduce infiltration through compaction. The successional status of Henderson's and Wallowa needlegrass is unknown. It is a deep-rooted perennial bunchgrass confined to a habitat that receives little disturbance. Therefore, it is likely this plant is an indicator of late seral condition. There are a total of 343 acres of documented *Achnatherum hendersonii* and *Achnatherum wallowensis* populations across the Ochoco National Forest, 42% of which occurs within this analysis area There are 26 documented populations of Henderson's needlegrass (143.7 acres) in the project area (see Table 161). Several of these populations are part of a long-term study to look at population dynamics, and the risk of non-native invasive grasses.

Non-native invasive annual grasses such as *Ventenata dubia* and *Taeniatherum caput-medusae* are considered the biggest threat to maintaining viable populations of *Achnatherum hendersonii* and *Achnatherum wallowensis.* Recent studies have shown that soil bio-crusts inhibit the invasion of annual grasses (Belnap et al., 2001; Belnap, 2006; Serpe et al. 2006) and that physical disturbances, including OHV use damages delicate biocrusts, and recovery is slow (Belnap et al., 2001).

Bolander's spikerush occurs in moist areas within habitat similar to the sensitive needlegrasses, as do Cusick's buckwheat and Ochoco lomatium, and effects to these plant species and habitat would be similar from OHV impacts. There are no known sites of the first two species on the Ochoco National Forest. Ochoco lomatium has one documented population in the southern extent of the project area. There is no known threat from OHV use to this population. Currently, there are no trails within needlegrass populations, however 40 miles of COMAC trails occur within scabland habitat. Use of these trails is expected to decrease as travel rules are enforced in the future.

Forest Species

The No Action Alternative would result in a biological evaluation determination of "No Impact" for forest sensitive plant species because no new routes would be designated as open to OHV travel. Toothleaf pyrola has no known populations within the project area, and bastard kentrophtya has one population on the southern periphery of the project area.

Detrimental impacts to toothleaf pyrola and bastard kentrophyta habitat from existing uses are similar to those described for riparian and scabland species above. To the extent that existing roads and unauthorized motorized use exist in forested sensitive plant habitats, crushing of unknown toothleaf pyrola individuals, soil compaction and erosion, removal of native vegetation, increased risk of introduction and spread of invasive plants, and disruption of forest mycorrhizal networks may negatively impact forest sensitive plant habitats. Like other *Astragalus* species, bastard kentrophtya may have an affinity for establishing on disturbed sites that are allowed to recover, such as old road cuts or decommissioned roads. Routes that would remain closed under alternative 1 may provide some potential habitat for this species.

Effects Summary for all Action Alternatives

All action alternatives would result in a biological evaluation determination of "May Impact Individuals or Habitat But Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species" for all sensitive species (Table 167). OHV travel would result in both direct and indirect effects to habitat to varying degrees between the Alternatives as described in the sections below. Project design criteria would prevent direct impacts to sensitive plant individuals. For example, surveys for habitat and sensitive plant populations by the district botanist would be required before any proposed ground disturbing activities are implemented as part of this project. Existing populations of sensitive plants would be protected with barriers such as buck and pole fencing to minimize impacts from staging areas. A trend towards the listing of any sensitive species would not occur due to the linear nature of trails and the relatively small "footprint" affected. The amount of habitat acreage affected by the project is relatively small.

Direct and Indirect Effects– TES Plants –Alternative 2

Alternative 2 is the Proposed Action, which would designate a trail system, staging and play areas, and associated camping facilities for all classes of off-highway vehicles. Associated with this action, roads would also be closed and/or decommissioned with appropriate restoration activities to promote recovery of the closed road. Approximately 170 miles of trail would be designated open for travel; this includes 69 miles of new construction, 55 miles of reconstructing previously closed or decommissioned roads, and 46 miles of open road. The trails would include 142 stream crossings, 10 staging areas, 3 play areas, 6 trailheads, and 1 parking area.

This alternative adds 170 miles of trail to the open roads, trails, gravel pits already designated for OHV use in the project area. In 2007 it was estimated that in Central Oregon as a whole, there were approximately 52,000 visitors using trail systems (Ramming, pers. comm.). The North Millican OHV area had 9,985 riders in 2008, which has similar weather and predicted period of use as the Ochoco Summit proposed trail system. In the long-term, trail use is expected to increase by 2.5-5.6 percent per year (Skelton, pers. comm.). Using the low end of estimated increase in the first half of the decade (due to the current recession), and using the high end on the second half of the decade, it is estimated there may be 15,000 riders using the Ochoco Summit trail system by 2020. This may likely be an underestimate, based on the 52,000 riders using Central Oregon trails.

Riparian Habitat Species

Alternative 2 would result in a biological evaluation determination of "May Impact Individuals or Habitat but Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species" for all riparian sensitive species.

This alternative proposes 31 crossings of perennial streams, totaling 13.8 miles within the RHCA, which is high-probability habitat for the sedges, mosses, and moonworts. Perennial streams are also moderate to high probability habitat for Peck's mariposa lily. Table 163 lists the sensitive plant populations that would be affected based on the current trail location proposal, which includes 1,377 feet of trail directly within Peck's mariposa lily populations. A project design criterion would prohibit designating trails within these populations (see Chapter 2 of the EIS), therefore the trail design would have to change. However, moving the trail out of the known distribution of this particular plant may still be a risk, as the plant does not flower consistently and exact population perimeter is difficult to determine.

Stream crossings would be designed to reduce impacts to water quality (see project design criteria in Chapter 2 of the EIS) by development such as bridges, elevated puncheons, or culverts. This would help reduce impacts to sensitive plant habitat from repeated traffic. Some potential exists for sediment mobility when hydraulic capacity is exceeded, or when a culvert becomes plugged and the road fills are overtopped. When road fills are breached, sediment loadings can greatly increase.

Table 163. Length of trail proposed within sensitive plant populations by alternative in the Ochoco Summit Trail System project.

Population ID	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
06070200018	0 feet	298 feet	298 feet	298 feet	224 feet
06070200019	0 feet	906 feet	703 feet	937 feet	17 feet
06070200025	0 feet	0 feet	0 feet	0 feet	123 feet
06070200067	0 feet	174 feet	174 feet	174 feet	174 feet
06070200109	0 feet	0 feet	0 feet	427 feet	0 feet
Total	**0 feet**	**1,378 feet**	**1,175 feet**	**1,836 feet**	**538 feet**

Approximately 9.9 miles of proposed trail within perennial stream habitat either is a new route, or on a closed or decommissioned roadbed (see Table 164). This equates to 12 acres (at an average 10-foot disturbance width). In addition to trails within perennial streams, there are 76 proposed crossings within class 4 intermittent streams, which is Peck's mariposa lily habitat. The amount of trail within the class 4 RHCA is 2.3 miles, or approximately 2.8 acres of disturbance. There is approximately 3, 320 acres of documented Peck's mariposa populations on the Ochoco National forest. The acres of Peck's Mariposa habitat impacted by all the proposed activity combined for this alternative is less than 0.5% of the total habitat. These acreages are small when put in context of the overall amount of land in the project area due to the linear nature of trails. This is especially true considering the vast amount of the planning area where no trails are proposed - the southern half of the project area. Indirect effects from dust and carbon emissions to vegetation will be long-term, for however long the trail system is in existence. Dust raised by OHV traffic can disrupt photosynthetic processes, thereby suppressing plant growth and vigor, especially along OHV routes. In turn, reduced vegetation cover may permit invasive and/or non-native plants—particularly shallow-rooted annual grasses and early successional species capable of rapid establishment and growth—to spread and dominate the plant community, thus diminishing overall endemic biodiversity (USGS 2007).

Effects due to erosion and physical crushing of vegetation directly adjacent to the stream, is not expected because of project design criteria mitigations, which include hardened crossings, bridges and culverts.

There are 10 staging areas, 7 trailheads, and 2 play areas planned within ¼ mile of riparian sensitive plant habitat. These are areas where vehicles, both off-road and passenger vehicles, will congregate. There is a staging area planned directly within a Peck's mariposa lily population along a tributary of Buck Hollow Creek. The greatest effect to sensitive plants in Alternative 2 would come from this staging area, which would likely destroy 0.75 acres of Peck's lily and habitat. The effect may be greater if disturbance increases beyond the currently designated area for staging.

The closest distance for the other staging and play areas is about 215 feet away from the stream. There may be impacts to this riparian area habitat from unauthorized riding from these points, where use can radiate out in many directions. Matchett and others (2004) point out that OHV use may be heaviest on slopes, along right-of-ways, in washes, and in the vicinity of camping facilities. The photograph in Figure 19 was taken from a study by Webb (1982) on effects to desert soil by motorcycles, showing an area open to OHV use. The area was heavily impacted by trail convergence, passenger vehicles and camping. The study found that after 10 passes of a motorcycle on desert soil crust and annual plants were destroyed. The terrain in the Ochoco Summit project area is more confined than in this example due to a mostly forested, mountainous setting, however it is reasonable to conclude that OHV use would be heavier and more difficult to regulate centered around staging and camping areas.

Project effects to riparian and meadow habitats from the perspective of their contribution to special plant habitat and biological diversity within the project area generally are addressed in the Special Plant Habitats of this EIS.

Table 164. Proposed trails within riparian sensitive species habitat, perennial streams.

Trail Type	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Closed	0 miles 0 acres	5.57 miles 6.7 acres	1.1 miles 1.3 acres	5.9 miles 7.1 acres	2.0 miles 2.4 acres
Decommissioned	0 miles 0 acres	0.71 miles 0.9 acres	0.53 miles 0.64acres	0.93 miles 1.1 acres	0.76 miles 0.92 acres
New	0 miles 0 acres	3.62 miles 4.4 acres	2.9 miles 3.5 acres	3.9 miles 4.7 acres	2.0 miles 2.4 acres

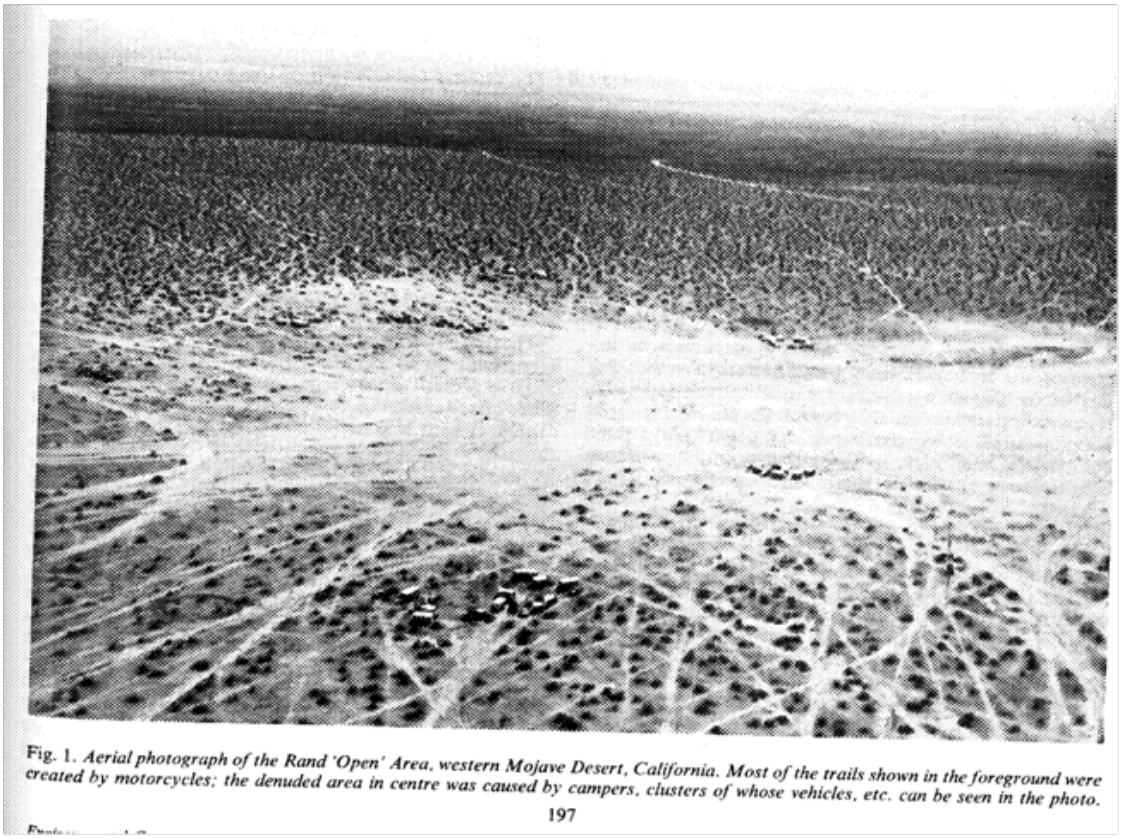


Figure 19. Trail Density and Denuded Camping Area in the Mojave Desert.

Scabland Habitat Species

Alternative 2 would result in a biological evaluation determination of "May Impact Individuals or Habitat But Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species" for all scabland sensitive species.

There are no trails proposed within documented needlegrass, Cusick's buckwheat, Ochoco lomatium, or Bolander's spikerush populations. These species all occupy roughly the same habitat types, primarily low and rigid sage, Sandberg's bluegrass on shallow soils. There are 49.6 miles of trail proposed in Alternative 2 within this type of habitat (see Table 165). Using an approximate distance of 10 feet for trail disturbance, this equals about 60 acres of the 48,447 acres of scabland sensitive species habitat in the planning area (less than 1%). Affected Bolander's spikerush habitat would be

less than 60 acres because it occupies moist meadows within the scabland habitat. Habitat mapping at that level of detail has not been done, so the exact figure is unknown.

Table 165. Trails proposed within scabland sensitive species habitat.

Action Alternative	New construction	Closed/ Decommissioned	Open roads	Total miles
Alternative 2	18.6 miles	12.8 miles	18.2 miles	49.6
Alternative 3	5.4 miles	4.1 miles	4.2 miles	13.7
Alternative 4	12.8 miles	8.8 miles	5.7 miles	27.3
Alternative 5	8.5 miles	7.8 miles	7.3 miles	23.6

Scablands are recognized as among the most fragile ecosystems on the Ochoco National Forest (USDA Forest Service, 1989). Damage to soil and vegetation is nearly impossible to mitigate due to shallow, unproductive soils. These soils also become heavily saturated and are susceptible to rutting. Impacts of constructed trails and roads are very long-term, if not permanent. Although the effect to this habitat is less than 1% of the total habitat present in the project area, trails are not easily restored or repaired if used when wet. A project design criterion was developed to protect TES plant habitat, by closing the trail system when adverse conditions exist that may result in resource damage (rutting, runoff, etc.), however in scabland habitat, once the damage is done, it is permanent.

There are 4 staging areas, 1 trailhead, and 2 play areas planned within scabland sensitive plant habitat. These are areas where vehicles, both off-road and passenger vehicles, would congregate. There are impacts expected to this habitat both from the development of the recreation areas (the exact area is unknown because they are not designed yet, but are estimated at 18 acres), and from unauthorized riding from these points, where use can radiate out in many directions (see Figure 19 and discussion above). These gathering area sites were chosen because most of them have already been disturbed. There is a risk of spreading invasive plants to connected sensitive scabland species habitat that is not disturbed. Although the amount of linear ground disturbance that would result from the proposed trails in this project is small in acreage relative to the amount of existing rare plant habitat, the influence could be much greater as invasive plants such as medusahead and ventenata spread from these trails into surrounding habitat. OHV trails across scablands create pathways for these problematic winter annual invasives to colonize rare plant habitat. The encroachment of ventenata and medusahead is thought to be the major contributor to the decline in Henderson's neeedlegrass populations across the Ochoco National Forest (Farris-Lopez, 2013; see also Invasive Plant Evaluation and Risk Assessment in this EIS).

Project effects to scabland habitats from the perspective of their contribution to special plant habitat and biological diversity within the project area generally are addressed in the Special Plant Habitats section in this EIS.

Forest Habitat Species

Alternative 2 would result in a biological evaluation determination of "May Impact Individuals or Habitat But Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species" for sensitive plant species within forested habitat. Toothleaf pyrola and bastard kentrophtya are the only sensitive plant species in the forest habitat category. There are no known populations of toothleaf pyrola and one population of bastard kentrophtya within the project area.

Effects to sensitive plant forest habitat would be similar to those described for riparian and scabland habitat. Crushing and destruction of unknown toothleaf pyrola or bastard kentrophyta populations, soil compaction and erosion, dust, increased invasive plant risk, removal of native vegetation, and disruption of mycorrhizal networks could result from actions proposed in Alternative 2. These impacts would be limited to the proposed trail system and associated trailheads, parking areas, and staging areas. Table 7 estimates the total area of forest sensitive plant habitat where such impacts

could occur for all action alternatives. Forest habitat has been broadly defined by Plant Association Group (PAG) codes that include moist grand fir, dry grand fir, Douglas-fir, mesic ponderosa forest, dry ponderosa forest, and aspen. Toothleaf pyrola and bastard kentrophyta habitats are likely more restricted than the coarse PAG definitions, but more precise habitat has not been defined for these species. Bastard kentrophtya is generally associated with drier ponderosa forests. Thus, the numbers in Table 166 represent the largest possible extent of negative impacts to forest sensitive plant habitat. The actual amount of habitat that could be potentially suitable for toothleaf pyrola or bastard kentrophyta is likely to be much less.

Table 166. Trails and OHV areas proposed within forest sensitive species habitat.

Action Alternative	New construction	Existing routes	OHV Areas
Alternative 2	53.5 miles	73 miles	1 parking area 2 trailheads 4 staging areas
Alternative 3	42.7 miles	39.6 miles	3 staging areas
Alternative 4	65.3 miles	98.6 miles	5 staging areas
Alternative 5	39.2 miles	63.2 miles	3 staging areas

The population of bastard kentrophtya is located on the southern periphery of the project area, well away from any action proposed. No bastard kentrophtya has been documented north of the present extent, despite many years of sensitive plant surveys that included bastard kentrophtya as a target species. Since this species is limited to one population on the edge of the project area where no action is proposed, the potential for negative effects to bastard kentrophtya and its habitat resulting from Alternative 2 are minimal. Additional surveys for this species would occur prior to any ground disturbance, as specified by project design criteria.

While no toothleaf pyrola populations are known along trails and OHV areas proposed in Alternative 2, it is important to note no targeted surveys for this species have been done on the Ochoco National Forest, due to the recent addition of this species to the sensitive plant list. While it is anticipated that toothleaf pyrola may be removed from the list, surveys for this species would occur prior to any ground disturbance if it is still listed at the time of project implementation, as specified by project design criteria.

Direct and Indirect Effects– TES Plants –Alternative 3

Alternative 3 was developed in response to potential issues related to how the trail system could impact riparian habitat (water quality, fish habitat and sensitive plant habitat) big game as well as potential conflict between motorized and non-motorized recreation. This alternative is intended to provide motorized access at a lesser scale to reduce impacts to riparian habitat and reduce conflicts between motorized and non-motorized use. Alternative 3 proposes a total of 101 miles of trail/roads, approximately 70 miles less than the Proposed Alternative. These projects would result in more effects to sensitive plants and habitat within the Ochoco Summit Trail Project Area as compared to Alternative 1, the no action alternative, but would have less effect compared to Alternative 3. Alternative 3 proposes a reduced trail system, fewer staging areas and fewer trailheads compared to the Proposed Alternative, and no play areas or parking areas. The motorcycle loop would be concentrated on the west side of the project area (Paulina Ranger District), while the ATV area would be on the east side of the project area near Highway 26. No OHV trails for jeeps and small trucks (80 inch category) would be included in this alternative. Associated with this action, roads would also be closed and/or decommissioned with appropriate restoration activities that would promote the recovery of the closed road. Approximately 101 miles of trail would be designated open for travel; this includes 50 miles of new construction, 37 miles of reconstructing previously closed or decommissioned roads, and 14 miles of open roads. The trails would include 62 stream crossings, 4 staging areas, and only 1 trailhead.

This alternative adds 101 miles of trail designation (approximately 83 acres) in addition to current designated open roads and dispersed camping areas.

Riparian Habitat Species

Alternative 3 would result in a biological evaluation determination of "May Impact Individuals or Habitat But Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species" for all riparian sensitive species.

This alternative proposes 21 perennial stream crossings, for a total of 6 miles in the RHCA, which is high-probability habitat for sensitive sedges and moonworts. Perennial streams are also moderate to high probability habitat for Peck's mariposa lily. Table 164 lists the sensitive plant populations that would be affected based on the current trail location proposal, which includes 1,174 feet of trail directly within Peck's mariposa lily populations. A project design criteria would prohibit designating trails within these populations (see Chapter 2 of the EIS), however moving the trail out of the known distribution of this particular plant may still be a risk, as the plant does not flower consistently and exact population perimeter is difficult to determine.

Stream crossings would be designed to reduce impacts to water quality (see project design criteria in Chapter 2 of the EIS) by development such as bridges, elevated puncheons, or culverts. This would help reduce impacts to sensitive plant habitat. There are also trails planned within riparian sensitive species habitat. Approximately 4.5 miles of proposed trail within perennial stream habitat either is a new route, or on a closed or decommissioned roadbed (see Table 164). This equates to 5.4 acres (at an average10-foot disturbance width). In addition to trails within perennial streams, there are 34 proposed crossings (1.2 miles equating to 1.4 acres) proposed within class 4 intermittent streams, which is Peck's mariposa lily habitat. These acreages are small when put in context of the overall amount of area in the project area due to the linear nature of trails. This is especially true considering the vast amount of the planning area where no trails are proposed - the southern half of the project area. Indirect effects from dust and carbon emissions to vegetation will be long-term, for however long the trail system is in existence. Effects due to erosion and physical crushing of vegetation are not expected because of project design criteria, which include hardened crossings, bridges and culverts.

Alternative 3 does not include the staging area near Buck Hollow Creek that lies within a Peck's mariposa lily population, eliminating the direct effect to this population. There are four staging areas planned within ¼ mile of riparian sensitive plant habitat. These are areas where vehicles, both off-road and passenger vehicles, will congregate. The closest distance is about 230 feet away from the stream. There may be impacts to this riparian area habitat from unauthorized riding from these staging areas.

Project effects to riparian and meadow habitats from the perspective of their contribution to special plant habitat and biological diversity within the project area generally are addressed in the Special Plant Habitats section in this EIS.

Scabland Habitat Species

Alternative 3 would result in a biological evaluation determination of "May Impact Individuals or Habitat But Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species" for all scabland sensitive species. However, this Alternative would have the least effect to scabland sensitive species of the action alternatives.

There are no trails proposed within needlegrass, Cusick's buckwheat, Ochoco lomatium, or Bolander's spikerush populations. These species all occupy roughly the same habitat types, primarily low and rigid sage, Sandberg's bluegrass on shallow soils. There are 13.7 miles of trail proposed in Alternative 3 within this habitat type (see Table 164). Using an approximate distance of 10 feet for trail disturbance this equals about 16.6 acres of the 48,447 acres of scabland sensitive species habitat

in the planning area (less than 1%). Affected Bolander's spikerush habitat would be less than 16.6 acres because it occupies moist meadows within the scabland habitat. Habitat mapping at that level of detail has not been done, so the exact figure is unknown.

Scablands are recognized as among the most fragile ecosystems on the Ochoco National Forest (USDA Forest Service, 1989). Damage to soil and vegetation is nearly impossible to mitigate due to shallow, unproductive soils. These soils also become heavily saturated and are susceptible to rutting (see Chapter 3 Soil Resource). Impacts of constructed trails and roads are very long-term, if not permanent. Although the effect to this habitat is less than 1% of the total habitat present in the project area, trails are not easily restored or repaired if used when wet. A project design criteria was developed to protect TES plant habitat, by closing the trail system when adverse conditions exist that may result in resource damage (rutting, runoff, etc), however in scabland habitat, once the damage is done, it is permanent.

There are no staging areas, trailheads, or play areas planned within scabland sensitive plant habitat in Alternative 3. This, along with the least amount of proposed trails in scablands, results in the least impact of the action alternatives.

Project effects to scabland habitats from the perspective of their contribution to special plant habitat and biological diversity within the project area generally are addressed in Section 2, Special Plant Habitats.

Forest Habitat Species

Alternative 3 would result in a biological evaluation determination of "May Impact Individuals or Habitat but Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species" for sensitive plant species within forested habitat. Toothleaf pyrola and bastard kentrophtya are the only sensitive plant species in the forest habitat category. There are no known populations of toothleaf pyrola and one population of bastard kentrophtya within the project area.

Effects to sensitive plant forest habitat would be similar to those described for riparian and scabland habitat. Crushing and destruction of unknown toothleaf pyrola or bastard kentrophyta populations, soil compaction and erosion, dust, increased invasive plant risk, removal of native vegetation, and disruption of mycorrhizal networks could result from actions proposed in Alternative 3. These impacts would be limited to the proposed trail system and associated OHV areas (such as parking, staging areas, and trailheads) in the amount shown for Alternative 3 in Table 166. Since Alternative 3 proposes the fewest miles of trail and fewer OHV areas than the other action alternatives, Alternative 3 would have the least impact on forest sensitive plant habitat and any unknown sensitive plant populations.

The population of bastard kentrophtya is located on the southern periphery of the project area, well away from any action proposed. No bastard kentrophtya has been documented north of the present extent, despite many years of sensitive plant surveys that included bastard kentrophtya as a target species. Since this species is limited to one population on the edge of the project area where no action is proposed, the potential for negative effects to bastard kentrophtya and its habitat resulting from Alternative 3 are minimal. Additional surveys for this species would occur prior to any ground disturbance, as specified by project design criteria.

While no toothleaf pyrola populations are known along trails and OHV areas proposed in Alternative 3, it is important to note no targeted surveys for this species have been done on the Ochoco National Forest, due to the recent addition of this species to the sensitive plant list. While it is anticipated that toothleaf pyrola may be removed from the list, surveys for the species would occur prior to any ground disturbance if it is still listed at the time of project implementation, as specified by project design criteria.

Direct and Indirect Effects– TES Plants –Alternative 4

Alternative 4 was developed in response to an issue identified during scoping that the proposed action trail system is too small and lacks quality. Alternative 4 includes trails for class I, II and III vehicles over more area and with more miles than the Proposed Action. Alternative 4 proposes a total of 212 miles of trails, with 88 stream crossing. Alternative 4 would result in the largest impact to sensitive plant populations within the Ochoco Summit Trail Project Area as compared to all of the other three alternatives (Table 163). New construction of trails would comprise 81 miles (38.4 acres) of sensitive plant habitat. There are also 10 proposed staging areas, and 1 play area. Total miles of OHV trails in Riparian Habitat Conservation Areas equals 22 miles. Road closures and associated restoration activities would also take place.

Riparian Habitat Species

Alternative 4 would result in a biological evaluation determination of "May Impact Individuals or Habitat But Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species" for all riparian sensitive species.

This alternative proposes 38 crossings of perennial streams, totaling 17.6 miles in the RHCA, which is high-probability habitat for the sedges, mosses, and moonworts. Perennial streams are also moderate to high probability habitat for Peck's mariposa lily. **Error! Reference source not found.**lists the sensitive plant populations that would be affected based on the current trail location proposal, which includes 1,836 feet of trail directly within Peck's mariposa lily populations. A project design criteria would prohibit designating trails within these populations (see Chapter 2 of the EIS), however moving the trail out of the known distribution of this particular plant may still be a risk, as the plant does not flower consistently and exact population perimeter is difficult to determine.

Stream crossings would be designed to reduce impacts to water quality (see project design criteria in Chapter 2 of the EIS) by development such as bridges, elevated puncheons, or culverts. This would help reduce impacts to sensitive plant habitat from repeated traffic. Some potential exists for sediment mobility when hydraulic capacity is exceeded, or when a culvert becomes plugged and the road fills are overtopped. When road fills are breached, sediment loadings can greatly increase.

Approximately 10.7 miles of proposed trail within perennial stream habitat either is a new route, or on a closed or decommissioned roadbed (see Table 164). This equates to 12.9 acres (at an average10-foot disturbance width). In addition to trails within perennial streams, there are 2.75 miles, 3.3 acres (92 stream crossings) proposed within class 4 intermittent streams, which is Peck's mariposa lily habitat. These acreages are small when put in context of the overall amount of area in the project area due to the linear nature of trails. This is especially true considering the vast amount of the planning area where no trails are proposed - the southern half of the project area. Indirect effects from dust and carbon emissions to vegetation will be long-term, for however long the trail system is in existence. Dust raised by OHV traffic can disrupt photosynthetic processes, thereby suppressing plant growth and vigor, especially along OHV routes. In turn, reduced vegetation cover may permit invasive and/or non-native plants—particularly shallow-rooted annual grasses and early successional species capable of rapid establishment and growth—to spread and dominate the plant community, thus diminishing overall endemic biodiversity (USGS 2007).

Effects due to erosion and physical crushing of vegetation directly adjacent to the stream are not expected because of project design criteria, which include hardened crossings, bridges and culverts.

There are 4 staging area and 1 play area planned within ¼ mile of riparian sensitive plant habitat. These are areas where vehicles, both off-road and passenger vehicles, will congregate. Like Alternative 2, there is a staging area planned directly within a Peck's mariposa lily population near Buck Hollow Creek. The greatest effect to sensitive plants in Alternative 4 would come from this

staging area, which would likely destroy 0.75 acres of Peck's lily and habitat. The effect may be greater if disturbance increases beyond the currently designated area for staging.

The closest distance for the other staging and play areas is about 215 feet away from the stream. There may be impacts to this riparian area habitat from unauthorized riding from these staging and play areas from use radiating out in many directions (Matchett et al. 2004).

Project effects to riparian and meadow habitats from the perspective of their contribution to special plant habitat and biological diversity within the project area generally are addressed in the Special Plant Habitats section in this EIS.

Scabland Habitat Species

Alternative 4 would result in a biological evaluation determination of "May Impact Individuals or Habitat But Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species" for all scabland sensitive species.

There are no trails proposed within needlegrass, Cusick's buckwheat, or Bolander's spikerush populations. These species all occupy roughly the same habitat types, primarily low and rigid sage, Sandberg's bluegrass on shallow soils. There are 27.3 miles of trail proposed in Alternative 4 within this type of habitat (see Table 164). Using an approximate distance of 10 feet for trail disturbance, this equals about 33 acres of the 48,447 acres of scabland sensitive species habitat in the planning area (less than 1%). Affected Bolander's spikerush habitat would be less than 33 acres because it occupies moist meadows within the scabland habitat. Habitat mapping at that level of detail has not been done, so the exact figure is unknown.

Scablands are recognized as among the most fragile ecosystems on the Ochoco National Forest (USDA Forest Service 1989). Damage to soil and vegetation is nearly impossible to mitigate due to shallow, unproductive soils. These soils also become heavily saturated and are susceptible to rutting (see Chapter 3 Soil Resource). Impacts of constructed trails and roads are very long-term, if not permanent. Although the effect to this habitat is less than 1%, trails are not easily restored or repaired if used when wet. A project design feature was developed to protect TES plant habitat, by closing the trail system when adverse conditions exist that may result in resource damage (rutting, runoff, etc.), however in scabland habitat, once the damage is done, it is permanent.

There are 4 staging areas, and 1 play area planned within scabland sensitive plant habitat. This is fewer than Alternative 2. These are areas where vehicles, both off-road and passenger vehicles, will congregate. There are impacts expected to this habitat both from the development of the recreation areas (the exact area is unknown because they are not designed yet, but are estimated at 14 acres), and from unauthorized riding from these points, where use can radiate out in many directions (see discussion under Alternative 2).

Project effects to scabland habitats from the perspective of their contribution to special plant habitat and biological diversity within the project area generally are addressed in Section 2, Special Plant Habitats.

Forest Habitat Species

Alternative 4 would result in a biological evaluation determination of "May Impact Individuals or Habitat But Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species" for sensitive plant species within forested habitat. Toothleaf pyrola and bastard kentrophtya are the only sensitive plant species in the forest habitat category. There are no known populations of toothleaf pyrola and one population of bastard kentrophtya within the project area.

Effects to sensitive plant forest habitat would be similar to those described for riparian and scabland habitat. Crushing and destruction of unknown toothleaf pyrola or bastard kentrophyta populations,

soil compaction and erosion, dust, increased invasive plant risk, removal of native vegetation, and disruption of mycorrhizal networks could result from actions proposed in Alternative 4. These impacts would be limited to the proposed trail system and associated OHV areas (such as parking, staging areas, and trailheads) in the amount shown for Alternative 4 in Table 166. Since Alternative 4 proposes the most miles of trail and 5 OHV staging areas compared to the other action alternatives, Alternative 4 would have the most impact on forest sensitive plant habitat and any unknown sensitive plant populations.

The population of bastard kentrophtya is located on the southern periphery of the project area, well away from any action proposed. No bastard kentrophtya has been documented north of the present extent, despite many years of sensitive plant surveys that included bastard kentrophtya as a target species. Since this species is limited to one population on the edge of the project area where no action is proposed, the potential for negative effects to bastard kentrophtya and its habitat resulting from Alternative 3 are minimal. Additional surveys for this species would occur prior to any ground disturbance, as specified by project design criteria.

While no toothleaf pyrola populations are known along trails and OHV areas proposed in Alternative 4, it is important to note no targeted surveys for this species have been done on the Ochoco National Forest, due to the recent addition of this species to the sensitive plant list. While it is anticipated that toothleaf pyrola may be removed from the list, surveys for the species would occur prior to any ground disturbance if it is still listed at the time of project implementation, as specified by project design criteria.

Direct and Indirect Effects– TES Plants –Alternative 5

Alternative 5 includes the reinstatement of the 930 road, which runs parallel to Jackson Creek in the eastern half of the project area. This is a closed road that was included as a motorcycle trail in Alternatives 2 and 4, but not included in Alternative 3, and instead was routed down an open road in the area. Concerns regarding the safety of a motorcycle designation on an open road led to this alternative to use the 930 road instead, but still maintain the purpose of Alternative 3, to reduce the impacts to riparian areas. Alternative 5 also includes changes in the Upper Marks Creek Subwatershed trail system. It adds approximately 2.8 miles of Class IV trail and includes open and closed road systems (2610-012, 2610-024 and 2600-015). It also adds approximately 1.5 miles of Class I trail just south of Crystal Creek to provide more loop opportunities in the area.

Alternative 5 also proposes a total of 133 miles of trails, with 50 miles of proposed new trail construction. There are also 4 staging areas and 1 trailhead planned. Total miles of OHV trails in Riparian Habitat Conservation Areas equals 12.6 miles, with 71 stream crossings. Road closures and associated restoration activities would also take place. Alternative 5 would have the least impact on documented Peck's Mariposa Lily populations compared with the other action alternatives, affecting 538 feet compared with the Proposed Acton alternative which would impact 1,377 feet (Table 4), and has the lowest proposed new trail construction in sensitive riparian plant habitat (2.0 miles for Alt. 5 compared to 3.6 miles for the proposed action alternative and 2.9 miles for Alternative 3. Alternative 5 proposes less new trail construction across sensitive scabland habitat (8.5 miles) than the proposed alternative (18.6 miles) but more than Alternative 3 (5.4 miles).

Riparian Habitat Species

Alternative 5 would result in a biological evaluation determination of "May Impact Individuals or Habitat But Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species" for all riparian sensitive species.

This alternative proposes 28 crossings of perennial streams, totaling 10.8 miles in the RHCA, which is high-probability habitat for the sedges, mosses, and moonworts. Perennial streams are also moderate to high probability habitat for Peck's mariposa lily. Table 4 lists the sensitive plant

populations that would be affected based on the current trail location proposal, which includes 538 feet of trail directly within Peck's mariposa lily populations. A project design criterion would prohibit designating trails within these populations (see Chapter 2 of the EIS), however moving the trail out of the known distribution of this particular plant may still be a risk, as the plant does not flower consistently and exact population perimeter is difficult to determine.

Stream crossings would be designed to reduce impacts to water quality (see project design criteria in Chapter 2 of this EIS) by development such as bridges, elevated puncheons, or culverts. This would help reduce impacts to sensitive plant habitat from repeated traffic. Some potential exists for sediment mobility when hydraulic capacity is exceeded, or when a culvert becomes plugged and the road fills are overtopped. When road fills are breached, sediment loadings can greatly increase.

Approximately 4.8 miles of proposed trail within perennial stream habitat either is a new route, or on a closed or decommissioned roadbed (see Table 164). This equates to 5.7 acres (at an average10-foot disturbance width). In addition to trails within perennial streams, there are 1.8 miles, 2.2 acres (66 stream crossings) proposed within class 4 intermittent streams, which is Peck's mariposa lily habitat. These acreages are small when put in context of the overall amount of area in the project area due to the linear nature of trails. This is especially true considering the vast amount of the project area where no trails are proposed - the southern half of the project area. Indirect effects from dust and carbon emissions to vegetation will be long-term, for however long the trail system is in existence. Dust raised by OHV traffic can disrupt photosynthetic processes, thereby suppressing plant growth and vigor, especially along OHV routes. In turn, reduced vegetation cover may permit invasive and/or non-native plants—particularly shallow-rooted annual grasses and early successional species capable of rapid establishment and growth—to spread and dominate the plant community, thus diminishing overall endemic biodiversity (USGS 2007).

Effects due to erosion and physical crushing of vegetation directly adjacent to the stream, are not expected because of project design criteria, which include hardened crossings, bridges and culverts.

There are 2 staging areas, within ¼ mile of riparian sensitive plant habitat. These are areas where vehicles, both off-road and passenger vehicles, will congregate. Although these staging areas are within .25 miles of documented sensitive plant populations, one proposed staging area is over 1,500 feet from documented Peck's Lily populations along Thorton Creek, and over 500 feet from another Peck's lily population northeast of the proposed staging area. The second proposed staging area by Mark's creek is over 300 feet away from documented Peck's lily populations so no direct impact to these rare plants or their habitat is expected. The effect may be greater if disturbance increases beyond the currently designated area for staging. There may be impacts to riparian area habitat from unauthorized riding from these staging and play areas from use radiating out in many directions (Matchett et al 2004).

Project effects to riparian and meadow habitats from the perspective of their contribution to special plant habitat and biological diversity within the project area generally are addressed in the Special Plant Habitats section of this EIS.

Scabland Habitat Species

Alternative 5 would result in a biological evaluation determination of "May Impact Individuals or Habitat But Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species" for all scabland sensitive species.

There are no trails proposed within needlegrass, Cusick's buckwheat, Ochoco lomatium or Bolander's spikerush populations. These species all occupy roughly the same habitat types, primarily low and rigid sage, Sandberg's bluegrass on shallow soils. There are 23.6 miles of trail proposed in Alternative 5 within this habitat type (see **Error! Reference source not found.**). Using an approximate distance of 10 feet for trail disturbance this equals about 28.6 acres of the 48,447 acres

of scabland sensitive species habitat in the planning area (less than 1%). Affected Bolander's spikerush habitat would be less than 28.6 acres, because it occupies moist meadows within the scabland habitat. Habitat mapping at that level of detail has not been done, so the exact figure is unknown.

Scablands are recognized as among the most fragile ecosystems on the Ochoco National Forest (USDA Forest Service, 1989). Damage to soil and vegetation is nearly impossible to mitigate due to shallow, unproductive soils. These soils also become heavily saturated and are susceptible to rutting. Impacts of constructed trails and roads are very long-term, if not permanent. Although the effect to this habitat is less than 1% of the total habitat present in the project area, trails are not easily restored or repaired if used when wet. A project design criteria was developed to protect TES plant habitat, by closing the trail system when adverse conditions exist that may result in resource damage (rutting, runoff, etc.), however, in scabland habitat, once the damage is done, it is permanent.

There is one trailhead proposed within scabland sensitive plant habitat in Alternative 5. The trailhead is located at a rock pit that is already highly disturbed. Due to the disturbance and lack of native vegetation, this area has already been effectively removed as suitable habitat capable of supporting sensitive scabland plant species, thus the effect to sensitive plant populations and habitat would be limited to increased dust relative to increased use of the site, and to any unauthorized OHV use that could be facilitated by the development of a trailhead. Project design criteria would limit such unauthorized use.

Project effects on scabland habitats from the perspective of their contribution to special plant habitat and biological diversity within the project area generally are addressed in the Special Plant Habitats section of this EIS.

Forest Habitat Species

Alternative 5 would result in a biological evaluation determination of "May Impact Individuals or Habitat But Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species" for sensitive plant species within forested habitat. Toothleaf pyrola and bastard kentrophtya are the only sensitive plant species in the forest habitat category. There are no known populations of toothleaf pyrola and one population of bastard kentrophtya within the project area.

Effects to sensitive plant forest habitat would be similar to those described for riparian and scabland habitat. Crushing and destruction of unknown toothleaf pyrola or bastard kentrophyta populations, soil compaction and erosion, dust, increased invasive plant risk, removal of native vegetation, and disruption of mycorrhizal networks could result from actions proposed in Alternative 5. These impacts would be limited to the proposed trail system and associated OHV areas (such as parking, staging areas, and trailheads) in the amount shown for Alternative 5 in Table 166. Since Alternative 5 proposes fewer miles of trail and 3 OHV staging areas compared to Alternatives 2 and 4, Alternative 5 would have less impact on forest sensitive plant habitat and any unknown sensitive plant populations than those alternatives.

The population of bastard kentrophtya is located on the southern periphery of the project area, well away from any action proposed. No bastard kentrophtya has been documented north of the present extent, despite many years of sensitive plant surveys that included bastard kentrophtya as a target species. Since this species is limited to one population on the edge of the project area where no action is proposed, the potential for negative effects to bastard kentrophtya and its habitat resulting from Alternative 3 are minimal. Additional surveys for this species would occur prior to any ground disturbance, as specified by project design criteria.

While no toothleaf pyrola populations are known along trails and OHV areas proposed in Alternative 5, it is important to note no targeted surveys for this species have been done on the Ochoco National

Forest, due to the recent addition of this species to the sensitive plant list. While it is anticipated that toothleaf pyrola may be removed from the list, surveys for the species would occur prior to any ground disturbance if it is still listed at the time of project implementation, as specified by project design criteria.

Cumulative Effects – TES Plants

Alternative 1 does not propose a trail network or disturbance, and as a result there are no cumulative effects. This alternative will not be carried further in the cumulative effects discussion.

Many decades of past activities have impacted sensitive species habitats. Most notable changes include eroded stream channels and loss of meadow and riparian habitats due to lowered water tables as a result of road construction, logging, livestock grazing, loss of beaver, and fire exclusion (USDA Forest Service, 1999). The density of fire intolerant conifers has increased, while the density of understory vegetation (grasses and shrubs) has decreased due to fire exclusion and grazing (Agee, 1993; Arno, 2000; Miller & Rose, 1999; USDA Forest Service, 1999). As a result of human influences, conditions include a decline in species diversity and biomass of available forage, increased threats from non-native invasive plants, and decline in overall landscape health.

Within the last decade, past management in the project area has focused on thinning small diameter trees, and using prescribed fire to reduce fuel loadings, which has little cumulative effect to the proposed trail system. Harvest generally avoids riparian areas where sensitive plants and habitat occur. Harvest also does not occur on scablands. New roads associated with harvest have mostly been limited to temporary roads outside of scabs and riparian areas, and are closed after use. Some areas within the project area, such as Deep Creek Watershed Restoration (2004), have had extensive restoration activities in both the uplands and riparian areas. The upland scabland-juniper interface has had juniper encroachment removal, which is a benefit to scabland sensitive species. Riparian areas have also had restoration activities such as headcut repair, fencing, planting, and culvert replacement. While there are short-term effects to riparian sensitive species habitat, cumulatively these actions will be a benefit in the futurerisk of introducing invasive plant infestations in off road areas not associated with designated trails.

Several wildfires have occurred within the Ochoco Summit Trails System project area including the Hash Rock fire (2000), Maxwell fire (2006), Bailey Butte Fire (2014), Ochoco Complex Fire (2014). These wildfires consumed riparian vegetation, and led to increased sedimentation and bank instability further degrading sensitive riparian plant habitat within the Ochoco Summit Trail System project area. Suppression efforts such as dozer lines created as fire breaks on the Ochoco Complex fire has directly impacted scabland habitat, and Henderson's needlegrass populations, however the Ochoco fire perimeter is not within the implementation area for this project. The Bailey Butte Fire however, overlaps with the proposed project area in Upper Marks creek sub watershed and burned through sensitive riparian habitat including seeps, springs and creeks that are now susceptible to invasion by non-native invasive plants. The Bailey Butte fire burned several exclosure fences protecting these areas from livestock. If they remain unrepaired, they would no longer prevent cattle from grazing or dispersing invasive weed seeds into these sensitive plant habitats. Non-native invasive weeds in sensitive plant habitat have a significant negative impact on rare plant populations. Non-native invasive weeds can outcompete sensitive plants by growing faster, larger and taking up limited resources, particularly nitrogen and water, more efficiently than rare native species. Invasive plants, particularly spotted knapweed, can chemically inhibit the germination of rare plants and can invade disturbed sites as well as relatively undisturbed perennial plant communities.

The Bailey Butte Fire project harvested fire killed trees that have economic value, and abated trees along public and administrative-use roads that posed a safety concern. The Bailey Butte Fire project decision notice authorizes the reforestation of desired tree species in severely burned stands. These activities could have a cumulative effect on rare plant habitat as logging activities may create more

ground-disturbance and increase the risk of introduction and spread of existing weed infestations into sensitive plant habitat. The Walton Lake Restoration project decision memo authorizes commercial and noncommercial thinning within the designated recreation area around Walton Lake and associated planting of native species within the moist mixed conifer stands; these activities also have the potential to affect sensitive plant habitat. Both project decisions include design criteria intended to protect sensitive habitats and reduce the potential for introduction or spread of weed populations.

Several other projects have been proposed within the Ochoco Summit Trail project but there has been no decision on implementation to date including Gap Landscape Restoration Project, Black Mountain Vegetation Management Project and Lookout Mountain Trail Project.

The ground disturbing activities listed in the paragraphs above have undoubtedly contributed to and will continue to contribute to the introduction and spread of invasive plant species. The present patterns of recreational use with dispersed campsites and OHV use contribute to the continued spread of invasive plant infestations. The spread of invasive plant species is second only to habitat destruction for endangering imperiled species (Flather, Joyce, & Bloomgarden, 1994).

Cattle grazing occurs on most of the project area under several Allotment Management Plans (AMPs) including Marks Creek AMP (2011), Big Summit AMP (2009), Fox Canyon Cluster AMP, Burn and Crystal Springs AMP (2008), and the proposed Bear Creek AMP. When native vegetation is overgrazed and trampled, bare ground is exposed, the competing native vegetation is removed, and livestock can introduce invasive plant seeds stuck on their fur, particularly the velcro like seeds of houndstongue and long-awned seeds like medusahead as well as transport seeds of many invasive species in their hooves into these disturbed areas, thus greatly increasing the probability of these sites becoming colonized by non-native invasive species. Non-native invasive species further degrades sensitive plant habitat, and outcompetes sensitive plant species such as small statured botrychiums. Implementation of the proposed OHV project would cumulatively increase the risk of introducing invasive plant infestations in off road areas by creating continual disturbance and bare ground susceptible to invasion.

A December 2011 Forest-wide Travel Management Plan decision, closes the Ochoco National Forest to cross country travel except on designated routes or in designated areas. Following implementation of the forest-level Travel Management Plan acres of disturbed habitat would be limited to only those roads and motorized trails that are designated as open to the public for motorized use. COMAC routes that do not overlap with the Ochoco Summit OHV Trails would also be closed. Additional road closures proposed in the action alternatives (see Chapter 2 of the EIS) would combine with the Travel Management Plan so that disturbance would be reduced overall. Prohibiting overland use of OHVs would also reduce the risk of introducing invasive plant infestations in off road areas not associated with designated trails.

Cumulative impacts to scablands, riparian plant communities, and other special habitats resulting from the proposed project and past, present, and reasonably foreseeable future actions are also addressed in the Special Plant Habitats section in this EIS.

Recommendations for Removing, Avoiding or Compensating Adverse Effects

The following recommendations are contained within Chapter 2 of the EA as design elements. Project design elements will be used during implementation; their purpose is to reduce the effects of proposed activities. The effects analysis and determination for each sensitive species considers these elements.

- A rare plant survey and evaluation will be completed prior to trail construction or other disturbance.
- Protection measures would be put in place so that impacts to rare or sensitive plants would not occur, or impacts would be mitigated to acceptable levels. Protection measures may include trail relocation, bridges or boardwalks, etc.

- To protect sensitive plant habitat, close the trail system when adverse conditions exist that may result in resource damage (rutting, runoff, etc).
- All Threatened, Endangered, and Sensitive plant and animal species will be protected (LRMP Chapter IV, pp. 4-246). If any species are found during project implementation, these species would be protected as described in the policy guidelines found in FSM 2670.
- Follow the invasive plant prevention measures included in the weed analysis report. Invasive plant introduction and spread can be a threat to Sensitive plants and their habitat.

Sensitive Species Determination

The Ochoco Summit Trail System Environmental Impact Statement addresses the need to provide recreation opportunities for off-road motorized vehicle use. The proposed activities would have negative effects on sensitive plants with suitable habitat within the project area. Table 167 contains the expected effects to sensitive plant species for each of the alternatives. The determination of "May Impact Individuals or Habitat, But will not Likely Contribute to a Trend towards Federal Listing or Loss of Viability to the Population or Species" MIIH is based on the assumption that all design elements and proper coordination at implementation (see Recommendations section) is in effect. The environmental effects section of the document provides the rationale for each determination. Each of the proposed action alternatives would only impact less than 1% of the total population or habitat available within the project area. Therefore, although there would be impacts to sensitive plant populations and habitat, none of the proposed activities would likely contribute to an overall decrease in population viability.

Table 167. Alternative effects summary to sensitive plant populations and habitat for the Ochoco Summit Trail System Project Area.

Species	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Achnatherum hendersonii	NI	MIIH	MIIH	MIIH	MIIH
Achnatherum wallowaensis	NI	MIIH	MIIH	MIIH	MIIH
Astragalus diaphanus var. *diurnus*	NI	NI	NI	NI	NI
Astragalus peckii	NI	NI	NI	NI	NI
Astragalus tegetarioides	NI	MIIH	MIIH	MIIH	MIIH
Botrychium ascendens	NI	MIIH	MIIH	MIIH	MIIH
Botrychium crenulatum	NI	MIIH	MIIH	MIIH	MIIH
Botrychium montanum	NI	MIIH	MIIH	MIIH	MIIH
Botrychium paradoxum	NI	MIIH	MIIH	MIIH	MIIH
Calochortus longebarbatus var. *peckii*	NI	MIIH	MIIH	MIIH	MIIH
Carex diandra	NI	NI	NI	NI	NI
Carex lasiocarpa var. *americana*	NI	MIIH	MIIH	MIIH	MIIH
Carex retrorsa	NI	MIIH	MIIH	MIIH	MIIH
Cheilanthes feei	NI	NI	NI	NI	NI
Cyperus lupulinus ssp. lupulinus	NI	NI	NI	NI	NI
Elatine brachysperma	NI	NI	NI	NI	NI
Eleocharis bolanderi	NI	MIIH	MIIH	MIIH	MIIH
Eremothera pygmaea	NI	NI	NI	NI	NI
Eriogonum cusickii	NI	MIIH	MIIH	MIIH	MIIH
Erythranthe inflatula	NI	NI	NI	NI	NI
Heliotropium curassavicum	NI	NI	NI	NI	NI
Lipocarpha aristulata	NI	NI	NI	NI	NI
Lomatium ochocense	NI	MIIH	MIIH	MIIH	MIIH
Muhlenbergia minutissima	NI	NI	NI	NI	NI
Penstemon peckii	NI	NI	NI	NI	NI
Phemeranthus spinescens (Talinum spinescens)	NI	NI	NI	NI	NI
Potamogeton diversifolius	NI	NI	NI	NI	NI
Pyrola dentata	NI	MIIH	MIIH	MIIH	MIIH

Rorippa columbiae	NI	NI	NI	NI	NI
Rotala ramosior	NI	NI	NI	NI	NI
Salix wolfii	NI	NI	NI	NI	NI
Thelypodium eucosmum	NI	NI	NI	NI	NI
Utricularia minor	NI	NI	NI	NI	NI
Encalypta brevipes	NI	NI	NI	NI	NI
Entosthodon fasicularis	NI	NI	NI	NI	NI
Schistidium cinclidodonteum	NI	NI	NI	NI	NI
Tortula mucronifolia	NI	MIIH	MIIH	MIIH	MIIH
Texosporium santi-jacobi	NI	NI	NI	NI	NI

NI - No Impact.
MIIH - May Impact Individuals or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing or Loss of Viability to The Population Or Species.
WIFV* - Will Impact Individuals or Habitat With A Consequence That The Action May Contribute To A Trend Towards Federal Listing Or Cause A Loss Of Viability To The Population or Species.
BI - Beneficial Impact
N/A - No Habitat or Species Present
***Trigger For A Significant Action As Defined in NEPA**
****Note: Rationale For Conclusion of Effect Is Contained In The NEPA Document.**
Form 2 (R-1/4/6-2670-95)

Non-native Invasive Plants

Introduction

The term invasive plant broadly encompasses all invasive aggressive or harmful non-indigenous plant species, including those designated as noxious weeds. Noxious weeds are those species of foreign origin, which have been listed by the Secretary of Agriculture or responsible state official, which can directly injure crops, or other interests of agriculture, fish and wildlife resources, or the public health. Some noxious weeds are toxic to wildlife, while others are simply unpalatable.

Regulatory Framework

Management of invasive plants is regulated by:

- The Federal Noxious Weed Act of 1974, as amended (7 U.S.C 2801 et seq.) requires cooperation with state, local, and other federal agencies in the application and enforcement of all laws and regulations relating to management and control of noxious weeds.
- U.S. Forest Service Manual 2080 directs the Forest Service to use an integrated weed management approach to control and contain the spread of invasive plants on National Forest System (NFS) lands and from NFS lands to adjacent lands.
- Executive Order 13112 (1999) directs federal agencies to reduce the spread of invasive plants. Invasive species have been identified by the current Chief of the Forest Service as one of the four threats to ecosystem health.
- In October 2004, the Chief of the Forest Service released a National Strategy and Implementation Plan for Invasive Plant Species Management – part of the President's Healthy Forest Initiative. It focuses on four key elements: preventing invasive species before they arrive; finding new infestations before they spread and become established; containing and reducing existing infestations; and rehabilitating and restoring native habitats and ecosystems.
- Invasive plant management direction contained in Land and Resource Management Plans of the Ochoco National Forest has been amended by the recently published *Pacific Northwest Region Invasive Plant Program – Preventing and Managing Invasive Plants* Record of Decision (USDA Forest Service, 2005). This site-specific FEIS follows new Standards and Guidelines as outlined in the regional document. The regional Record of Decision also

releases the USDA Forest Service from direction provided by the 1988 Environmental Impact Statement and 1988 Record of Decision for Competing and Unwanted Vegetation, and the associated 1989 Mediated Agreement for invasive plant management. The R6 2005 ROD added goals, objectives, and standards for invasive plant management by amending the Ochoco National Forests' LRMP.

- Treatment of noxious weeds and other invasive plants are authorized by the 2012 Ochoco and Deschutes National Forests Invasive Plant Treatments FSEIS. (USDA Forest Service 2012).
- Local prevention measures are outlined in the "Deschutes and Ochoco National Forests and Crooked River National Grassland Invasive Plant Prevention Practices" dated January 2006.

Analysis Methods

The existence, introduction, and spread of invasive plants are difficult to quantify and attribute specifically to any one vector on a landscape. As a result, this effects analysis will provide a mostly qualitative assessment of the alternatives on the risk potential for invasive plant spread as a function of off-road vehicles, and adjacency of known invasive plant populations. Off-road vehicles are a physical vector of invasive plant introduction and spread, and cause disturbance that creates a susceptible environment.

Invasive plant population, as used here, describes an invasive plant occurrence that can be as small as one plant, to as large as thousands of plants but are spatially separated from other occurrences. Most invasive plant infestations begin on disturbed areas, such as road shoulders, harvest landings, and recreation sites. The level of potential risk of invasive plants among the four alternatives is measured by:

- total mileage of motorized routes designated for this project
- route adjacency to areas infested with invasive plants

Assumptions used in the analysis:

- Project Design Criteria (PDCs) for invasive plants listed in Chapter 2 of the Ochoco Summit Trail System Project EIS would be implemented and enforced.
- Vehicles are a vector for the establishment and spread of invasive plants. The more miles that are open to motorized use, the greater the potential for invasive plant spread.
- All highways and open Forest Service roads would continue to receive motorized use by all types of vehicles, which is the same for all alternatives. The difference between alternatives is based on the number of trail miles proposed.
- All forms of motorized vehicles are lumped together in the analysis, regardless of class of vehicle. Trails are considered to be 10-feet wide, regardless of class of vehicle, to account for effects from microclimate changes, dust, vehicles passing, etc.
- As determined by the Travel Access Management decision, cross-country travel would not be permitted within the project area.
- A 2.5 to 5.6 percent yearly increase in the number of riders would occur for each of the action alternatives.

Existing Condition

As of July, 2015 there were 702 invasive plant populations encompassing approximately 3,305 acres within the project area. See Table 168 for a list of invasive plants present. These invasive plant sites

range from a handful of plants, acres of scattered individuals, to areas with complete invasive plant cover. Systematic invasive plant inventories have been completed in some areas through project botanical surveys; other informal inventories occur as Crook County Weed Control and Forest Service personnel travel throughout the project area.

Table 168. Invasive plant infestations within the Ochoco Summit project area.

Species	Common Name	Morphology	Number of Populations	Acres
Acroptilon repens	Russian knapweed	Perennial with adventitious shoots	3	0.9
Cardaria draba	Whitetop	Rhizomatous perennial	20	5.8
Carduus nutans	Musk thistle	Biennial / winter annual	2	0.7
Centaurea stoebe ssp. micranthos	Spotted knapweed	Short-lived perennial	114	479
Centaurea diffusa	Diffuse knapweed	Herbaceous annual to perennial	30	13.8
Centaurea solstitialis	Yellow starthistle	Herbaceous annual	5	20.5
Cirsium arvense	Canada thistle	Perennial with adventitious root buds	94	25.1
Convulvulis arvensis	Field bindweed	Herbaceous perennial	5	0.8
Cynoglossum officinale	Houndstongue	Herbaceous biennial or short-lived perennial	278	2446
Cytisus scoparius	Scotch broom	Woody perennial shrub	1	0.1
Dipsacus fullonum	Teasel	Herbaceous biennial	13	3.0
Euphorbia esula	Leafy spurge	Herbaceous perennial	1	0.25
Hypericum perforatum	St. John's-wort	Rhizomatous perennial	11	4.6
Leucanthimum vulgare	Oxeye daisy	Rhizomatous perennial	3	0.2
Linaria dalmatica	Dalmatian toadflax	Perennial with adventitious root buds	4	0.78
Linaria vulgaris	Yellow toadflax	Perennial with adventitious root buds	3	0.6
Onopordum acanthium	Scotch thistle	Herbaceous biennial	8	3.7
Potentilla recta	Sulfur cinquefoil	Herbaceous perennial	10	3.8
Salvia aethiopis	Mediterranean sage	Herbaceous biennial	11	5.9
Taeniatherum caput-medusae	Medusahead	Annual grass	86	290
Total			702	3,305

Table 168 does not include low priority species such as bull thistle, mullein, cheatgrass, ventenata, or other species that are not tracked in databases kept by the Forest due to abundance. Canada thistle is also under-represented in Table 168 because the Forest stopped keeping records on small populations due to abundance.

The morphology of invasive plants determines how a plant reacts to other control methods. Hand-pulling rhizomatous perennials such as whitetop and toadflax, is not effective, they are species that usually increase in density using manual control because new plants form from any root segments left in the soil after pulling the mature plant. Biennial plants can be reduced in density with diligent, twice-yearly manual pulling. Very small patches of medusahead can be controlled by diligent hand pulling throughout the growing season; however, most infestations are too large to effectively pull the vast numbers of this annual grass. Species such as spotted knapweed, Russian knapweed and toadflax are perennial plants that have deep root structures and usually do not respond to manual control.

Most of the invasive species sites within the project area are found along road corridors. From these points of initial infestation, invasive species species become opportunistic in invading suitable microhabitats adjacent to the initial infestation site. Exceptions to this include the Snowshoe area in the northwest corner of the project area, and Roba, which is located in the southeast. These two areas contain large infestations of houndstongue that has invaded riparian and forest habitats rather than roadsides. Most of the invasive species species within the project area thrive in open full sunlight on disturbed soils in which native species have been diminished or displaced (conditions commonly associated with roads). Most of the invasive species species listed in Table 168 are spread by vehicle traffic making road corridor invasive species sites of high concern. Medusahead and houndstongue are primarily spread by other means. These invasive speciess are extremely competitive, have rapid spread rates and are moved around by wind, and animals in addition to vehicles. Low priority invasive species species, such as Canada thistle and bull thistle, also readily establish where soil and plant associations have been disturbed. These species, however, are not highly persistent and populations usually decline as the tree canopy closes and/or with competition from seeded/native species.

An Environmental Impact Statement for the treatment of invasive plants was signed in May of 2012 (USDA Forest Service, 2012). This EIS approves chemical, manual, mechanical, biological and cultural treatment of many invasive plant populations. In addition, it provides procedures for an early detection/rapid response (EDRR) strategy and subsequent treatment of future invasive plant infestations. The Invasive Plant Treatments EIS outlines treatment prioritization and protocol that will standardize how invasive plant treatments within the Ochoco Summit OHV project area are conducted.

Direct and Indirect Effects – Alternative 1

All terrain vehicles can affect the project area in two ways, the new introduction of invasive plants by bringing seed in from elsewhere, and the spread of established infestations in the planning area by creating disturbance. Travel Management rules allow vehicle use and camping on most gravel and native surface roads. Exceptions include individual roads signed as closed to vehicle traffic, and areas such as Lookout Mountain Roadless Area. There are also seasonal closures of spur roads in the southern portion of the project area during fall and winter. OHV use in the east part of the project area is low, mostly local riders, with an increase during hunting season (personal observation, Farris-Lopez). The western part of the project area receives more OHV use, presumably because it is closer to Prineville. There are no designated OHV trails within the area to draw riders specifically for recreational trail riding, and no designated trails are proposed in this alternative. Therefore, the probability of increase in establishment and spread of invasive plants is equal to the current condition; vehicles would continue to be a vector of invasive plant spread. No new trails that would provide susceptible environment for invasive plant establishment, and there would be fewer OHVs to act as vectors of invasive plant spread.

The effects of the project on invasive plant introduction, establishment, and spread is indicated by the area of potential disturbance as measured in miles of designated roads and trails to be used for OHV routes within the project area. Table 169 indicates miles of potential disturbance by alternative and a description of effects in the sections following.

Table 169. Miles of designated trail, and number of gathering areas by alternative.

Alternative	1	2	3	4	5
Existing routes	0	46.4	13.8	53.2	40.4
Closed routes	0	43.2	29.4	61.1	11.9
Decommissioned routes	0	11.4	7.5	13.4	50.4

New routes	0	69.1	50.3	84.5	30.1
Total miles	**0**	***170.1***	***101***	***212.2***	*132.8*
Staging areas	0	10	4	10	4
Play areas	0	3	0	1	0
Parking areas	0	1	0	0	0
Trailheads	0	6	0	0	1
Total number of areas	***0***	***20***	***4***	***11***	***5***

OHV use would continue to occur under the No Action alternative. The resulting risk of invasive species introduction is moderate in the project area. OHVs brought to the project area that are not clean may harbor invasive species seed and plant parts that can introduce new infestations. OHVs can also run through existing invasive species infestations, further spreading the population by creating additional disturbance for a seed bed, or picking up seed and carrying it to another portion of the area. There are several areas open to cross country travel (such as rock pits) within the Ochoco Summit project area that have invasive species populations. These sites include Walton Lake Sno-Park, Crystal, Scotts Camp, Podo and Six Corners. OHV users that recreate in these areas are likely to cause new invasive species infestations in the project area.

No new trails would be designated or constructed within or adjacent to the Snowshoe or Roba areas. These areas have large populations of invasive speciess, primarily houndstongue, across the landscape. Less soil disturbance and fewer vehicles results in less risk of invasive species introduction and spread in this alternative.

Direct and Indirect Effects - Alternatives 2, 3, 4 and 5

There has been a dramatic increase in OHV use in Oregon over the last 20 years. A publication by Lindberg (2009) for Oregon State Parks reports that there were nearly 139,000 in-state permits given out in 2008 for OHVs. Central Oregon is the 4th most used region for recreational riding in the state, with 382,218 trip days (including riders from out-of-state it is 449,668 trip days). Designating a trail system within the Ochoco Summit project area would increase the OHV use. The increased use of OHVs within the project area would increase the introduction and spread of invasive plants for Alternatives 2, 3, 4, and 5.

Seeds from many species of invasive plants can be carried within the tread of tires or in cracks and crevices of motor vehicles and then become dislodged in other areas. A study done by Montana State University (Tayor & Mangold, 2011) determined that there is little difference in the number of seeds picked up by different vehicles. OHVs and passenger vehicles all collect the same number of seeds, and these seeds can remain attached to the vehicle after travelling 160 miles. It is then reasonable to assume that unwashed vehicles coming from other areas can bring new invasive plant species to the project area. When tires of motor vehicles displace topsoil and damage vegetation, the resulting bare soil becomes potential sites for invasive plant establishment. A Montana State University Extension Service Bulletin (MSU, 1992) explains that rapid dispersal of invasive plants is characteristic of motorized routes where “ORVs can quickly spread 2,000 knapweed seeds over a ten mile area.” Sheley, Olson, and Hoops (1998) state, “Protecting and conserving the surface soil are critical to the long-term sustainability of healthy, functioning ecosystems. In one study, runoff was 1.5 times higher and sediment yield was 3 times higher on spotted knapweed-dominated plots than on plots dominated by the native bluebunch wheatgrass. Loss of soil because of invasive plants may have very serious consequences in the future.” Healthy, functioning plant communities are critical for deterring the establishment of invasive plants.

Alternatives that propose more area open to motor vehicle travel and that have higher densities of designated routes, staging areas, trailheads and play areas pose a higher risk of invasive plant spread, introduction into new sites, and create greater challenges for detecting and controlling new invasive plant sites. Table 169 displays the planned miles of designated trails and OHV areas for the action

alternatives. Alternative 3 and 5 propose the fewest miles of trail (101 and 133 respectively) and the fewest number of gathering areas (5) somewhat lowering the risk of invasive plant introduction compared to Alternatives 2, 4. Alternative 3 also splits the use into two areas, without a designated connection between the two. In one of the two areas, the east side of the project area on the Paulina Ranger District, a motorcycle trail system would be designated where OHV use is currently low. This will increase the risk of invasive plant introduction substantially for that area. The above combination of factors gives Alternative 3 a high risk level for invasive plant establishment even though the Alternative proposes the least amount of trail miles.

Table 169 shows that Alternatives 2 and 4 would designate 170 miles and 212 miles of trail from Highway 26 across the Forest to Deep Creek Watershed on the Paulina Ranger District. Along with mileage differences for the two alternatives, there are also differences in the number of gathering areas. These are areas where use would be concentrated, and activities such as camping and play-riding for kids would take place. Anywhere that use is concentrated and various vehicle types are gathered, will increase the risk of invasive plant introduction. Alternative 4 proposes 11 different gathering areas compared to the 20 proposed for Alternative 2, which has fewer miles of trail designated. This is in response to one faction of public comments about the project, saying more miles of trail are needed, and fewer trailheads, parking, and playing areas. Alternatives 2, and 4 are similar in the percentage of closed, decommissioned, and new routes, 73%, and 75% respectively. These two alternatives would expose new bare ground and also recovered vegetation on closed and decommissioned roads resulting in a high risk for invasive plant establishment.

Project design criteria require that trail construction and maintenance equipment be cleaned of all dirt and plant parts before entering Forest Service lands. This requirement would reduce the risk of introducing a new invasive plant population. Another possible form of invasive plant introduction is through materials brought in to build trails (dirt, gravel, rock), or enhance trail difficulty. Enhancement often includes narrowing the trail or placing obstacles such as logs and boulders. A project design criterion requires materials to be weed free. This criterion is thought to be only moderately effective because some materials clean better than others. For example, boulders can be cleaned, while logs and fill material are much more difficult to guarantee to be weed free.

As stated above, the type of activity, intensity and location of associated disturbance, and proximity to a seed source will affect the probability or risk of introducing invasive plants. When ground and soil disturbance are likely to result in a measurable change from the existing condition, there is a high associated risk of introducing invasive plants. Location of the proposed trail system is also important to the risk potential and associated effects. OHV use on the east end of the project area on Paulina Ranger District is currently low. All alternatives propose trails circling the area surrounding Little Summit Prairie that was designated as a sensitive resource area by the Paulina District Ranger, and who recommended to prohibit off-road OHV use. This area contains important resource attributes including a major population center for Peck's mariposa lily, a Regional Forester's sensitive plant species; a high density of prehistoric archaeological sites; soils that have a high-risk for erosion; and one of the most interconnected habitats for redband trout, another Regional Forester's sensitive species. Although no trails are proposed directly within the Little Summit Prairie area, trail designation in close proximity, and increased use on all open roads would result in increased potential for invasive plant establishment and spread in an important resource area. This area, and others within the project boundary, is scab-stringer habitat, dominated by non-forested plant communities that have shallow clay soils. These areas have seen a dramatic increase in invasive winter annual grasses over the last six years (personal observation, Farris-Lopez). *Ventenata dubia* (North Africa grass) in particular has spread, along with cheatgrass and medusahead rye. Theories on reasons for the increase include distance to infested roads and trails and the nature of soil properties. These heavier textured soils do not support vegetation that provides shade, soil temperatures are higher and the high clay content provides ample winter moisture for early growth of invasive grasses, while native grasses

are still dormant (Riegel, pers. comm., 2010). The colonization of scablands with rare plant habitat may be responsible in part for the dramatic decline in *Achnatherum hendersonii* populations (Farris-Lopez, 2012). Increases in trail miles within or adjacent to scabland habitat is likely to increase the potential for spread of annual grasses.

Directly south of the Little Summit area is a very large infestation (Roba) of houndstongue scattered throughout 19,000 acres. This species is spread through "Velcro"-like hooks on the seed, and is readily transported by clothing, vehicles, and animals. It germinates readily anywhere a seed is dropped on bare soil, and OHV trails would be vulnerable to houndstongue establishment. There is also a large infestation of houndstongue on the west end (Snowshoe) of the project area adjacent to the trail system proposed near Ochoco Divide Research Natural Area. There is a high risk that houndstongue would be spread in this area as well.

Another element of risk that would have an effect on the potential for invasive plant spread is the proximity to existing invasive plant seed sources. Table 170 and Table 171 display the trails and gathering areas directly within invasive plant infestations. Overall overlap within invasive plant locations is low. There are three invasive plant infestations being crossed by trails, and 5 gathering areas within invasive plant sites. Invasive plant sites within the concentrated use areas (staging, etc.) have the most potential for spread throughout the trail system. The gathering areas would receive intense use and seed would be carried down the trails radiating out of the area. Alternatives 2 and 4 have the highest risk of spreading existing infestations as it has the highest number of trail/gathering/invasive plant overlap.

Table 170. Summary of proposed trails within invasive weed infestations.

Infestation		Alternative 2	Alternative 3	Alternative 4	Alternative 5
Houndstongue	#137	0.2 acres	0.2 acres	0.2 acres	0.2 acres
Houndstongue	#680				0.08 acres
Houndstongue	#682				0.06 acres
Canada thistle	#691	.03 acres	.03 acres	.03 acres	0.03 acres
Canada Thistle	#694	.007 acres	.007 acres	.007 acres	
Medusahead	#772				0.6 acres
Spotted knapweed	#784			0.42 acres	
Spotted knapweed	#828	0.2 acres		0.35 acres	
Houndstongue	#904	0.34 acres	0.15 acres	0.34 acres	0.09 acres
Houndstongue	#905	3.2 acres	2.8 acres	3.8 acres	1.8 acres
Houndstongue	#1125			0.04 acres	1.2 acres
Diffuse knapweed	#20453	0.05 acres	0.05 acres	0.05 acres	0.06 acres
Houndstongue	#20560	.02 acres	.02 acres	0.02 acres	
	Total	4 acres	3.2 acres	5.3 acres	3.2 acres

Table 171. Summary of proposed trails and gathering areas within invasive plant infestations.

Infestation		Alternative 2	Alternative 3	Alternative 4	Alternative 5
Diffuse knapweed	#453	Scotts Camp Trailhead			
Spotted knapweed	#785	Walton Lake staging area	Walton Lake staging area	Walton Lake staging area	Walton Lake staging area
Canada thistle	#691	Walton Lake staging area	Walton Lake staging area	Walton Lake staging area	Walton Lake staging area
Canada thistle	#692	Walton Lake staging area	Walton Lake staging area	Walton Lake staging area	Walton Lake staging area
Russian knapweed	#922	Walton Lake staging area	Walton Lake staging area	Walton Lake staging area	Walton Lake staging area

Spotted knapweed #197	Cottonwood Pit staging area	Cottonwood Pit staging area	Cottonwood Pit staging area	Cottonwood Pit staging area
Canada thistle #198	Cottonwood Pit staging area	Cottonwood Pit staging area	Cottonwood Pit staging area	Cottonwood Pit staging area
St. John's-wort #167	Staging area on FS road 42		Staging area on FS road 42	
Diffuse knapweed #206	Play area on FS road 30			

All action alternatives would result in an increase of invasive plants and other invasive plants across the project area. This in turn would result in additional expense for controlling invasive plants on the Forest. The nature of the proposal involves a constantly disturbed environment due to continued use of the trail system by vehicles coming from different parts of the state or country with a high probability of bringing in invasive plant seed and plant parts. In 2007 it was estimated that in Central Oregon as a whole, there were approximately 52,000 visitors using trail systems (Ramming, pers. comm., 2010). The North Millican OHV area had 9,985 riders in 2008, which has similar weather and predicted period of use as the Ochoco Summit proposed trail system. In the long-term, trail use is expected to increase by 2.5-5.6 percent per year (Skelton, pers. comm., 2010). Using the low end of estimated increase in the first half of the decade (due to the current recession), and using the high end on the second half of the decade, it is estimated there may be 15,000 riders using the Ochoco Summit trail system by 2020. Concentrated and increased of use of the area will result in a constant need to monitor the trail system for invasive plant presence, and an increased need for treatment. As the Forest does not currently have the ability to use herbicides as a treatment method for new sites, manual control would be used which is more labor intensive and more expensive. As costs increase, the ability to inventory and monitor the trail system decreases, which limits the ability to catch the infestations while small. Controlling small infestations of most species is less expensive and more effective. Current budgets are not sufficient for the Ochoco National Forest to control all known infestations; due to the high risk potential of invasive plant establishment on an OHV trail system, it is not unreasonable to expect that the proposed trail system would further jeopardize the Forest's ability to detect and control invasive plants in the long-term.

Summary

Alternative 1 (no trail system) would not increase the potential for invasive plant establishment. Alternatives 2, 3, 4 and 5 would increase the potential for invasive plant establishment. When ground and soil disturbance are likely, there is a high associated risk of introducing invasive plants and other invasive plants. All action alternatives result in a high risk, with differences due to magnitude. The two measures used to differentiate between alternatives (miles of trail/number of gathering areas, and adjacency to existing seed source) show that Alternative 3 and 5 have a somewhat reduced potential for invasive plant spread due to fewer miles of trail, fewer areas of concentrated vehicles in staging and parking, and less disturbance adjacent to existing invasive plant infestations. Alternative 4, proposes more miles of trail, and has a higher risk and potential for invasive plant spread along trails and roads than Alternative 2. However, Alternative 4 has fewer gathering areas than Alternative 2 (11 staging/parking/play areas versus 20) and these concentrated areas of use and collection of vehicles pose a greater potential for invasive plant spread. Alternative 4 has the highest potential for invasive plant introduction and spread and associated expense of treatment.

Cumulative Effects

Alternative 1 does not propose a trail network or disturbance, and as a result there are no cumulative effects. This alternative will not be carried further in the cumulative effects discussion. Cumulative effects are the same under Alternatives 2, 3, 4 and 5 with only the variance in the direct and indirect effects.

Past road construction and maintenance, grazing, timber harvest and other soil disturbance such as prescribed fire and wildfire have provided environments for invasive plant species establishment, vectors for invasive plant dispersal, and infestations of invasive plants as seed sources for spread. Past activities within the analysis area have resulted in moderate amounts of invasive plant infestations occupying 3,305 acres. Over 2,446 acres of this is houndstongue, which is difficult to control and easily spread by a number of vectors, including vehicles.

Cattle grazing occurs on most of the project area. Cattle can also spread invasive plants, particularly houndstongue which sticks to their hair. They can also transport seeds of many invasive species in their hooves. Implementation of the proposed OHV project would cumulatively increase the risk of introducing invasive plant infestations in off road areas by creating continual disturbance and bare ground susceptible to invasion.

The potential for invasive plant establishment and spread from passenger vehicles not associated with the project along open road corridors (including seasonally open roads) would continue. The potential for other vectors of spread within the project area including people, wind, or animals would also continue.

Specific on-going activities in the project area are similar to past actions including timber harvest, precommercial thinning, prescribed burning, grazing, OHV use, and other forms of recreation such as hiking, horseback riding, and camping, all of which introduce and spread invasive plants. Known sites are treated based on priority; effectiveness of the treatment depends on the species and control method – pulling or herbicide.

Several wildfires have occurred within the Ochoco Summit Trail System project area including the Hash Rock fire (2000), Maxwell fire (2006), Bailey Butte Fire (2014), and the Ochoco Complex Fire (2014). These wildfires consumed existing vegetation and led to increased bareground which was colonized by seeds from adjacent invasive plant populations, or from invasive plant seeds brought in on fire suppression vehicles, and equipment coming from outlying areas. The Bailey Butte fire of 2014 burned through large infestations of houndstongue overlapping the project and will undoubtedly lead to a rapid expansion into newly burned areas within the Ochoco Summit Trail System project area.

In addition to the current harvest activities (Canyon and Jackson timber sales) within the project area, adding 101 to 212 miles of designated OHV trail would result in cumulative impacts to native vegetation from invasive plants. OHV travel is allowed on designated routes within most areas of the Ochoco Summit Trail project area, and use is increasing. The proposed designated trail system is adjacent to several large houndstongue infestations. Based on the phenology and mechanism of spread of this particular invasive plant, there is a high risk that the trail system would cause additional disturbance that would provide an optimal seed bed for germination. Designating a trail system would increase the intensity and extent of use in an area susceptible to invasive plant invasion faster than use is occurring at present. The 2012 Invasive Plant Treatments EIS allows treatment of new or expanding invasive plant populations with a variety of control methods, including herbicide. If these populations are discovered early, while small and before they are fully established, effects to native vegetation would be minimized. However the amount of traffic and disturbance expected from increased use cannot be constantly monitored with current invasive plant funding, and is anticipated to result in expanding invasive plant populations regardless of the ability to treat using herbicide. Effective herbicide control would help reduce the extent and duration of effects of invasive plants on native vegetation. Herbicide is more effective on difficult to control species such as annual grasses and rhizomatous species, resulting in smaller infestations and lower plant densities. Herbicide treatment may result in scattered, patches of bare ground near or on the trail system, and would occur at the same time as the OHV use. There would be short-term (1-2 year) additions of bare ground

before the area is re-established with native vegetation. Herbicide treatments per se also add to the impacts where treatment of existing or spreading invasive plant populations overlap with actions proposed in this project as well as ongoing and reasonably foreseeable future actions. These effects are analyzed in detail in the Invasive Plant Treatments EIS (USDA Forest Service, 2012).

On-going and planned activities that have the potential to incrementally increase the risk of invasive plant introduction which overlap with the Ochoco Summit OHV project area are the Bailey Butte Fire Project, Walton Lake Restoration Project, Gap Landscape Restoration Project, and Black Mountain Vegetation Management Project. Approximately 20,000 to 30,000 acres of vegetation and fuels management are proposed for treatments including commercial thinning, small diameter thinning and prescribed burning. Of these activities, commercial harvest and fuels management (either burning or piling) would produce bare ground that is susceptible to invasive plant establishment, including species such as North Africa grass, medusahead and cheatgrass. Timber harvest may also require the construction of temporary roads to access units, and currently closed roads may be used for haul routes during timber harvest operations. Collectively, these actions would have a short-term (3-5 years) increase in susceptible area until bare ground is revegetated.

Implementation of the Travel Management Rule of 2005 became effective December 30, 2011. The Deschutes and Ochoco Travel Management Plan is currently in the enforcement stage; and under this forest-level travel management plan, motorized use will be restricted to designated OHV trail systems and those Level II roads open for passenger vehicle travel. Cross-county OHV travel is no longer be allowed within the project area. This will lessen the cumulative impacts of the Ochoco Summit trail system in two ways. It will make it illegal to create new trails modifying those proposed for Ochoco Summit. For example there would be less potential for riders to cut across the loop around Little Summit Prairie, a sensitive resource area, in order to shorten the ride. Prohibiting the ability for users to create their own trails will reduce disturbance to native vegetation, and reduce the amount of exposed soil, thus lowering the risk of creating a susceptible seed bed for invasive plant establishment. Implementing the Travel Rule will also concentrate OHVs as a vector of spread to areas designated in Alternatives 2, 3, 4 and 5. This will help limit the scale of risk to a known location, facilitating surveys and invasive plant control. It may however increase the intensity of use, more vehicles means more risk of invasive plant introduction and spread.

Special Plant Habitats

Introduction

Special plant habitats are areas which sustain unusual and/or particularly rich biological diversity. These habitats have a high probability of supporting rare species. All non-forest and riparian habitats are often treated as special habitats because they encompass such a small percentage of the land base in forested regions but have a disproportionate value in the conservation of biological diversity. For example, riparian areas where hardwood species are found usually constitute about 1-2% of the landbase on the Forest, yet riparian habitats are abundantly used for recreation such as camping, fishing and hiking. For this analysis, hardwoods, meadow, rock outcrops, shrub-scablands, and grasslands will be considered special habitats.

There is substantial overlap between special plant habitats, as described above, and sensitive plant habitats that support or have the potential to support sensitive plant species. The analysis in Section 1, Biological Evaluation for Threatened, Endangered, and Sensitive Plants, addresses the particular concerns and impacts of the proposed project in relation to sensitive plants and their associated habitats. This section considers the impacts of the proposed project on plant habitats from the broader perspective of the overall contribution of these habitats to biological diversity and desired native plant habitats. This includes sensitive plant species and non-sensitive plant species.

Regulatory Framework

The Forest and Rangeland Renewable Resources Planning Act of 1974, as amended by NFMA of 1976 requires National Forests to provide for the diversity of plant and animal communities. Forest Service direction for managing habitats for all existing native and desired non-native plants in order to maintain viable populations of species comes from Forest Service Manual 2600 (USFS 1995, WO Amendment 2600-95-7). Direction for Research Natural Areas is found in Forest Service Manual 4063.04b, which gives direction to manage and protect all RNAs and allow natural processes to occur for research and education.

The Ochoco National Forest Land and Resource Management Plan (LRMP) (USDA Forest Service, 1989) addresses some facets of special habitats and biological diversity, such as riparian areas, connective habitat, snags, old growth, RNAs, non-forest plant communities including scablands, and sensitive plant and animal species. This analysis will look at a subset of these as described in the introduction. The LRMP does not specifically identify a desired future condition for the biological diversity of plant species. It does address riparian areas, which provide important habitat for many sensitive species within the Project Area. The LRMP states that most of the riparian areas will be in excellent condition within 50 years, characterized by vigorous stands of forbs, grasses, and grass-like species on stable stream banks. It also addresses scablands, and recognizes them as fragile areas adversely affected by management activities.

Analysis Methods

Special Habitats large enough to be mapped in a spatial layer in GIS have been mapped forest-wide in polygons which are contained on a layer in the fish and wildlife layer file called SHAB. These areas were used as a map base for determining effects on special wildlife and plant habitats. Hardwoods, meadow, rock, shrub-scablands, and grasslands will be addressed as special habitats in this analysis. Hardwoods will include cottonwood, aspen, alder and willow communities. Meadows include dry, moist and wet meadows that have saturated soils for some of time during the year. Rock features are exposed rocks that are large enough to be mapped in GIS. Shrub-scablands include non-forested areas dominated by low and rigid sagebrush and Sandberg's bluegrass, with occasional mountain mahogany and western juniper. Unique grassland areas include those dominated by Sandberg's bluegrass and one-spike oatgrass. The Ochoco Divide Research Natural Area will be included in the discussion due to its special status and proximity to proposed trails. Effects of the proposal will be measured by acres/miles of special plant habitat impacted by proposed trails and gathering areas.

Effects of new trail construction and construction of trails on revegetated closed and decommissioned roads will be analyzed for short-term effects of 3-5 years. Use is expected to continue on all trails for the long term, >10 years.

Assumptions:

- Areas open to motorized recreation have a higher risk of impacting vegetation, including special plant habitats.
- All forms of motorized vehicles are lumped together in the analysis, regardless of class of vehicle.
- Areas that are seasonally closed were analyzed as open because there can be impacts to native plants and native plant habitats regardless of when the area is open. If the area is not 100% closed all year long, it is considered open.
- Trail impacts are considered to be 10-feet wide, regardless of class of vehicle, to account for effects from microclimate changes, dust, vehicles passing, etc.
- Calculated acres of hardwood communities are based on potential, and stands are not necessarily fully occupied by hardwood species at this time.

Existing Condition

The texture and pattern of biodiversity can be examined at many different scales, ranging from global to microscopic. At the landscape scale, the coarse scale of Plant Association Groups was used to calculate the amount of special habitat within the project area (see Table 172). This course scale using GIS can miss unusual small scale habitats such as an individual dead tree or root wad, which can provide habitat for rare species of fungi, bryophytes, and lichens. That fine scale of biological diversity will not be analyzed.

Hardwoods – This type is dominated mostly by quaking aspen (*Populus tremuloides*) stands. Black cottonwood (*Populus trichocarpa)*, mountain alder (*Alnus incana*), and willow (*Salix* species) make up a small amount of the acreage listed in Table 9. These deciduous hardwood trees and shrubs provide a variety of important ecological functions, diversification of landscape patterns, and habitat for many other species. Riparian communities made up of these species are extremely diverse in plant life since they initiate forest succession, and thus provide great structural diversity. Hydrologically, hardwoods provide excellent stability to stream banks and soil surfaces. Their deep and spreading root systems can resist flood pressures and slow water velocity. They provide shade to help maintain stream temperatures, and abundant leaf shedding in the fall increases soil fertility.

Aspen and cottonwood are short-lived, early seral species that rely on disturbance for establishment. Black cottonwood has been declining due to conversion of floodplain vegetation to agricultural uses, changes in stream systems (confining streams into a single channel), over browsing by livestock, elk and deer, and conifer encroachment. Quaking aspen, alder and willow are declining as the result of conifer encroachment and increasing density, over browsing by livestock, deer and elk, and loss of habitat where the water table as dropped due to stream downcutting.

Meadows (wet, moist and dry) – Meadow communities are found in areas where ground water is higher than that found on the surrounding upland sites, such as a spring. They can also include perched water table areas within stream communities. Meadows communities include moist meadows, where moisture is available in the rooting-zone during the growing season, but drops 1-3 feet in the fall, and wet meadows, where available water is at or near the surface all season long. Dry meadows have no standing water and dry out completely in the summer.

Rock – these are areas of exposed surface rock (pavement), outcrops, or boulders. Dry rock habitats occur when plants establish themselves in soil deposited between rocks. Many plants found here are also found in dry forest and even moist forest habitats; however, some plants occur only when a dry rock habitat receives ample moisture in the spring before drying up in summer. Lichen, mosses, ferns, currently are often found here. This plant habitat is unique, including ephemeral meadows formed by filling of rock pools, and "hanging" clumps of vegetation developed in soil that accumulates in stepped, pocket-like depressions along outcrops and boulder fields.

Shrub-scabland – These non-forested habitats have rocky, shallow soils and are commonly found on topographically high sites such as ridges. Dominated by scattered sagebrush, bunchgrasses, and forbs, these sites are particularly exposed to summer heat and dryness, winter cold, and spring frost-heaving. Occasional species include mountain mahogany and juniper. Scablands are recognized as among the most fragile ecosystems on the Ochoco National Forest. Damage to the soil and vegetation as a result of management activities is nearly impossible to mitigate. Revegetation is nearly impossible due to water saturation and frost heaving (USDA Forest Service, 1989).

Grassland – These are also scabland habitats, but are even drier and have shallower soils than shrub-scabland described above, and have the highest combined surface rock, pavement, bare ground percentage (63%) of any grassland in the Blue and Ochoco Mountains (Johnson & Clausnitzer, 1991). This habitat is dominated by Sandberg's bluegrass and one-spike oatgrass. Forbs include low pussytoes, yarrow and bisquitroots.

Table 172. Acres of special habitat within the Ochoco Summit project area.

Special Habitats	Acres	Percent of total area
Hardwood	2,046	0.7
Meadows	8,705	3
Rock	1,668	0.6
Shrub-scabland	41,296	14
Grassland	5,897	2

Biological soil crust is present in scabland and grassland habitat where there are significant areas of open space between vegetative clumps that are exposed to the elements. Erosion in these areas is controlled by pebbles and communities of nonvascular or cryptogamic plants that grow upon or immediately beneath the soil surface. Where established and undisturbed, the cryptogams form a recognizable crust. These plants, made up of algae, lichens and mosses play an important role in soil stabilization (Belnap et al., 2001). This crust is a unique feature to semi-arid conditions within scabland habitat.

Research Natural Areas - (RNAs) are part of a national network of ecological areas designated in perpetuity for research and education and/or to maintain biological diversity on National Forest System lands (Forest Service Manual 4063). RNAs are managed such that natural physical or biological processes are allowed to prevail without human intervention. According to FSM 4063.3, standards, management of an RNA must support and promote the basic objectives and purposes of establishing the area.

Overall objectives for RNAs are to maintain a wide spectrum of high quality representative areas of the major forms of variability found in forest, shrublands, grasslands, alpine, and natural situations, to preserve and maintain genetic diversity, and to protect against human-caused environmental disruptions. Each RNA contains representative or unique natural features in a relatively undisturbed condition. The designation of these areas provides long-term protection and recognition of their natural values for research and baseline ecological study, observation, and conservation of biological diversity. The Ochoco Divide RNA is present within the project area and was chosen to represent the ponderosa pine-Douglas fir and grand fir-western larch-Douglas fir plant associations.

There would be no change to the management of RNAs, regardless of the chosen alternative. These areas are not open for motorized travel off of designated routes nor motorized access to dispersed camping. It is included in the analysis due to the proximity of the proposed trail system and invasive plant populations.

Direct and Indirect Effects – Alternative 1

Alternative 1 is the No Action Alternative; no trail system would be designated, and no staging or associated camping areas would be developed. The current management policy is that many roads within the project area are open to travel by motorized vehicles, however cross-country travel is prohibited except in selected areas designated as open under the 2011 Travel Management Plan as displayed on the Motor Vehicle Use Maps (MVUM). This policy would remain in effect in this alternative. Areas not open to motorized use includes Ochoco Divide RNA, Bridge Creek Wilderness, and Lookout Mountain Roadless Area. There are many miles of user-created trails which were established during prior to implemention of the 2011 Travel Management Plan when cross-country travel was allowed. Though use of unauthorized routes (closed roads not on MVUM) is no longer legal, some use still occurs on some of these routes. There are 659 miles of roads that are legal for mixed use by off highway vehicles (OHVs). Most of the OHV use in the project area occurs on roads (personal observation, Mafera 2012), where the disturbance to native vegetation from the construction of the road is a past action. There are some areas where user-created trails have increased over the past decade, especially on the west side of the planning area closest to Prineville. The amount of both on and off road use is expected to continue as the popularity of OHV use continues to increase and

the population of Prineville and the surrounding area continues to increase. Even though OHV use is expected to increase, the effects under Alternative 1 are minor, because the roads open for travel are already established, and no new disturbance would take place as a result of this alternative. Minor effects from dust would affect plants along the roadsides (see the effects section below for more detail).

General Effects Common to all Action Alternatives

Direct impacts on vegetation caused by vehicles include crushing of foliage, root systems, and seedlings (Wilshire et al., 1978). Plant foliage and stems can be damaged and plants uprooted by vehicles, so that actual plant damage may occur over an area much larger than the track width. Indirect effects of vehicles on vegetation may include undercutting of root systems as vehicle paths are enlarged by erosion (Wilshire, Shipley, & Nakata, 1978). Secondary effects from disturbance include the proliferation of exotic plant species and a higher frequency of fire (Lovich & Bainbridge, 1999). Effects of these impacts include alteration or destruction of macro- and micro-vegetation elements, establishment of annual plant communities dominated by exotic species, destruction of soil stabilizers, soil compaction, and increased erosion.

Indirect effects can be invasion by invasive plants into disturbed areas which then compete with native plants. In general, grasslands, riparian areas, and relatively dry, open forests are more susceptible to invasion than are dense moist forests and high montane areas (USDA Forest Service 2005, p. 3-40). The former have frequent gaps in plant cover, which favor invasive plant establishment, whereas the latter have relatively closed plant cover or have extreme climate or soils, which are tolerated by fewer invasive plant species. Invasive plants tend to colonize disturbed ground along roads, highways, along trails, and in campgrounds and quarries. Once established, invasive plants begin to spread, displacing native vegetation. Eastside forests are more susceptible to some invasive plant species for the above reasons.

Motorized use, especially concentrated and repeated use, can degrade native plant habitats by denuding areas of understory vegetation and compacting soils. Of particular concern are special habitats, those which sustain unusual and/or particularly rich biological diversity. People are drawn to unique places such as aspen stands, meadows, and rock outcrops; scablands often provide vistas due to their ridgetop location. Visiting these areas by motor vehicle can have a lasting impact to areas of fragile soils, including damage to biological soil crust. When soils are severely disturbed, vegetation cover can be reduced significantly and plant growth can be impaired (reviewed in Ouren et al., 2007). Davidson and Fox (1974) reported significant loss of herbaceous vegetation from motorcycle activity. Bolling and Walker (2000) reported that track roads had significantly lower total vegetative cover than control areas. Total plant density and cover were significantly lower in roads than in controls in the Mojave Desert, and long-lived plant species were greatly reduced in disturbed areas compared to controls (Prose et al., 1987).

Several special habitats are particularly susceptible to invasion of non-native annual grasses (medusahead, cheatgrass, and North Africa grass) including the dry meadows, shrub-scabland and grassland habitats.

Direct and Indirect Effects - Alternatives 2, 3, 4 and 5

The Ochoco Summit project proposes a designated trail system, and accompanying trailheads, campgrounds, staging areas, parking areas and play areas (herein called gathering areas). Alternatives differ in the number of miles, trail location, and number of and development of gathering areas. Effects to sensitive areas are similar between alternatives, varying by magnitude of interaction.

The action alternatives are expected to increase off-highway vehicle use, increase number of riders, and provide associated facilities that would impact special habitats.

Relatively low recreational traffic intensities cause a significant drop in plant cover, plant height, species richness and species diversity, leading to an increase in soil compaction and a decrease in soil organic matter and moisture content (reviewed in Kutiel et al. 2000). Kutiel et al. (2000) studied the response of soil and annual plants to various intensities of short-duration pedestrian and motorcycle traffic, and found that motorcycle passage had an immediate detrimental impact on annual plants at all traffic intensities.

Table 173 displays the number of trail miles and converted acres (at 10' width of disturbance) within special habitats mapped on the SHAB (special habitat) layer for the Ochoco National Forest.

Table 173. Acres (assuming 10' zone of influence) and miles of proposed trails located within special habitats (not on existing roads).

Alternative	1	2	3	4	5
Hardwood	0 acres 0 miles	0.59 acres 0.49 miles	0.59 acres 0.49 miles	0.59 acres 0.49 miles	0.40 acres 0.33 miles
Meadows	0 acres 0 miles	1.52 acres 1.25 miles	2.19 acres 1.81miles	2.90 acres 2.39 miles	1.42 acres 1.17 miles
Rock	0 acres 0 miles	0.99 acres 0.82 miles	0.73 acres 0.6 miles	1.08 acres 0.89 miles	0.82 acres 0.68 miles
Shrub-scabland	0 acres 0 miles	21.33 acres 17.6 miles	7.82 acres 6.45 miles	26.34 acres 21.73 miles	16.18 acres 13.35 miles
Grassland	0 acres 0 miles	5.56 acres 4.59 miles	3.64 acres 3.0 miles	4.70 acres 3.88 miles	3.58 acres 2.95 miles
Total	0 acres 0 miles	30.0 acres 24.75 miles	14.97 acres 12.35 miles	35.61acres 29.38 miles	22.4 acres 18.48 mi

In addition to the planned trails, the facilities to support the trail network would also occur within special habitats. Table 174 shows the number of gathering areas (staging, playing, trailheads, etc) planned for each alternative. Most of the planned facilities fall within or adjacent to mapped special habitat (primarily rock or scabland) as listed below.

- Alternative 2 - 17 out of 20 areas within or adjacent to special habitat
- Alternative 3 - 3 of 4 areas within or adjacent to special habitat
- Alternative 4 - 9 of 11 areas within or adjacent to special habitat
- Alternative 5 - 4 of 5 areas within or adjacent to special habitat

Some of these locations are on large, already-disturbed and/or developed sites, such as Ochoco Divide and Walton Snoparks, and mineral material sources (rock pits) such as Thornton, Six Corners, Aspen, Road 600, Scott's Camp, Walton Lake, Ahalt and Scott's material sources (refer to Table 174). Some of these areas are aggregated within a single site, for example Ahalt Pit is associated with three areas in Alternative 2 (staging, play and parking) and two areas in Alternative 4 (staging and play). Similarly Aspen Pit is associated with three areas in Alternative 2 (staging and two play areas). It is noteworthy that the majority of the staging areas, play areas and trailheads associated with mineral material sources are already highly disturbed and open to motorized use under the existing Travel Management Plan as displayed on the Motor Vehicle Use Maps (MVUM). Refer to the Cumulative Effects Section below. In these existing disturbed or developed areas effects would be negligible. Other sites would have impacts as developed recreation facilities are added. Impacts to special habitat may come from unauthorized riding from these points, where use can radiate out in many directions if not properly designed, marked and enforced (see Figure 19). Matchett and others (2004) point out that OHV use may be heaviest on slopes, along right-of-ways, in washes, and in the vicinity of camping facilities.

Table 174. Number of gathering areas within special habitat.

Alternative	1	2	3	4	5
Staging areas	0	10	3	9	3
Play areas	0	3	0	1	0
Parking areas	0	1	0	0	0
Trailheads	0	3	0	0	1
Total number of areas	*0*	*17 (10 associated with rock pits)*	*3 (2 associated with rock pits)*	*10 6 associated with rock pits)*	*4 (2 associated with rockpits)*

The effect of trails on hardwood communities appears low, 0.6 acres for alternatives 2, 3 and 4 and 0.4 acres for alternative 5; however the pattern and location of the trails may have an effect beyond direct overlap with hardwoods. There are ten mapped black cottonwood stands within the 300,000+ acre project area. This project proposes trails within or directly adjacent to three of them, including one that would have new trail built through it. For example, Alternative 5 proposes to build 0.04 miles of new 48 inch wide trail within mapped cottonwood (SHAB), while 0.07 miles of trail would be on existing open roads in cottonwood under that alternative. The net impact would be from placement of approximately 0.11 mile of trail designation within cottonwood, of which the majority would be on existing open road under Alternative 5. The other action alternatives also propose 0.04 miles of new 48" wide trail in cottonwood and alternatives 2 and 4 propose 0.02 miles of designated class II vehicle route on existing open roads in cottonwood. The net result is that alternatives 2, 3, and 4 all propose less than 0.1 mile of trail in cottonwood, one third of which is on existing open roads. Alternatives 2, 3 and 4 would designate 0.15 miles of trail in mapped aspen, most of which would be on existing closed or decommissioned roads (0.04 miles of new construction) and all routes would be 48" wide or less. Alternative 5 proposes to designate 0.11 miles of trail in aspen with 0.04 miles of that being new construction. Hardwood communities provide aesthetic enjoyment to humans, and aspen and cottonwood stands are particularly important to biological diversity. They provide important foraging, nesting, breeding, and resting sites for a wide variety of birds and mammals. In addition to the effects on vegetation within hardwood stands, noise may be a factor effecting wildlife (see the EIS Chapter 3 wildlife section). The network of trails shown in Figure 20 shows the adjacency to the many aspen stands in the west end of the planning area.

Effects to rock habitat would be low; regardless of the Alternative, less than two acres would be impacted by trails or gathering areas (0.1% of the rock in the project area). New trail (a subset of the trail miles displayed in Table 173) proposed through rock habitat include 0.47 miles, 0.25 miles, 0.53 miles and 0.37 for Alternatives 2, 3, 4and 5 respectively. The fractured basalt in the project area does not provide the large boulders desired by jeeps for "rock crawls". Trails would however, be designed to go through rock habitat to provide roughness and difficulty. Many of the rock areas in project area are cliffs and rimrock, which have stepped, "hanging" vegetation would not be impacted.

Meadow and scabland soil and vegetation are vulnerable to disturbance by vehicles. Driving through these areas, on native substrate, especially when wet leads to rutting and soil compaction. Natural recovery rates following disturbance depend on the nature and severity of the impact but are generally very slow. Recovery to pre-disturbance plant cover and biomass may take 50-300 years, while complete ecosystem recovery may require over 3,000 years (Lovich and Bainbridge 1999). Table 173 shows that proposed routes that are not on existing open roads impact about 1.5 acres, 2.2 acres, 2.9 acres or 1.4 acres in Alternatives 2, 3, 4, and 5 respectively. This represents less than 1/10 of 1 percent of the 8,705 acres present in the project area for each action alternative. Within meadows, roughly half of the trail miles not on existing open roads would occur on previously closed or decommissioned roads, where impact to soils and vegetation have already occurred, especially soil compaction; however recovered vegetation would be impacted. Meadows are also open areas, where keeping traffic on the trail may be more difficult to enforce. New trails would be built through or adjacent to meadows as follows: 0.6 miles, 0.9 miles, 1.1 miles, and 0.7 miles in Alternatives 2, 3, 4, and 5 respectively. Effects to meadows would be long-term, but small in magnitude.

Scabland soils (both shrub-scabland and grassland special habitats) are fragile ecosystems where damage is nearly impossible to mitigate (USDA Forest Service, 1989). The Ochoco National Forest LRMP states that the transportation system in scablands will be limited to long-term roads because of the inability to restore the impact of the road. Once a trail is constructed through the scabland or grassland, the effect is permanent. Design criteria (see EIS Chapter 2) meant to limit resource damage, such as closing trails if erosion or soil displacement is occurring, have little effect in this situation due to length of recovery period for scabland soil and vegetation. Belnap (1995) discuss how desert soils may recover slowly from surface disturbances, resulting in increased vulnerability to desertification. As a result, recovery from compaction and decreased soil stability is estimated to take several hundred years. The nitrogen fixation capability of soil requires at least 50 years to recover (Belnap 1995). For this reason careful design and construction (such as erosion prevention surfacing) and routine monitoring and maintenance will be critical to prevent erosion and loss of stability in these areas.

Combining shrub-scabland and grassland special habitats as having similar vegetation and soils, Table 173 shows that there are 22.2 miles of trail proposed in Alternative 2; 9.5 miles in Alternative 3; 25.6 miles in Alternative 4; and 16.3 miles in Alternative 5 (other than on existing open roads). Off-road vehicle activity has been shown to greatly increase soil compaction in areas of intense traffic (Adams et al., 1982). Soil characteristics, particularly soil compaction, play important roles in the distribution, abundance, growth rate, reproduction, and size of plants. Even a few passes by vehicles can cause significant changes in soil properties (Ouren et al., 2007). Adams et al. (1982) found reduced cover of desert annuals in tracks created by as few as one (on wet loamy sand) to 20 (on dry loamy sand) vehicle passes; the reduction in cover, however, was not due to fewer plants, but to smaller plant sizes. With tracks made by 1, 3, 10, and 20 vehicle passes, Adams et al. (1982) found that annuals with large taproots decreased, whereas there was significantly greater cover of a non-native, fibrous-rooted grass. The fibrous root system allows for easier germination and root growth than large-taprooted species. Overall, the extent of immediate effects increases with the frequency of OHV passes. For example, Webb (1982; reviewed in Ouren et al., 2007) found that after a single pass, annual plants on an OHV route remained intact, but most were destroyed after 10 passes. On the majority of the existing open roads reduction in vegetative cover and soil compaction is already evident. This situation would continue to be the case on open roads regardless of designation as a trail route under this project. None the less, traffic volume and the number of passes are anticipated to be higher once a route becomes designated, so the effect would be perpetuated on 10.4 miles, 4.2 miles, 9.5 miles and 7.3 miles of existing open roads on grassland or shrub/scabland SHABs under Alternatives 2, 3, 4 and 5 respectively.

In addition to effects to soil and herbaceous vegetation, biological soil crust is impacted by OHV use. Maintaining soil stability and normal water and nutrient cycles in desert systems is critical to avoiding desertification (Belnap 1995). Soil compaction and disruption of biological soil crusts can result in decreased water availability to vascular plants through decreased water infiltration (Belnap 1995). Biological soil crusts are a complex mosaic of cyanobacteria, green algae, lichens, mosses, microfungi, and other bacteria. In rangelands, they function as living mulch by retaining soil moisture and discouraging annual weed growth (Belnap et al., 2001). Biological crusts are an important component of desert ecosystems, as they influence soil stability and fertility (Belnap, 2002).

Once disturbed, natural recovery rates were found to be very slow (Belnap, 1993). Recovery of biological soil crusts can be hampered by large amounts of moving sediment, and re-establishment can be extremely difficult in some areas. The rate of recovery for some components of biological soil crusts were significantly hastened on areas inoculated with surrounding biological crust material, however, lichen and moss recovery was minimal.

Belnap et al. (2001) also discuss how invasive plants affect biological soil crusts by reducing the diversity of native vascular plants. The risk of invasive plants spread by the project is high (see Section 3, Invasive Plant Evaluation and Risk Assessment). The vertical and horizontal vascular plant structure of many arid and semi-arid vegetation communities optimizes growth of biological soil crusts. Vascular plants create windbreaks and shade, influencing how much moisture and light reach the soil surface. They also trap leaf litter, keeping the interspaces free of substantial or persistent litter cover. Invasive exotic plants generally decrease the structural diversity of native vascular plant communities by creating monocultures of densely spaced plants and by homogenizing litter distribution. They also lead to decreased biological crust cover and species richness in most ecosystems.

Invasion of exotic annual plants into perennial plant communities can pose a long-term threat to biological soil crusts, as the crust-dominated interspace between perennial plants is often heavily invaded. Because biological crusts stabilize soils, germination of seeds of exotic species can be inhibited in sites with well-developed crusts and low plant litter, as has been demonstrated for the annual exotic grass, cheatgrass (*Bromus tectorum*) (Belnap et al., 2001). Kaltnecker, Wicklow-Howard, and Pellant (1999) found that areas with intact biological soil crust cover maintain low cheatgrass densities despite abundant seed sources nearby. In contrast, native species that have evolved with biological soil crusts may have mechanisms, such as a geniculate awn that drills the seed into the soil. Shrub-scabland and grasslands within the project area are experiencing a recent increase in the density of invasive grasses, including cheatgrass, North Africa grass, and medusahead rye.

Effects to shrub-scabland and grassland habitat, including biological soil crust, would be long-term to permanent, but small in magnitude, with the most potential impact occurring near gathering areas. Acreage-wise there would be little scabland area affected, 21.3 acres, 7.8 acres 26.3 acres and 16.2 acres respectively for Alternatives 2, 3, 4 and 5 associated with route miles not on existing open roads. In addition, staging areas may impact up to 5 acres of grassland or shrub-scabland SHABs at each site, while Trailheads may impact up to 1 acre per site. As noted above play areas and a parking area are aggregated within a single site with two staging areas under Alternatives 2 and 4. The net result is that proposed OHV areas in support of proposed trail networks could impact up to 25 acres at five staging areas and up to 3 acres at three trailheads (Alternative 2); up to 5 acres at one staging area (Alternative 3); up to 15 acres at three staging areas (Alternative 4); or up to 5 acres at one staging area and 1 acre at one trailhead (Alternative 5) in or adjacent to shrub-scabland or grassland SHABs. The combined potential impact (trails and areas) to shrub-scabland and grassland SHABs is 49.3 acres, 12.8 acres 41.3 acres and 22.2 acres for Alternatives 2, 3, 4 and 5 repectively. These potentially impacted acres represent 1/10 of one percent or less of the 47,193 acres present within the project area under all action alternatives.

Research Natural Area

The Ochoco Divide RNA is within the project boundary; no trails are proposed with the RNA itself. Direct effects to vegetation within the RNA are not expected. The risk of indirect effects from invasive plants is expected to increase as a result of the project. Alternative 3 proposes ¾ mile of new trail along the south RNA boundary, which is also directly adjacent to a houndstongue population. There are already houndstongue infestations within the RNA in the southeast corner, and all along the northern boundary. For all alternatives, OHV traffic out of the Ochoco Divide Snopark staging area may increase the risk of spreading the northern populations into the RNA from use of the 26-600 road system.

Cumulative Effects

Alternative 1 does not propose building and designating trails or other disturbance within special plant habitats, and as a result there are no cumulative effects. This alternative will not be carried

further in the cumulative effects discussion. Cumulative effects are the same under Alternatives 2, 3, 4 and 5 with only the variance in the direct and indirect effects described above.

Past road construction and maintenance, mineral extraction, grazing, timber harvest and other disturbance have impacted special habitats. There are also many miles of user-created trails within the project area as a result of past use by recreationists as well as woodcutters, hunters, antler hunters and other forest visitors and permittees. Hardwood communities have decreased in stand size and health, and have become fragmented, due to lowered water tables, herbivory and conifer encroachment. Moisture regimes in meadows have been altered by grazing and road construction. Dry meadows are becoming smaller due to conifer encroachment as a result of fire suppression. Shrub-scabland and grassland plant communities have been altered by invasive plants and succession as a result of fire suppression.

On-going activities, will continue across the project area. Specific on-going activities in the project area are similar to past actions including timber harvest, precommercial thinning, prescribed burning, road maintenance, grazing and recreation such as hiking, horseback riding, mountain biking, OHV riding, hunting and camping, all of which can impact special plant habitat. Some of these actions have positive impacts, such as conifer removal within aspen stands, and removal of encroaching juniper in shrub-scablands. Observations of current OHV use in the project area show that some OHVs are damaging special habitat. Observations such as ruts in meadows, and hill-climbs on scabland habitat are not uncommon. OHV use in the spring is especially damaging to the soft soil in meadows and scablands. This damage is not limited to OHVs. Passenger vehicles also engage in “mud bogging” as a form of recreation, and some ruts in meadows are the result of highway legal vehicles accessing camping sites, especially during spring turkey hunting season and fall big game hunting seasons that occur during wet weather or while soils are wet.

A December 2011 Forest-wide Travel Management Plan decision, closed the Ochoco National Forest to cross country travel except on designated routes or in designated areas. With implementation of the forest-level Travel Management Plan acres of disturbed habitat would be limited to only those roads, areas and motorized trails that are designated as open to the public for motorized use. The areas included in proposed alternatives that are currently designated as open to cross-country motor vehicle use include: Thornton (Cottonwood Pit CG), Six Corners, Aspen, Scott’s Camp, Walton Lake and Ahalt mineral sources. The first three listed are open seasonally, while the last 3 are open year-round. All of the proposed staging areas and trailheads are also currently open to dispersed camping within 300 of open roads under the current Travel Management Plan as shown on MVUM. Under this project unauthorized routes would be closed under the restore/rehab component of this project. Additional road closures proposed in a variety of Vegetation and Fuels Management Projects would combine with this project and the Travel Management Plan so that disturbance would be reduced overall. This would cumulatively lessen the overall impact on SHABS within the Ochoco Summit Trail System Project area in several ways. It results in making it illegal to create new trails within the OHV Management Area; it focuses motorized use in appropriate and designated areas; it clearly defines what is acceptable and what is not; it reduces the overall mileage of routes physically open especially in sensitive habitats; and would increase education and enforcement of the Travel Management Plan. For example there would be less potential for riders to cut across the loop around Little Summit Prairie, a sensitive resource area, in order to shorten the ride. Prohibiting the ability for users to create their own trails would reduce disturbance to native vegetation, and reduce the amount of exposed soil, thus lowering the risk of creating a susceptible seed bed for weed establishment. Implementing the Travel Rule, physically enforcing existing closures and closures planned under the Vegetation and Fuels Management Projects described above, while developing a designated, designed, monitored, maintained and enforced OHV trail network would also concentrate OHV uses as a vector of spread to a more confined area. This would help limit the scale of risk to a known

location, facilitating surveys, monitoring and weed control. It may however increase the intensity of use within the designated area. More vehicles could mean more risk of weed introduction and spread.

On-going and future actions that have the potential to incrementally increase the risk of weed introduction within the Ochoco Summit Trail System project area are the Spears, Canyon, Howard Elliot Johnson, Jackson, Gap, Wolf and Black Mountain Vegetation Management EISs. Commercial harvest and fuels management (either burning or piling) would produce bare ground that is susceptible to invasive plant establishment, including species such as North Africa grass, medusahead and cheatgrass. Timber harvest may also require the construction of temporary roads to access units, and currently closed roads may be used for haul routes during timber harvest operations. Additionally the Bailey Butte Fire of 2014 and associated fire suppression and rehab efforts resulted in areas of bare soil conditions within a portion of the analysis area, particularly in moderate to high severity areas of the fire and within tractor firelines. Collectively, these actions would have a short-term (3-5 years) increase in susceptible area until bare ground is revegetated.

In combination with the current activities within the project area, adding 101 to 212 miles of designated OHV trail (88 to 158 miles of trail not on open roads) would result in small scale cumulative impacts to some special habitats, including meadows, shrub-scabland and grassland.

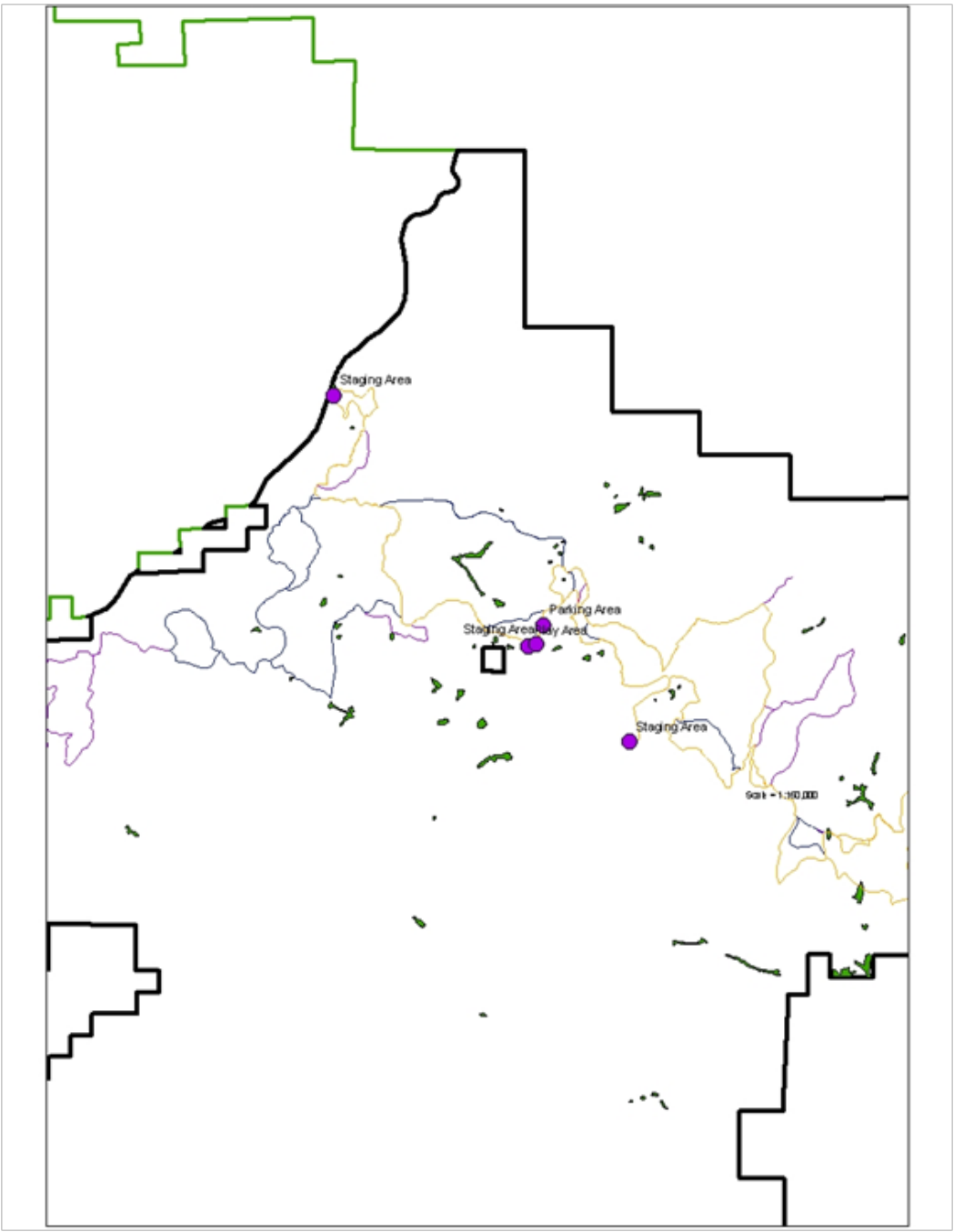
- Hardwood plant communities are not expected to be cumulatively impacted by the proposed trail project. This is because the scope and scale of impact is negligible at the landscape scale. Trail impacts are less than 1 acre for all alternatives (Table 173) and only one staging area occurs in proximity to aspen (Ochoco Divide Snopark). That staging area is already developed with paved access road and parking area with a vault toilet. There would be no additional construction within the aspen stand, so the only effect from designation would be increased volume and season of use in the existing developed area adjacent to the aspen stand.
- The effects of the project on rock habitat is largely associated with designated routes and areas occurring at mineral material sources (Ahalt, Scott's, Scott's Camp and Walton) 16 acres at most from Alternatives 2 and 4. Designation under this project would result in slight increase in use as these sites, three of which are already open to cross-country motorized travel and dispersed camping under the Current Travel Management Plan. Trail impacts to rock SHABs amount to 1.1 acres or less for the action alternatives (Table 173). In combination, 17 acres of impact to rock SHAB represents about 1/10th of one percent of the rock habitat within the project area, thus cumulative impacts would be negligible at the landscape scale.
- Trails through meadows, grassland and shrub-scabland would increase soil compaction, damage biological soil crust, and affect native plants as described under the Alternatives. However, due to the narrow linear nature of these trails, the amount of area affected is small. These habitats are very open, and there is a risk of people travelling off the designated trail, potentially increasing the amount of special habitat affected. Though the legal season of use would exclude the spring turkey hunting season and the rifle big game hunting seasons, there would be overlap with the big game archery season. Therefore there is increased risk of off-trail impacts as a result of existing use of the area during archery season.
- A risk of cumulative impacts to special habitats comes from the increase and spread of invasive plants. The proposed designated trail system is adjacent to several large houndstongue infestations. This area was also affected by the Bailey Butte Fire. Based on the phenology and mechanism of spread of this particular weed, there is a high risk that the trail system would cause additional disturbance that would provide an optimal seed bed for germination in addition to areas burned at moderate to high severity during the Bailey Butte Fire. Designating a trail system would increase the intensity and extent of use in an area that

is already susceptible to weed invasion. The Forest does have the ability to control invasive plants using a variety of methods, including herbicides, and houndstongue treatments and monitoring are occurring within the Bailey Butte Fire area. This project has potential to increase use and potentially weed seed sources, factors which have potential to increase the amount of treatment necessary and associated costs. These factors combine to cumulatively result in increased risk of introduction or spread of invasive plant populations.

Resource Protection Measures

Project design includes measures to allow adjustment during layout of trail system to avoid sensitive plant populations and non-native invasive plant sites currently known or that may be discovered during layout. Mitigation measures such as avoiding sensitive plant or weed sites, or monitoring followed by weed controls would be implemented (refer to resource protection measures in Chapter 2 of this EIS). Specific areas of concern include:

- Nature Cr. - avoid hound's-tongue infestations.
- Deep Cr. – avoid Scotch broom infestations.
- 2630 Rd. – control invasive plants.
- 2610-150 and 2620, including routes between these roads – control invasive plants.
- Avoid *Calochortus longebarbatus var. peckii* populations in vicinity of Big Spring Cr., Jackson Cr., Looney Cr., and Porter Cr. drainage.
- Defer trail construction within the Bailey Butte Fire area until after 2017 to allow vegetative recovery prior to trail construction.
- Monitor houndstongue populations and all segments of trail within the Bailey Butte Fire to facilitate Early Detection and Rapid Response to expanding or new infestation of this species.



Yellow = proposed trails in Alternative 2
Purple = additional proposed trails in Alternative 3
Blue = additional proposed trails in Alternative 4

Figure 20. Aspen stands (dark green) on the west end of the Ochoco Summit Project Area in relation to proposed trail locations and gathering areas.

Cultural Resources

This section includes a summary of the Cultural Resources specalist's report; the entire report is in the Ochoco Summit Trail System project record, located at the Ochoco National Forest, Prineville, Oregon. Due to the sensitive nature of some information in the report, portions of the report are FOIA-exempt.

History

The Ochoco Mountains form the headwaters for the Crooked River. Drainages including tributaries join the North Fork of the Crooked River as it winds its way through Big Summit Prairie. Likewise tributaries join Little Summit as they feed the wetlands at Little Summit Prairie eventually joining in with Deep Creek drainages and making their way into the North Fork of the Crooked River. These waters, along with the Wolf Creek drainages, flow from the high ridges of the Ochocos through forested uplands to the main stem of the Crooked River in the Deschutes basin. Big Summit Prairie and Little Summit Prairie were especially important to both Indian People and early Anglo settlers for their abundant resources and water. The Ochoco Mountains offered high elevation country in contrast to the arid shrub-steppe lowlands common along the main stem of the Crooked River which makes the high desert country so unique.

Indian people have occupied these upland areas since time immemorial. Archaeological evidence documents the intensive use in and around Big Summit and Little Summit Prairies. The uplands extended seasonal hunting and gathering activities and provided valuable resources. Camas and a variety of other root crops could be dried and stored to sustain these groups through the long cold winters common to the high desert. The North and South Fork of the Crooked River provided north-south access routes between obsidian resources to the south and upland areas like the Ochoco Mountains and their mountain prairies. This area has primarily been occupied seasonally due to cold winters and snowfall. Indian occupation was subsistence based with the more recent. The dominant cultural theme in this area is represented by a long period of Indian occupation. A variety of site types represent a mobile hunting and gathering lifeway dependent on upland resources as part of their seasonal rounds. Site types vary from surface lithic scatters to more complex sites with formed tools and features like house pits, camas ovens and peeled trees. Traditional resources continue to available and gathered today. Traditional foods include root crops like camas, bitterroot, Indian celery, lomatium species, and other foods and resources like hanging black moss, yellow bells, wyethia, and chokecherry along with a host of other plants and faunal resources.

The influx of Anglo-settlement changed cultural patterns in the mid-1800s. Anglo-settlement occupation was based on stock grazing, agricultural practices and forest products. Stock grazing and agricultural practices were introduced to this area in the late 1800s with the influx of Anglo exploration and settlement. The high elevation meadows provided excellent stock grazing opportunities and attracted early homesteaders. By the 1930s for a variety of reasons the population shifted to larger trade centers and communities like Prineville and Mitchell. Changes in the economy and social patterns also led to larger ranches utilizing this area primarily in the summer months compared to year-round homestead parcels.

The timbered lands surrounding Big Summit Prairie were first visited during the exploration and mining periods in the 1860s. Gold was discovered along nearby Ochoco Creek in the 1870s and travel route was established across the Ochoco Mountains to Canyon City. This is mapped as the Canyon City Wagon Road on early maps. Cinnabar was discovered near the turn of the century and the production of mercury flourished until the 1940s when market conditions and the economy changed.

Public domain lands and Forest Reserves were established in the early 1900s. Stock grazing was at its peak and the Forest Service mission was set up to manage grazing and settle range disputes. The mission included marking forest boundaries, coping with beetle infestations and establishing roads, trails, telephone lines and facilities like ranger stations and fire lookouts. Grazing allotments and stock driveways were soon established to better manage stock grazing. Logs were burned out to develop watering troughs for sheep, cattle and horses. Names and dates in many of the surviving aspen stands reflect herders moving stock across the forest. Magnetic telephone lines were soon constructed to provide better communication between local communities, ranger stations and fire lookout points. These administrative developments led the way to fire patrol, range management and access to the forest.

Management Direction

Management direction for cultural resources is found in the Ochoco National Forest Land and Resource Management Plan, in the Forest Service Manual section 2360, in Federal Regulations 36CR64 and 36CFR800 (amended December 2000), and in various federal laws including the National Historic Preservation Act (NHPA) of 1966 (as amended), the National Environmental Policy Act, and the National Forest Management Act.

In general, the existing management direction asks the Forest to consider the effects on cultural resources when considering projects that fall within the Forest's jurisdiction. Further direction indicates that the Forest would determine what cultural resources are present on the Forest, evaluate each resource for eligibility to the National Register of Historic Places (National Register), and protect or mitigate effects to resources that are eligible.

Additional surveys of potentially impacted areas would be done in accordance with the Ochoco Inventory Strategy.

Desired Condition

The desired condition is not clearly stated in the Forest Plan but can be derived from the implied goals of the Standards and Guideliness and the Monitoring Plan. It would be desired to know the location and extent of all cultural resources, to have evaluated each one for eligibility to the National Register, and to have developed management plans for all eligible properties that would provide protection or mitigate effects that may occur to the resources.

It is desired that the current trend of unmanaged recreation activities, such as those occurring on known sites, would in the future have such use directed to areas more appropriate and sustainable in consideration of cultural resources. Existing use patterns have likely affected historic properties and individual site integrity. This project provides an opportunity to direct some of the motorized recreational use to areas away from historic sites and cultural resources.

Existing Condition

It is assumed there has been loss of site integrity from actions that occurred before the implementation of regulations for the National Historic Preservation Act (NHPA). This means that the active protection of cultural resources has a relatively short history, approximately 40 years. Historic use of places beginning in the historic period of discovery, settlement, and subsequent development of forest roads, trails, and other facilities that overlap known and unknown sites has likely caused loss of site integrity.

In addition to pre-field investigations utilizing Geographical Information System layers and existing records, site specific surveys have been conducted on seven percent of the entire project area. The area of potential effects (APE) occurs approximately 100 ft on each side of proposed trails and an

area of up to 5 acres at each staging area. The majority of the high probability areas within the APE for the Preferred Alternative (Alternative 3) have been surveyed.

Numerous cultural resource sites are present in the project area. Many of these are linear features such as historic roads and trails, stock driveways and telephone lines. One of the historic linear sites, the Historic Summit Trail, has been evaluated and has been found to be eligible to the National Register of Historic Places (NRHP). A small percentage of the remaining linear features have been recommended for eligibility but have not been fully evaluated. Any on these sites that have been recommended for eligibility would have to be fully evaluated if they were to be found adversely affected by the proposed project. The remaining are prehistoric in age (inferred from the presence of stone tool technologies), or contain evidence of occupation during both time periods.

Sites from the historic period include the Historic Summit Trail, Cold Springs Guard Station, stock driveways and corrals, historic structure remains, utility corridors, fire lookouts, historic trails (many of which are now roads) and the remains of historic sheep camps. Prehistoric site types represented include lithic scatters, lithic scatters with flaked stone tools and sacred sites.

Spatial data review for all known sites in the APE indicated that the majority of the prehistoric sites are not located near any of the proposed routes of the designated trail system. Many of the remaining prehistoric and historic sites in the APE are crossed by or are situated on or adjacent to existing Maintenance Level 1 (closed roads) or Level 2 (roads for high clearance vehicles) that would become part of the designated trail system. Since an effort was made to locate proposed trails on existing disturbance such as roads or trails, some of the designated routes are on top of roads or trails that have been identified as historic sites. Of the sites that are crossed by proposed trail segments, each alternative is described based on the total number of sites crossed and the number of sites that are linear features such as roads, trails or telephone lines.

- Alternative 1 does not propose any designated trails and therefore does not add any designated routes or remove any unauthorized routes across cultural sites. The existing transportation system (roads and trails) would remain as currently in place regardless of the presence or absence of heritage sites.
- Alternative 2 (APE = 4,088 acres): Routes cross or closely approach a total of 26 recorded sites and one traditional food area. Of the recorded sites: four are linear features located on system roads; nine are sites alongside system roads where the proposed route is on the road prism, four are proposed route crossings on linear features that are not system roads; five can be mitigated by implementing minor rerouting to avoid sites; and four are on segments of FS road 2630 which would be mitigated by designing these segments in accordance to the Historic Summit Trail Management Plan. One site is located at a viewpoint, where heritage values would be maintained by coordinating placement of the trail and any associated improvements with the District or Forest Archeologist, and the historic significance would be interpreted for the benefit of the public.
- Alternative 3 (APE = 2,432 acres): Routes cross or closely approach a total of 23 recorded sites and one traditional food area. Of the recorded sites: three are linear features located on system roads; six are sites alongside system roads where the proposed route is on the road prism, six are proposed route crossings on linear features that are not system roads; five can be mitigated by implementing minor rerouting to avoid sites; and two are on segments of FS road 2630 which would be mitigated by designing these segments in accordance to the Historic Summit Trail Management Plan.
- Alternative 4 (APE = 5,087 acres): Routes cross or closely approach a total of 39 recorded sites and one traditional food area. Of the recorded sites: five are linear features located on system roads; eleven are sites alongside system roads where the proposed route is on the road

prism, ten are proposed route crossings on linear features that are not system roads; nine can be mitigated by implementing minor rerouting to avoid sites; and 4 are on segments of FS road 2630 which would be mitigated by designing these segments in accordance to the Historic Summit Trail Management Plan. One site is located at a viewpoint, where heritage values would be maintained by coordinating placement of the trail and any associated improvements with the District or Forest Archeologist, and the historic significance would be interpreted for the benefit of the public.

Historically significant structures exist in the projectarea at the Ochoco Ranger Station, Cold Springs Guard Station, and Salters Cabin. None of these structures are within the APE. Also included within the projectarea are the Blue Ridge, Mother Lode, Amity, Independent, Mayflower and Scissorsville mines. Some of these mines have associated structures. However, none of these mines are within the APE. The Summit Trail was found eligible for nomination to the National Register of Historic Places in 1987. Within the project area, the Summit Trail corridor includes approximately 3,036 acres allocated for partial visual retention, 2,780 acres allocated for visual retention and 86 acres allocated for preservation. Within all of these allocations the desired condition is to maintain the existing historic integrity of the Summit Trail and to enhance and interpret significant segment for public enjoyment and education (LRMP 4-61). The LRMP also states that pristine segments will be managed to protect, interpret and preserve their historic qualities.

Direct and Indirect Effects

Alternative 1

In general, this alternative would continue the existing situation of uncontrolled recreation and use of user-created trails through the forest until the Travel Management Rule is implemented. Where new routes are developed through cultural resource sites, there is displacement, crushing, breakage, and general loss of site context and integrity. Where OHV use persists on existing roads that traverse eligible or unevaluated cultural resource sites, integrity would continue to degrade as unrestricted travel allows vehicles to forge into new sites. Lack of maintenance on user-created trails can compound effects on eligible or unevaluated sites by development of deep ruts causing erosion plus breakage, displacement, and loss of artifacts and site integrity.

Action Alternatives

Following guidelines in a 2003 Regional Programmatic Agreement (PA) among USDA-Forest Service, the Advisory Council on Historic Preservation, and the Oregon State Historic Preservation Office (SHPO), a finding of “No Adverse Effect” (No Historic Properties Affected) was determined under Stipulation III(B)5 of the Programmatic Agreement. The Forest finds that there are historic properties but the undertaking would have no effect on them as defined by 36 CFR 800.16(i). Any potential information that would otherwise be lost would be documented and reported to the SHPO. This finding is based on Project Design Elements and Mitigation Measures (see Chapter 2 of this document) that have been incorporated to determine the eligibility of unevaluated sites prior to trail construction. This would be accomplished through a series of treatment, data collection, and trail rehabilitation measures to document potential character defining features of the site. For those sites that may be eligible and are already being traversed from user-created trails through or adjacent to the site, Mitigation Measures would include site protection of the remaining portion adjacent to the route, data recovery, and/or avoidance. Protection is not required for those sites that are evaluated and found not eligible.

The Ochoco Land and Resource Management plan provides direction for the historic Summit Trail, which includes maintaining the existing historic integrity. Thus for the proposed trail segments along the Summit Trail further development, including construction, maintenance, signs, information

boards, etc. should be consistent with the emphasis and desired conditions for the Historic Summit Trail (MA-F7, LRMP page 4-61 to 4-62).

A mitigation/site protection table is incorporated in the cultural resource compliance report. Because of its sensitive nature, it is not included here. Coordination between project implementation personnel and the District and/or Forest archaeologist(s) would occur during layout of the trails in the sensitive areas to best adjust designated routes, design mitigating structures or surfacing, or identify site boundaries where avoidance is required.

Trail construction may involve widening or narrowing of the trail clearance to the appropriate width for the class of vehicle to be used for the trail system. On some trails, this would be 50 inches for ATVs (class I), which also accommodates motorcycles. Other trails would be 24 inches to accommodate motorcycles (class III) only. Still other trails would be 80 inches wide for jeeps and buggies (class II), which would also accommodate class 1 and III vehicles. Also, routine ground disturbing activities would occur such as blading of trails for leveling and maintenance, as well as creating and maintaining appropriate drainage features and width limiting obstacles.

There are circumstances where past motorized access for dispersed recreation activities has occurred within known sites. It is unknown if these activities in the area have altered character defining site features and how much site integrity has been compromised. Where a user-created trail is proposed for the designated trail system and it overlaps a known site, rutting and periodic maintenance activities have the potential to bury, crush, displace and/or lose context for artifacts that may be within the footprint of the trail. Prior to trail construction and designation, all known sites would be mitigated or evaluated for eligibility to NRHP. If the site is found to be eligible, the next step would be to determine whether the portion that overlaps the trail would contribute to that eligibility. If it does, then the following may take place: 1) trail relocation; 2) data recovery efforts sufficient to recover available information and the trail system would continue to be used; and/or 3) site protection through tread armoring and/or barriers to off-trail travel.

Trail grooming equipment includes a narrow tracked machine with a blade mounted in the back. Such equipment might eventually expose otherwise unknown cultural material on an unidentified site by removing obscuring deposits. Due to the patchy distribution of ash and clay deposits in the project area, artifacts are likely to be near the surface on tight clay soils, while they may migrate up and down in the ash soil strata. Agents of movement are artificial, as noted above, as well as natural, such as wind and flood events, erosion, tree roots, tree tip ups, burrowing insects, rodents, birds, and especially freeze-thaw cycles. Where ash soils are present, artifacts are not always visible on the surface and may be exposed following disturbance. Where clay soils are present and surface erosion has occurred, artifacts may be transported from their original location.

On proposed trail segments that are on top of existing roads, the trail would be built on ground that is already disturbed. In those instances when the road or existing trail traverses a known cultural resource site, loss of potential site information has been assumed to have already occurred within the depth of the road material and would not increase as a result of changing the use of the road. In some cases, the road would have shared use between regular (passenger cars, pickups, etc.) and trail vehicles. In others, the road would be closed to all but trail system users. Neither of these instances would directly affect a known site that is already traversed by the road. Design elements include the staying within the existing road prism when converting old roads into trails.

Another potential loss of site integrity would occur if an existing road is being converted to a narrower width for a trail segment. The method of ripping the road bed with heavy equipment, especially on a native surface, could directly affect a cultural resource site that may be traversed by the road. Although loss of integrity may have occurred during road formation and continued use, deposits below the surface of the road bed could disturb a buried archaeological site, its artifacts, and their context within the site. Project Design Features in this circumstance would maintain the integrity

of the site by avoiding ripping of the soil on known cultural sites and using trail narrowing methods such as surface impediments in lieu of subsurface ripping during road-to-trail conversion.

Outside of known sites there is potential for disturbance to sites that are yet to be discovered. During ripping or cross drainage installation during conversion of old roads to trails, and during decommissioning of unwanted existing roads or user trails, additional sites may be exposed or disturbed. Monitoring and/or mitigation would be coordinated with the District or Forest archeologist for any newly discovered site. All rehabilitation ground disturbing activities would occur where there would be no effect to eligible historic properties or other known cultural sites. Other rehabilitation activities would use appropriate non-ground disturbing methods such as above ground barriers and shallow scarification and rooting of vegetation especially on native surface project locations.

There is a potential from the sound generated by OHVs to be heard where American Indians potentially hold ceremonies or harvest traditional cultural foods. There may be other unknown sites that would typically remain unidentified because of their sacred nature. The purpose of the sites is of religious importance and is meant to occur in the absence of artificial/outside intrusions. The sound from OHV engines, or other activities unrelated to OHV use could be considered such an intrusion. The Scoping Letter and maps were sent to representatives of Confederated Tribes of Warm Springs, Klamath Tribes, Burns Paiute Tribe and Confederated Tribes of Umatilla. Communication with these tribes will continue throughout the planning and Section 106 (cultural resource management) process. Any information on cultural resources or traditional cultural properties will be addressed following the Project Design Elements in Chapter 2 of this DEIS.

Cumulative Effects

Cumulative effects on cultural resources were determined by focusing on the current aggregate effects of past, present, and reasonably foreseeable future actions. For cultural resources, in general, past actions have avoided effects to eligible or unevaluated cultural resource sites, because of the Forest Service responsibility to protect their values. This has largely been accomplished through avoiding the pertinent cultural resource sites for those activities that are closely monitored. For example, overlapping vegetation management projects (Spears, Canyon, Ochoco Valley Fuels, Howard Elliot Johnson, Zane, Deep Restoration) determination of effect to cultural resources found: “Following guidelines in a 2004 Regional Programmatic Agreement among USDA-Forest Service, the Advisory Council on Historic Preservation, and the Oregon State Historic Preservation Office, a finding of “No Historic Properties Adversely Affected” was determined.

In the past, the strategies of site protection or mitigation have been successful because of efforts to inventory, identify, evaluate, and manage cultural resources. Therefore, any overlapping past, present, or reasonably foreseeable action on this project would not result in cumulative effects.

Monitoring

Site monitoring would occur during any phase of soil disturbance when it overlaps a known site. Site monitoring would also occur when excavating for toilet vaults to examine buried deposits for potential artifacts and features that would indicate a buried site not previously identified.

Range Resources

This section includes the Range specialist's report in its entirety and was written directly into this EIS.

Introduction

The Ochoco Summit Trail System project area is approximately 301,574 acres and is located on the Ochoco National Forest in Crook and Wheeler Counties. The project area has been grazed since the late 1800s and early 1900s by sheep, cattle, and horses with the main objective of providing forage for livestock. The project area is located within portions of twenty-eight allotments and a Wild Horse Management Area. Table 175 describes the 28 allotments adjacent to and intersecting the project area. Twenty-five of the allotments are active allotments, one of which is a sheep allotment. Remaining active allotments are currently grazed by cattle. The Little Summit Allotment is comprised of both private and National Forest System lands. The other allotments are composed solely of National Forest System lands. To facilitate the management of these allotments, water developments and fences have been constructed over the years. A majority of the water developments are associated with spring sources or stock ponds. Water developments benefit both wildlife and livestock.

For the purpose of discussing livestock grazing, all of the area located within the allotments will be included in discussion.

Table 175. Allotment Information.

Allotment	Total Acres	Acres In Project Area	Kind/Class	Permitted Number	Season of Use	AUMs
Antler	661	661	Cattle-cow/calf	114	06/16-09/30	537
Badger	29,942	29,942	Cattle-cow/calf	496	06/21-09/30	2,248
Bearskull/Cottonwood	43,226	6,365			Closed	0
Big Summit	24,750	24,750	Cattle-cow/calf	400	06/16-09/30	1,883
Brush Creek	10,521	10,521	Cattle-cow/calf	110	07/01-09/30	445
Buck	451	451	Cattle-cow/calf	16	07/11-09/25	54
Burn	4,671	3,174	Cattle-cow/calf	130	04/15-08/14	698
Crystal Springs	7,190	7,190	Cattle-cow/calf	185	05/17-08/31	871
Deep Creek	17,577	17,577	Cattle-cow/calf	200	06/16-09/30	929
Derr	12,474	12,474	Cattle-cow/calf	150	07/01-09/30	599
Elkhorn	15,020	15,020	Cattle-cow/calf	290	06-15-09/30	1,340
Fox Canyon	13,007	13,007	Cattle-cow/calf	217	06/15-09/30	1,031
Gray Prairie	10,935	10,935	Cattle-cow/calf	325	06/15-09/30	1,544
Happy	18,624	18,624	Cattle-cow/calf	230	06/21-09/30	1,018

Table 175. Allotment Information.

Allotment	Total Acres	Acres In Project Area	Kind/Class	Permitted Number	Season of Use	AUMs
Indian Creek	525	525	Cattle-cow/calf	30	07/15-09/30	103
Little Summit	15,704	15,704	Cattle-cow/calf	200	06/21-09/30	886
Lookout	2,625	2,345			Closed	0
Lost Horse	6,848	460	Cattle-cow/calf	100	06/16-09/30	471
Marks Creek	10,542	10,542	Cattle-cow/calf	366	07/01-09/30	1,449
North Fork	6,034	6,034	Cattle-cow/calf	150	06/15-09/30	713
Pisgah	5,079	5,079	Cattle-cow/calf	156	06/16-08/11	391
Prairie Parcels (Shady Cr.)	78	78	Cattle-cow/calf	22	05/01-06/15	45
Prairie Parcels (Brush)	353	353	Cattle-cow/calf	22	07/15-10/15	89
Pringle	7,203	21	Cattle-cow/calf	225	06/21-09/24	950
Reservoir	34,173	34,173	Sheep-ewe/lamb	2,200	06/16-09/30	2,354
Roba	18,266	18,266	Cattle-cow/calf	236	06/16-10/15	1,250
Rock Creek	6,428	6,428			Vacant	0
Snowshoe	2,710	2,710	Cattle-cow/calf	156	08/12-09/30	343
Wolf Creek	42,231	23,901	Cattle-cow/calf	781	06/16-10/15	4,135

Information for pasture turn on dates, turn off dates and numbers were taken from the Grazing Permits at Lookout Mountain Ranger District and Paulina Ranger District.

Cattle Allotments

All cattle allotments in the project area range in size from one pasture to eight pastures. Most allotments containing more than one pasture are on a deferred rotation grazing system. Grazing season varies from April 15th to October 15th. A combination of cow/calf pairs, yearlings, and bulls graze the landscape, within an authorized Animal Unit Months (AUMs) stocking limit per allotment.

Sheep Allotment- Reservoir

The Reservoir allotment is not split into pastures, but is managed by the trailing of two bands of sheep. The permit authorizes 2,200 ewe/lamb pairs from June 16th through September 30th, for a total of 2,354 AUMs. There are two bands of sheep (each 1,100 pairs) that trail through the allotment, the Canyon Creek Band and the Reservoir Band. Herders are with the sheep for the entire grazing season. Sheep are permitted to water and bed at specifically authorized locations only once per season. Actual turn-out dates and permitted numbers have been consistent with the permit. Range readiness criteria have always been met prior to turn-out (2210 Range File, Reservoir Allotment, Inspection Notes).

Wild Horses

The Wild Horse Management Area falls within the same area as the Reservoir allotment and is managed for 55 to 65 animals.

A wild horse is any untamed horse that resides in or has temporarily strayed from a recognized Wild Horse Territory. In 1975 a Wild Horse Management Plan and Environmental Assessment was developed for the Ochoco National Forest. The objective is "to provide protection, management and control of wild, free roaming horses in order that we might perpetuate a sound biological unit consistent with the Wild Free Roaming Horse and Burro Act of 1971" (2260 Range File, Ochoco Wild Horse Management). The plan states that the wild horse herd should be managed for 55 to 65 animals. If population numbers rise above 65 animals, methods of capture and control are utilized to keep a stable population. The Wild Horse Herd Management Area does not fall within the Burn and Crystal Springs Allotments; however, wild horses are commonly found in both. Wild horses have often resided in Hohn Springs pasture of the Burn Allotment and in the Coyle Creek pasture of the Crystal Springs Allotment.

There are several factors that possibly contribute to the migration of wild horses out of the Herd Management Area (HMA). Key factors are fence maintenance (particularly winter damage to fences), lack of winter range and off-road vehicles. Wild horses have been able to move out of the HMA by the means of damaged fence. Currently the HMA does not contain enough winter range to accommodate the herd and horses naturally move to lower elevations where winter forage is more accessible. These areas are typically outside of the HMA. There is some speculation that horses may also be moving to escape harassment from off-road vehicles, which are commonly used within the HMA.

Information on wild horse data was taken from the Wild Horse File for the Herd Management Area, which is located on the Lookout Mountain Ranger District, Ochoco National Forest.

Range Improvements - Cattle and Sheep Allotments

Throughout the project area there are several range improvements including fences and water developments and exclosures. All range improvements help in keeping livestock distributed throughout the allotment. Permittees are responsible for pasture fenceline, allotment boundary fenceline and water developments. Permittees maintain these fences prior to turn-out every year. Most exclosure maintenance is the responsibility of the Forest Service. Several water developments have been recorded as needing maintenance or relocation.

Environmental Effects

Under any alternative, livestock grazing would continue to occur within the Ochoco Summit Trail System project area. Current stocking rates and management practices would remain the same. Wild horse occupancy would continue to occur within the project area, and management would target a population size of 55 to 65 horses.

Alternative 1

Under this alternative there would be no dedicated trail system for off-road motorized recreation. Current management plans would guide management of the project area, and OHV use off of designated roads and trails would be expected to decline with implementation of the Travel Management Plan (2011).

Range vegetation trend and livestock distribution would not be altered by trail development or use. Range improvements including troughs, ponds, exclosures and pasture fences would remain at the current level of risk of damage by people. Likelihood for livestock-OHV interactions would not be

changed from what is expected to occur under implementation of the current Travel Management Plan. Additional cattle guards would not be needed.

Effects Common to all Action Alternatives

Under these alternatives a system of trails and areas would be designated by class of vehicle and season of use. Trails would be designated in 15 active allotments. Rehabilitation or restoration activities would take place in previously damaged areas and interconnecting unauthorized or user-created routes to promote recovery, and to prevent confusion about which routes are open and which are not. Non-motorized use would not be prohibited on proposed motorized trails.

Alternatives 2, 3, 4 and 5 would decrease available forage for livestock. The implementation of new routes would remove suitable range, which can be a source of forage (see Table 176 and Table 177 for Loss of Forage in Acres). Livestock may be displaced during high use times on the trail system and distribution throughout the project area could also be negatively affected with the increase of OHV use in a localized area. If livestock distribution is negatively impacted, localized areas in uplands and riparian areas may receive greater grazing utilization. The proximity of the trail to several livestock water developments may cause livestock to avoid those areas when approached by OHV users, making those developments ineffective. This would change the distribution of livestock and utilization patterns, which would lead to a need for additional monitoring of livestock and potentially require a change in existing Allotment Management Plans (AMPs).

Range improvements such as troughs, fences, water tanks, and cattle guards not only help manage livestock, but wildlife as well. Table 178 identifies range improvements that are adjacent to or intersecting a proposed trail segment under each alternative. A major concern with increased use on the trail system adjacent to range improvements is vandalism or user group conflicts. Improvements are used to disperse domestic livestock throughout the allotment. All action alternatives include design elements intended to avoid or reduce the likelihood of damage to improvements. Livestock may avoid trail users entirely, or be harassed by OHVs, which could potentially lead to the destruction of fences or injury to livestock.

Direct and indirect effects to grazing operations should be minimal. Permittees that operate in the project area should continue to be able to access range improvements for maintenance, spread salt, and check the herd for distribution. By restricting travel to designated routes only, permittees may have an increase in labor under this alternative due to the need to pack salt and access improvement by foot or horseback. Permitted off road travel to access range improvements may be administratively authorized under the Term Grazing Permit, but would have to be planned in advance and authorized by a Line Officer.

Direct and indirect effects under action alternatives may affect the introduction and spread of noxious weeds. The type of activity, intensity and location of associated disturbance, and proximity to a seed source will affect the probability or risk of introducing noxious weeds or contributing to their spread. Potential for noxious weed infestations due to cross-country travel across the project area will decrease with vehicle access restricted to designated areas. However, there will continue to be unauthorized use, which can potentially create in an increase in the spread of noxious weeds in rangelands if vehicles are not clean. The increase in weed infestations can decrease native vegetation, which provides forage for livestock. As noted in the Invasive Plant section, all action alternatives could result in an increase of noxious weeds and other invasive plants across the project area. Overall overlap of proposed routes within noxious weed locations is low. There are up to three weed infestations crossed by proposed trails, and up to 5 gathering areas within or adjacent to weed sites (varies between alternatives). Weed sites within the concentrated use areas (staging, etc) have the most potential for spread of weeds. Refer to Table 171 in the Botany section for further details on weed sites intersected by proposed routes or areas.

Mitigations that Address Livestock Safety/Harassment Effects are as follows:

- Place cattle guards in place of gates where OHV trails cross existing pasture fences.
- Increase distance of trail from water developments if trail is within 100 ft. of development. This will reduce the potential of collisions between livestock and off-road vehicles and the potential of vandalism to water developments and livestock.
- Provide education literature about livestock management at staging areas.
- If rangeland conditions change due to OHV pressure on livestock movement, DMAs (designated monitoring areas) should be moved to more representative areas if needed.

OHV use for maintaining grazing allotment improvements off the trail system will be by prior authorization as part of AOI (Annual Operating Instructions), which are reviewed annually by the line officer (typically the District Ranger).

Table 176. Loss of Suitable Rangeland on New Routes (Acres of Forage lost by Alternative).

	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Miles of New Routes	69	50	81	50
Acres of Suitable Range Lost	31.7	17.9	38.4	17.9

Table 177. Loss of Suitable Rangeland on New Routes for Forage by Alternative & Allotment.

		Alt. 2	Alt. 3	Alt. 4	Alt. 5
Badger Allotment	Miles of New Routes	12.51	2.51	13.62	2.51
	Acres of Suitable Range Lost	8.45	.61	9	.61
Big Summit Allotment	Miles of New Routes	5.23	.48	4.41	.48
	Acres of Suitable Range Lost	4.14	.12	3.52	.12
Crystal Springs Allotment	Miles of New Routes	1.23	3.05	3.9	3.05
	Acres of Suitable Range Lost	.62	1.54	1.97	1.54
Deep Creek Allotment	Miles of New Routes	12.28	11.17	13.6	11.17
	Acres of Suitable Range Lost	4.68	2.71	5.54	2.71
Derr Allotment	Miles of New Routes	1.17	.45	2.94	.45

Table 177. Loss of Suitable Rangeland on New Routes for Forage by Alternative & Allotment.

		Alt. 2	Alt. 3	Alt. 4	Alt. 5
	Acres of Suitable Range Lost	.28	.11	.71	.11
Elkhorn Allotment	Miles of New Routes	4.89	2.64	6.07	2.64
	Acres of Suitable Range Lost	1.65	1.33	3.07	1.33
Happy Allotment	Miles of New Routes	6.33	1.99	6.41	1.99
	Acres of Suitable Range Lost	2.89	.48	3.24	.48
Little Summit Allotment	Miles of New Routes	5.4	5.4	7.65	5.4
	Acres of Suitable Range Lost	1.31	1.31	2.14	1.31
Marks Creek Allotment	Miles of New Routes	1.27	4.11	5.49	4.11
	Acres of Suitable Range Lost	.64	2.08	2.77	2.08
Pisgah Allotment	Miles of New Routes	4.14	2.41	3.56	2.41
	Acres of Suitable Range Lost	1.55	1.22	1.8	1.22
Reservoir Allotment	Miles of New Routes	6.86	7.33	6.87	7.33
	Acres of Suitable Range Lost	3.43	3.7	3.47	3.7
Roba Allotment	Miles of New Routes	.65	.65	.65	.65
	Acres of Suitable Range Lost	.16	.16	.16	.16
Rock Creek Alltoment	Miles of New Routes	.39	.39	.87	.39

Table 177. Loss of Suitable Rangeland on New Routes for Forage by Alternative & Allotment.

		Alt. 2	Alt. 3	Alt. 4	Alt. 5
	Acres of Suitable Range Lost	.09	.09	.21	.09
Snowshoe Allotment	Miles of New Routes	1.24	1.24	1.24	1.24
	Acres of Suitable Range Lost	.63	.63	.63	.63
Wolf Creek Allotment	Miles of New Routes	5.35	5.35	6.06	5.35
	Acres of Suitable Range Lost	1.3	1.3	1.47	1.3

Table 178. Range Improvements in the Ochoco Summit Trail System Project Area that are Adjacent to or Intersect Proposed Trail Segments.

Improvements	No Action	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Troughs or Ponds	0	23	24	39	24
Fence Crossings/Adjacencies	0	58	50	81	50
Corrals	0	2	1	2	1
Cattle guards	0	Est. 50	Est. 50	Est. 65	Est. 50
Troughs indicated are at least within ¼ mile of trail. Fences indicated include fence crossings and/or fence-lines that run adjacent to trail. New cattle guards for trail crossings through range fences would require excavation in the road prism for installation.					

The Wild Horse HMA was specifically avoided during the development of alternatives and trail system routes would not go through the HMA. There would be no decrease of available forage in the HMA for wild horses due to trail development. There is potential for disturbance to wild horses who migrate out of the HMA and into an area where designated OHV trails would be developed under any of the action alternatives; however, motorized vehicle use is already common in and around the HMA on open roads (highway legal only and mixed use) and the horses are expected to be habituated to vehicle use. Because OHV use would be limited to designated trails and areas only, cross-country travel would not occur as a result of implementation of any action alternative; harassment of wild horses is not an expected outcome of any alternative. The “Wildlife” section of this EIS includes discussion related to disturbance of wild animals in the vicinity of the proposed trail system.

Cumulative Effects

Cumulative effects may result from the effects of an increase in recreational use by OHVs on designated routes in the Ochoco Summit project area combined with the effects of past, present or ongoing activities. For Alternatives 2, 3, 4 and 5, the proximity of trail users to existing water developments may be expected to cause avoidance of these areas by livestock. Combining OHV use and livestock grazing on allotments may lead to increased livestock use in areas that are generally utilized less or not at all. Travel patterns of cattle may be altered and new cattle trails may be created, which may lead to new areas of soil compaction. Vegetation and forage species composition can be

expected to change over time in response to changes in livestock distribution. This effect may be off-set to some degree in areas where implementation of the Travel Management Rule limits motorized access, thereby reducing effects of human interaction with livestock in areas not associated with designated routes. Past road construction and maintenance, grazing, timber harvest and other soil disturbance have provided environments for noxious weed species establishment. Past activities within the project area have resulted in moderate amounts of weed infestations occupying 2,090 acres. The potential for noxious weed establishment and spread from passenger vehicles not associated with the project alternatives along open road corridors (including seasonally open roads) would continue. The potential for other vectors of spread within the project area including people, wind, or animals would also continue.

In addition to the past and current activities within the project area, adding 88 to 158 miles of designated OHV trail on routes that are not otherwise open to motorized travel could result in cumulative impacts to forage production due to establishment or spread of invasive plants. At the same time, implementation of the Travel Management Rule, prohibits overland use of OHVs and all motorized travel on routes that are not designated as open, which would reduce the risk of introducing invasive plants into areas not associated with designated trails.

The Ochoco/Deschutes NFs Invasive Plant Treatment Record of Decision increases the ability to effectively control invasive plants with herbicides. The ability to use herbicides will increase efficiency, thus lowering costs, which results in the ability to treat more acres for the same costs. This proposal does not synergistically interact with the proposed trail system, but does help reduce the extent and duration of effects of noxious weeds on native vegetation.

Wilderness, Inventoried Roadless and Unroaded Areas

This section contains the entire Wilderness, Inventoried Roadless and Unroaded Areas analysis.

Wilderness and Inventoried Roadless Areas

Existing Condition

One Wilderness Area, two Inventoried Roadless Areas (IRAs) and one Wilderness Study Area are within the Ochoco Summit Trail System project boundary.

The 5,355-acre Bridge Creek Wilderness is within the project area. Emphasis in the Bridge Creek Wilderness Area is to protect the wilderness ecosystems and manage use to maintain a natural setting and preserve solitude. Bridge Creek Wilderness is to be managed as a nontrailed wilderness (Forest Plan, p. 4-51). Generally, no motorized or mechanized use is allowed on trails in Wilderness Areas (Forest Plan, p. 4-188).

Within the 15,660-acre Lookout Mountain Recreation Area, of which 14,365 acres are within the project area, the management emphasis is to maintain a natural setting, provide continued opportunities for high quality semiprimitive recreational activities and wildlife habitat, and maintain healthy forests (Forest Plan, p. 4-68). Year-round trails to facilitate the use of the area by horseback riders, mountain bikers, hikers, snowmobilers and cross-country skiers will be developed (Forest Plan, p. 4-188). Emphasis in the Rock/Cottonwood Roadless Area (5,098 ac in the project area) is to provide opportunities for nonmotorized recreational use while protecting the anadromous fishery, sensitive soils on steep slopes and big game habitat (Forest Plan, p. 4-63).

The management emphasis in The North Fork Crooked River Wilderness Study Area (WSA) as discussed in the Forest Plan (p. 4-54) is to maintain existing conditions of the area for potential wilderness designation or until it’s either designated as wilderness or released from further consideration. The North Fork Crooked River WSA was evaluated and recommended as non-suitable for Wilderness designation by the Prineville District BLM in the mid-1980s. This recommendation

was approved by the BLM Oregon State Office, the Secretary of the Interior and the President of the United States. The final status of the WSA is to be determined by Congressional legislation. In the meantime it is being managed for its wilderness potential under Interim Management Policy (BLM Manual H-8550-1) and by guidance under the North Fork Crooked River Management Plan (USDI/USDA 1993).

Environmental Effects

The following values often characterize unroaded values (Federal Register, January 12, 2001):

- High quality soil, water, and air.
- Sources of public drinking water (the Ochoco Summit Trail System project area is not a source of public drinking water).
- Diversity of plant and animal communities.
- Habitat for threatened, endangered, proposed, candidate, and sensitive species, and for those species dependent on large, undisturbed areas of land.
- Primitive, Semi-Primitive Non-Motorized, and Semi-Primitive Motorized classes of recreation opportunities (refer to LRMP GL-19).
- Reference landscapes
- Landscape character and scenic integrity.
- Traditional cultural properties and sacred sites.
- Other locally identified unique characteristics.

Alternative 1

Under Alternative 1, characteristics that are used to define unroaded values such as high quality soil and water, and recreational opportunities would remain at current levels. Opportunity to hear and see motorized vehicles would not change. Due to the basic unregulated nature of travel and the expanse of the riding area, law enforcement for incursions of motorized vehicles into unroaded areas would remain problematic. Implementation of the Travel Management Rule generally limits motorized travel to designated routes, and OHV travel to designated mixed-use roads; some mixed-use roads are adjacent to unroaded areas. There are 1.3 miles of road currently open to non-highway legal OHV use adjacent to or within the Lookout Mountain Recreation Area.

Alternatives 2, 3, 4 and 5

Bridge Creek Wilderness would not be affected by the proposed alternatives because the closest point to any proposed motorized OHV trail is over one mile. No portion of the wilderness area is within the noiseband greater than 45 db for designated trail system routes under any alternative. Forest Road 2630 between the junction of Forest Road 150 and the open, mixed-use segment of Forest Road 2630 south of the Bridge Creek Wilderness boundary is proposed to be designated as open to mixed use travel under Alternative 5. This designation would provide a legal mixed use road connection between the West Implementation Area and the East Implementation Area of the Ochoco Summit Trail System. This connecting road segment would not be mapped as a designated trail, but would be available for mixed-use travel. The segment of Forest Road 2630 adjacent to the Wilderness boundary is already well-traveled by motor vehicles and is currently available for use by OHVs. Implementation of Alternative 5 would not add a new mixed-use route adjacent to the wilderness but could increase the level of use on this existing open road. The entirety of this road is within the proposed OHV Management Area for Alternative 5, which would authorize the use of OHV management funds to monitor, educate and enforce restrictions on travel off of designated routes. This designation would also facilitate use of OHV Management funds to control the proliferation of unauthorized routes off of this road, including into the Wilderness Area. Under designation of an OHV Management area funding sources would be available that would not be accessible without a designated OHV Management Area. These funds could be used to patrol and enforce the Travel

Management Plan and/or to close, conceal, rehabilitate or restore areas impacted by unauthorized motorized travel. Thus even though there is some potential for increased human presence adjacent to the Wilderness, there would also be improved opportunity to control unwanted and unauthorized routes adjacent to, or into the Wilderness. Effects to dispersed recreation in the Wilderness and other areas are discussed in the Recreation section of this EIS.

Activities proposed under any alternative in the Ochoco Summit project do not overlap any IRA; there would be no effect to any IRA associated with implementation of any alternative analyzed in this EIS. Effects to soil, water and air quality are as disclosed in those sections of this EIS.

There would be no effect from any of the action alternatives on any area within the Lookout Mountain Recreation Area. The closest proposed motorized trails are more than 4 miles from the boundary of this area. OHV use would be allowed on any road open to non-highway legal vehicles that are within or adjacent to the Recreation area as described for Alternative 1.

Rock Creek/Cottonwood Creek Area is an unroaded area with a management emphasis on protecting soil, water and fisheries while providing opportunities for nonmotorized recreational use. Activities proposed by this project do not overlap the Rock Creek/Cottonwood Creek Area and therefore do not affect unroaded characteristics within that management area. Potential impacts to nonmotorized recreation and to Keeton Trail based on areas where sounds may be heard at greater than 45db when OHVs are riding on the designated OHV trail system are discussed in the Recreation Section.

No trails or areas are proposed within the North Fork Crooked River Wild and Scenic River Corridor and no portion of the corridor is within the noiseband for greater than 45db.

How the Action Alternatives Respond to Identified Unroaded Values

High quality soil, water and air: Impacts to the soil resource are limited to the area of activity and are described in the Soils section in Chapter 3 of this EIS. Soil productivity would be maintained through Project Design Criteria and rehabilitation of user-created trails within the identified implementation and OHV management areas. Project Design Criteria were included that would minimize sediment potential; the analysis of effects to soils and hydrology indicates that there would be a net maintenance and restorative process overall by meeting Forest Plan standards and guidelines; many user-created trails within riparian areas would be closed or redesigned to meet standards (see discussion in the Soils and Hydrology and Aquatic Species sections, Chapter 3 of this document). Air quality is also addressed in Chapter 3 of this document. Any localized impairment would be diluted to a scale that would be impractical to measure. A projected 2.5 to 5.6 percent yearly increase in riders would not change this condition because the primary use would be during daylight hours and within a season of use (late spring and summer) when dispersion of vehicle emissions and fugitive dust is likely to occur.

In summary, there would be no measureable effect to air quality since the net emissions from vehicles, vehicle travel, forest management activities, and wildfires are unlikely to appreciably change under the action alternatives. There may be some temporary air quality impairment from localized vehicle emissions and fugitive dust, but it would be well away from Wilderness, the Wilderness Study Area and Inventoried Roadless Areas.

Sources of public drinking water: The Ochoco Summit project area does not contain any municipal watersheds. There are ground water wells and spring developments at some Forest Service facilities and developed campgrounds. Because the proposed trail system would not affect ground water, there would be no change to these sources of public drinking water.

Diversity of plant and animal communities: The diversity of plant and animal communities within the Wilderness, Wilderness Study Area, and Inventoried Roadless Areas, and within the greater Ochoco Summit project area, is not unique for the area. Effects to wildlife and botany are disclosed

in Chapter 3; in summary, effects of the proposed trail system would be limited in scale to the zone of influence for the designated trail system itself, as described in the effects to wildlife and botanical resources, and no effects to the overall diversity of plant and animal communities are anticipated.

Habitat for threatened, endangered, proposed, candidate, and sensitive species, and for those species dependent on large, undisturbed areas of land: Please see discussions in the "Hydrology and Aquatic Species," "Wildlife," and "Botany" sections in Chapter 3 of this EIS for effects to threatened, endangered, proposed, candidate and sensitive species. In all action alternatives the proposed trail system is designed on top of, adjacent to, or in proximity to existing disturbed areas (for instance, mixed-use roads, closed/decommissioned roads, and user-created trails). The proposed trail system design avoids large, undisturbed areas of land and therefore would have no effect on species that are dependent upon such habitat.

Primitive, Semi-Primitive Non-Motorized, and Semi-Primitive Motorized classes of recreation opportunities: The Ochoco Summit Trail System project does not change the Recreational Opportunity Spectrum (ROS) for these areas. The project area boundary defines where motorized trail use might be designated; this is further refined by the identified trail implementation areas (see Chapter 2 in this EIS). OHV trail may be designated in the vicinity of primitive and semi-primitive ROS areas, and in some cases sound may carry into these areas (see Table 48 in the "Recreation" section of this EIS); however, non-motorized opportunities would continue to operate unchanged from the current condition.

Landscape character and scenic integrity: The landscape character would be similar following trail construction. Disturbance associated with unregulated motorized use has already occurred; closure and rehabilitation of user-created trails that are located in undesirable locations or in areas that are valued for riparian, cultural or wildlife habitat would offset new trail construction and route designation. Trails would essentially be designed to not dominate the landscape, thus maintaining the current scenery and landscape character. For more information, see the "Visual Quality" section in Chapter 3 of this EIS.

Traditional cultural properties and sacred sites: There are no effects to known traditional cultural resources or sacred sites in Wilderness areas, IRAs or the WSA, including potential linkage from a historic trail from the project area. Appropriate consultation with affected parties has occurred ("Cultural Resources" section, Chapter 3).

Lands with Wilderness Characteristics

Forest Service Handbook 1909.12 Chapter 70 section 71.2 outlines the criteria to be applied to meet the statutory definition of wilderness. Essentially, these criteria are related to size requirements and presence of roads and other improvements.

Within the Ochoco Summit Trail System project area, there are no unroaded areas with potential to meet or exceed the threshold of 5,000 acres besides the IRAs and wilderness discussed above.

Because of active forest and range management and ongoing recreation both within and adjacent to the project area, the project area is generally well-roaded except in areas already identified and established to preclude roads and motorized access.

Forest Service Handbook section 71.22a discusses which road improvements may be present in land with wilderness characteristics (LWC); these include Maintenance Level 1 roads and closed and decommissioned roads. LWC may include recreation improvements that are easily removable (71.22b(7)). According to these criteria, conversion of closed or decommissioned roads or user-created roads to motorized trail or construction of new trail segments would not preclude consideration of an area as wilderness.

Unroaded Areas Identified by Commenters

In the early 2000s, the interest group Oregon Wild conducted an inventory across Oregon, including the Ochoco National Forest, to determine areas that are unroaded, using inventory criteria that they developed for their purposes. A map of Oregon Wild's unroaded areas was provided to the Ochoco National Forest during the comment period on the draft EIS for the Ochoco Summit project (see Figure 21).

The proposed action alternatives were evaluated against Oregon Wild's map, as follows:

Alternatives 3 and 5

The northern side of the loop at Indian Butte skirts the edge of the southwestern most tip of the polygon that is shown across both sides of the county line near the top center of Oregon Wild's map. The majority of this route is on existing old road beds; however there is a proposed trail crossing the peripheral extension of this polygon that connects between roads 2200-306, 307 and 309 in the vicinity of Indian Creek. All three of these roads are open year-round under the 2011 Travel Management Plan and are displayed as open on the MVUM map. Therefore the character of this finger of Oregon Wild's polygon is not unroaded. The area in which this trail system loop is proposed is identified as a Recreation Opportunity Spectrum (ROS) of Roaded Modified (Forest Plan page 4-179).

The largest polygons on Oregon Wild's map at Lookout Mountain and Rock/Cottonwood are entirely avoided by all proposed system trails.

The two smaller polygons south of Deep Creek (one along the North Fork of the Crooked River and the one south of Roba Butte sandwiched between private land and the 4260 road) are entirely avoided by all proposed system trails.

All polygons south of Big Summit Prairie are entirely avoided by all proposed system trails.

Alternatives 2 and 4

For Alternatives 2 and 4, the overlap on the southwest finger of the mapped polygon that crosses the county line (north central part of the map provided) is the same as described for Alternative 3. However these alternatives include routes that continue eastward from Indian Butte across the south facing flank of Mt. Pisgah. Under both of these alternatives proposed routes are approximately along the southern exterior edge of the central lobe of this polygon. Alternative 4 continues along the eastern exterior edge of this same central lobe, while Alternative 2 pulls away from it. Continuing eastward, both of these alternatives travel along the edge of this polygon on open road 2630. Both alternatives then travel into the southeastern lobe of this polygon primarily on road 2630 and adjacent spurs, with two short connector trails between roads 2630-555 and 556 and between 2630-600 and 606. All of these roads are open year-round and approved for mixed use (OHV legal) under the 2011 Travel Management Plan as displayed as such on the Motor Vehicle Use Maps (MVUM).

Alternatives 2 and 4 both propose class II trails in the peripheral tip of the finger at the southeast corner of this same northern polygon. These proposed trails are along ridges on and adjacent to road 3000-550 and connecting between roads 3000-550 and 3000-500. These routes are partially on existing road beds and partially on proposed new trails between existing road beds. Road 3000-550 and part of 500 are open year round and approved for mixed use.

No routes are proposed within any other polygon on the map provided under any action alternative.

A map was also provided by Wildlands CPR. Wildlands CPR used their own data and Geographical Information System analysis to estimate areas that are greater than one mile from a motorized travel route (see the green polygons in Figure 22).

The proposed action alternatives were evaluated against Wildlands CPR's map, as follows:

Of the areas shown on Wildlands CPR's map as being more than 1 mile from an open road, only the small polygon in the area of Big Spring Creek (west of Little Summit Prairie) is directly involved with any proposed designated route. Alternatives 2, 3, 4 and 5 all have a single proposed route on an existing closed road within close proximity to that polygon. Under Alternative 5 that route has been relocated to another closed road bed that is also in close proximity to that polygon. Under each action alternative the proposed route does affect this small polygon. Because the polygon is within 1 mile of the proposed route, it would no longer be more than a mile from any motorized route. For a detailed analysis of impacts to areas more than 1 mile from open motorized routes, refer to the sections titled "General Effects to Wildlife" and "Big Game – Deer and Elk" in this EIS.

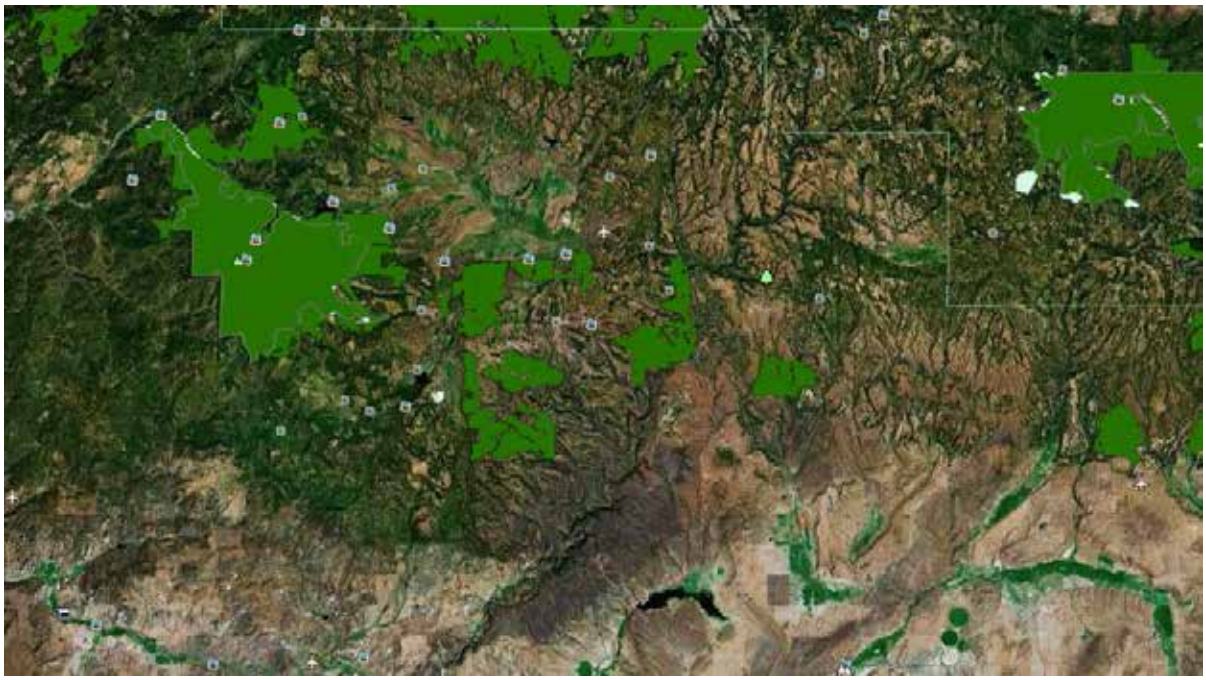


Figure 21. Map of "unroaded areas" provided by Oregon Wild during the comment period on the DEIS.

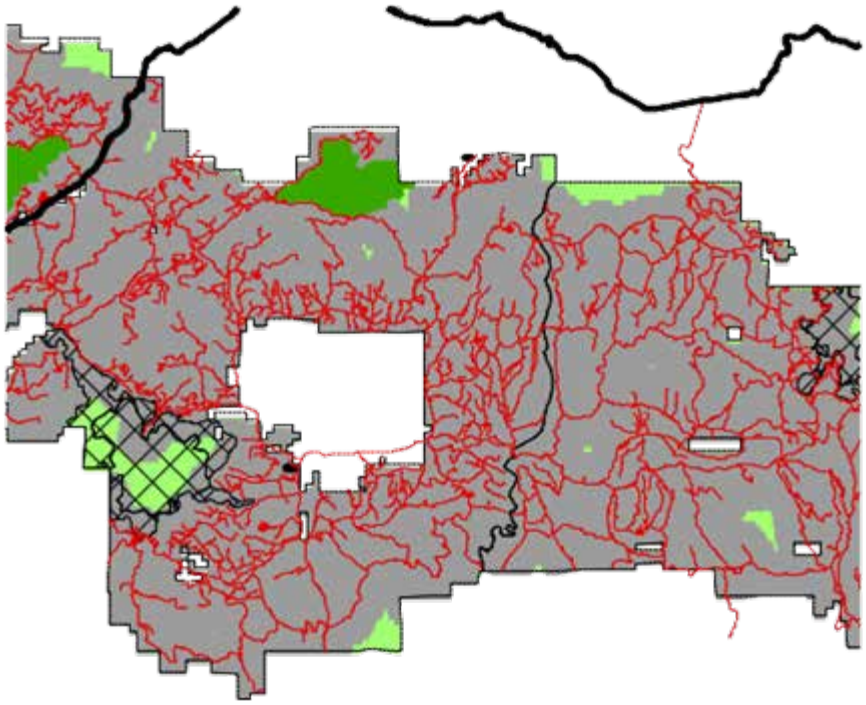


Figure 22. Map of "areas greater than 1 mile from a road" provided by Wildlands CPR.

Visual Quality

This section includes the entire Visual Quality analysis.

The existing scenery has a variety of disturbed and undisturbed areas. Human-caused activities and natural disturbances have altered the appearance of the landscape. Diverse vegetative composition and structure across the project area provide textural and color patterns that vary seasonally. Depth-of-field views vary between restricted to immediate foreground in high density stands, to filtered middleground views in moderate density to open timbered stands, to wide-open spaces offering long distance background views (vistas). This project would have a very limited amount of clearing of vegetation. Clearing would be the minimum width necessary to meet trail clearing standards along proposed routes, and clearing at staging areas or trail heads would be focused on safety and providing adequate room for turning-around, parking and in some cases campsites. Impacts to vegetative scenery would be evident, but would be of a relatively small scale in comparison to more expansive activities associated with vegetation and fuel management projects that have occurred, are being planned, or are ongoing within the project area.

There are specific Project Design Criteria (PDC) listed in Chapter 2 for visual emphasis areas including the Historic Summit Trail and visual corridors. Visually attractive areas such as aspen stands, cottonwood groves, meadows, seeps and springs would also be avoided during trail layout and construction as described in the PDC. The trail designs and sign plan would be developed that consider Forest Plan Visual Quality Objectives. However, directional and traffic management signs would be installed at trail system intersections, at trail crossings over open roads, and at Staging areas and/or Trail Heads. These signs may be considered to be an impact to the natural appearance of the sites where these signs are installed. However, they would be comparable to other signs that are already present across the project area for traffic control, recreation sites, trail markers and visitor information. Where rehabilitation or concealment of unwanted routes is proposed, these sites should improve in natural appearance compared to their current condition once vegetation becomes established.

Air Quality

This section includes the entire Air Quality analysis.

Affected Environment

The 1970 Federal Clean Air Act, as amended in 1977 and 1990 (42 U.S.C. §7401 et seq.), is a legal mandate designed to protect human health and welfare. National Ambient Air Quality Standards are defined in the Clean Air Act as levels of “criteria” pollutants above which may result in detrimental effects on human health and welfare. These criteria pollutants include carbon monoxide, lead, nitrogen oxides, particulate matter (PM2.5 and PM10), ozone, and sulfur dioxide.

State Implementation Plans (SIPs) are adopted by each state to implement the provisions of the Clean Air Act. State Implementation Plans describe the state’s actions to achieve and maintain National Ambient Air Quality Standards. Oregon Department of Environmental Quality is responsible for assuring compliance with the Clean Air Act. In 1994, the Forest Service, in cooperation with Oregon Department of Forestry and the Bureau of Land Management signed a Memorandum of Understanding (MOU) to establish a framework for implementing an air quality program in Northeast Oregon. However the MOU is specific to smoke management associated with prescribed fire. Implementation of this project is not expected to alter smoke emissions from prescribed fire and would thus not affect compliance with the MOU.

Section 160 of the Federal Clean Air Act also requires measures to "preserve, protect, and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores, and other places of specific national or regional natural, scenic, or historic values." Class I airsheds include Forest Service and Fish and Wildlife Service Wilderness areas over 5,000 acres that were in existence before August 1977, and National Parks in excess of 6,000 acres as of August 1977. Designation of Class I airsheds allows only very small increments of new pollution above existing air pollution levels, Class I airsheds have high air quality protection standards, in part, because visibility was identified as an important value. The nearest Class 1 airshed to the Ochoco Summit project area is The Strawberry Mountain Wilderness. Due to the location of the project area, prevailing winds and low volume of emissions anticipated from construction, use and maintenance of this OHV trail system, this project is not likely to affect any Class I airshed.

Class 2 airshed is an airshed classification representing National Forest System Land that is not within a Class I airshed. The Ochoco Summit project area is a Class 2 airshed. Class 2 airsheds may receive a greater amount of human-caused pollution than Class I airsheds. These areas include areas that are neither industrialized nor meet the specific requirements for classification as Class I areas. They are protected by the Prevention of Significant Deterioration (PSD) program. The Prevention of Significant Deterioration (PSD) permitting program is a Clean Air Act permitting program for new and modified major sources of air pollution such as power plants, manufacturing facilities, and other facilities that emit air pollution.

Background

The U.S. Environmental Protection Agency (EPA) set national air quality standards for six common pollutants (also referred to as "criteria" pollutants. These standards are known as National Ambient Air Quality Standards (NAAQS) and are listed at the following web site: http://www.deq.state.or.us/aq/planning/. PSD applies to all pollutants that do not exceed the National Ambient Air Quality Standards (NAAQS) in an area. PSD also applies to other pollutants that do not have a NAAQS. These non-criteria pollutants are listed in EPA's regulations. Maintenance Areas are those geographic areas that had a history of nonattainment, while Nonattainment Areas have not consistently met the clean air levels set by the U.S. Environmental Protection Agency in the National Ambient Air Quality Standards (NAAQS). There are no mapped Air Quality Maintenance or Non-attainment Areas in Crook, Wheeler or Grant Counties (Oregon DEQ 2009). The Oregon Smoke Management Report displays principal population centers that are smoke sensitive receptors. The cities of Bend, Redmond and John Day are the closest municipalities shown as smoke sensitive areas on the Oregon Smoke Management Plan map which can be viewed at the following web site: http://www.oregon.gov/odf/pages/fire/smp/smkmgtannualrpts.aspx. The City of Bend was previously classified as a "Designated Area" in an Oregon Smoke Management Report as potentially air quality impaired. The City of Prineville, which is closest to the project area, is not shown as smoke sensitive on the Smoke Management Plan map, but is tracked by DEQ with an Air Quality Index. The Air Quality Index (AQI) is a color-coded tool which shows air pollution levels. The AQI for particulate matter (both $PM_{2.5}$ and PM_{10}) is based on the average of the previous 24 hours of pollution levels and is coded as good, moderate and two classes of unhealthy.

Fugitive Dust

"Fugitive dust" is the term used when the soil crust is disturbed or broken and soil particles are released and raised into the air by air currents generated by vehicles (Ouren et al. 2007).

Soil disturbance and migration are items to be considered in any setting where motor vehicle travel is off hardened surface roads. These soil particles, created when the crust is disturbed, are considered particulate matter. Particulate matter is a mixture of small liquid droplets and microscopic solid particles that can be formed or emitted directly into the air (including dust, dirt, smoke and soot) The

haze associated with air pollution is caused when these tiny particles scatter or absorb visible light (McCarthy et al. 2006; EPA 2010). The EPA (2009) defines the following sizes of particulate matter:

Ultrafine particles generally defined as those less than 0.1 microns.

$PM_{2.5}$, also known as fine fraction particles (generally defined as those particles with an aerodynamic diameter of 2.5 microns or less), are usually 1/30th the diameter of a hair.

PM_{10} (generally defined as all particles equal to and less than 10 microns in aerodynamic diameter; particles larger than this are not generally deposited in the lung).

The Clean Air Act directs the EPA to set standards for particulate matter in the form of primary and secondary standards. Primary standards set limits on the amount and size of particulate matter that could be injurious to human health, while secondary standards set public welfare limits (damage to crops, animals, visibility impairment). These pollutants and standards are displayed in Table 179.

McCarthy et al. (2006) describe the dust plume raised by passing vehicles as PM_{10} whereas the emissions created by engine combustion are usually $PM_{2.5}$. The smaller size of the $PM_{2.5}$ particles allows for easy ingestion into human lungs and has been linked to health issues, such as asthma and strokes (EPA 2003). Road surface type, speed, and vehicle type all play a part in how much dust is created (Goossens and Buck 2009).

Consistent dispersal patterns indicate that larger particles travel shorter distances and stay relatively close to the ground while smaller particles go higher into the air and travel further away from the source (Padgett 2006). Wind direction, velocity, and canopy cover are factors in dust dispersal patterns and distance. Riders may not ride at mid-day on hot summer days due to the hot, dry and dusty conditions. Optimum riding is typically in the slightly cooler morning and evening periods during mid to late summer and during the moister and cooler spring, early summer and fall months.

In one study, the more open the trail terrain with adequate air circulation the faster the dust particles dispersed, and conversely, if the riding area was under heavy canopy with poor air circulation dust particles hang in the air for longer amounts of time (Meadows et al. 2008). In the Ochoco Mountains air circulation is also effected by time of day, with afternoon and evening breeze common during the summer use period.

Emissions

Vehicle emissions, particularly those resulting from two-stroke engines (nitrogen oxides, sulfur dioxide, carbon monoxide, ozone, aldehydes, and extremely persistent polycyclic aromatic hydrocarbons) and lightweight soil particles or “dust” resulting from vehicle travel on unpaved surfaces (also known as fugitive dust) can contribute to localized air quality degradation, even though National Ambient Air Quality Standards in a larger area are being met (Ouren et al. 2007).

Emissions from OHVs, particularly two-stroke engines (engines that use a gas and oil mixture in the combustion chamber), can contribute to decreased air quality because two-stroke engines do not completely burn fuels resulting in increased emissions containing nitrogen oxides (NO_x), sulfur dioxide (SO_x), carbon monoxide (CO) and ozone (O_3). Research has shown that a small two-stroke engine (e.g. chainsaw, which is considerably smaller than a standard two-stroke OHV engine) running for two hours emits the same amount of hydrocarbons as driving 10 fuel-efficient cars for 250 miles each (http://www/arb/ca/gov/msprog/offroad/sm_en_fs.pdf). Pollutants emitted from exhaust can create varying impacts on vegetation.

The U.S. Environmental Protection Agency (EPA), as directed by the Clean Air Act, set national air quality standards for six common pollutants, also referred to as “criteria pollutants.” These pollutants, carbon monoxide (CO), lead (Pb), nitrogen dioxide (N_2), Ozone (O_3), particulate matter (PM), and sulfur dioxide (SO_2), can damage crops, reduce visibility, combine with other pollutants to form wet and dry acids (acid rain), and prevent heat from escaping into space. This latter effect contributes to

the increasing concentrations of greenhouse gases that are considered responsible for climate change. Weather plays a part in the formation of some pollutants like ozone. Hotter, drier weather means higher ozone levels (EPA 2008), but the reduction of nitrogen oxide (NO_x) emissions reduces ozone levels.

Table 179 shows the criteria pollutants and their current allowable limits. These limits have been reviewed by the EPA to determine if the levels set in the 1990s are still appropriate or if more stringent measures are needed to reduce the potential impacts on greenhouse gases and human health. Previously, just registered vehicle engines (passenger cars and trucks) were tested and had exhaust emissions criteria set. Historically nonroad engines (recreational vehicles, diesel marine engines, and snowmobiles, etc.) were not required to have emissions standards. The EPA started implementing emissions standard requirements for these type engines (off-highway motorcycles and ATVs) in 2006, with 100 percent phase-in in 2007 (see 40CFR 1051). As new engines are designed to meet these criteria, older and less clean OHVs would be gradually phased out.

Table 179. Pollutants and standards.

Pollutant	Average Time	National Ambient Air Quality Standard (NAAQS) Violation Determination[1]	Federal Primary Health Standard (NAAQS) Exceedance Level	State Standard Exceedance Level
Carbon monoxide	1-hour	Not to be exceeded more than once/year	35 ppm	35 ppm
	8-hour	Not to be exceeded more than once/year	9 ppm	9 ppm
Lead	Calendar Quarter	Quarterly arithmetic mean	0.15 µg/m^3	0.15 µg/m^3
Nitrogen dioxide	Annual	Annual arithmetic mean	53 ppb	53 ppb
	1-hour	3-year average of the maximum daily 98th percentile one hour average	100 ppb	NA
Ozone	8-hour	3-year average of the annual 4th highest daily maximum 8-hour average concentration	75 ppb	75 ppb
$PM_{2.5}$	24 hour	98th percentile of the 24-hour values determined for each year. 3-year average of the 98th percentile values.	35 µg/m^3	35 µg/m^3
	Annual Average	3-year average of the annual arithmetic mean	15 µg/m^3	15 µg/m^3
PM_{10}	24 hour	The expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than 1 over a 3-year period.	150 µg/m^3	150 µg/m^3
Sulfur dioxide	1 hour	3-year average of the maximum daily 99th percentile one hour average	75 ppb	NA
Units of measure are parts per million (ppm), parts per billion (ppb) or micrograms per cubic meter of air (µg/m^3). For more information about the standards, visit http://www.epa.gov/air/criteria.html (EPA 2011).				

Direct and Indirect Effects

Alternative 1

Under the No Action Alternative, fugitive dust is present and a result of cross-country travel along user-created trails and existing motorized travel on established roads. With implementation of the Travel Management Rule motorized travel on designated routes the dust would be localized close to

the open unpaved roads within the project area. Motor vehicle travel on unpaved or native surface roads would produce dust but most would settle back out quickly and close to the trail. Some of the lighter particles would travel higher in the air and farther from the trail, but given the open nature of the trail design and air circulation, these would settle out in relatively short distances.

Alternatives 2, 3, 4 and 5

The action alternatives would affect where motorized vehicles can be legally operated on National Forest lands, and thus could potentially affect the location and concentration of vehicle emissions and fugitive dust resulting from vehicle travel on non-paved surfaces. There may be some increased temporary localized air quality impairment from vehicle emissions and fugitive dust in areas where a high level of OHV use occurs. This increased effect on air quality is assumed to be minimal, except in localized areas, because none of the alternatives is likely to change the overall amount of motorized use across the Forest. Vehicle travel on unpaved surfaces in areas prone to dust will continue to occur on the system of native and aggregate surface open roads, with larger vehicles and at speeds much higher than what is anticipated to occur on the proposed OHV trails, and when dusty conditions are likely. Thus there would be an increase in fugitive dust in close proximity to the proposed trail network, but it would be relatively small in comparison to the effect of ongoing travel across the project area.

The alternatives could also indirectly affect the location of unplanned human-caused wildfire starts, which could then have an indirect effect on air quality. It is possible that fire starts could occur as a result of OHV equipment or associated human use along the trail system. Because Alternatives 2 through 5 would designate a motorized trail system, fire risk associated with use of the trail system would be more readily monitored and restricted as necessary during extreme fire conditions. This could lead to reduced ignitions, more rapid detection and suppression, thereby potentially reducing emissions. Effects on air quality related to human-caused wildfire that could be attributed to fire starts from OHVs or other uses within the designated trail system are highly speculative and are therefore not measurable. It should be noted that Oregon state laws require spark arrestors on OHV mufflers to reduce the risk of fire. In addition, motorized vehicles are prohibited on native surface roads during Public Use Restriction periods. There is no clear evidence that OHVs contribute to more wildfires when used on appropriately maintained designated trails and use of motorized vehicles on designated motorized trails is generally not restricted; however, the Forest Service retains the authority to restrict use as conditions warrant for resource protection and public safety. Therefore the potential for any of the alternatives to increase fire risk and indirectly affect air quality is predicted to be negligible and is not discussed in further detail in this analysis.

In Alternatives 2 and 4 the areas with trail segments and supporting areas at or near the Ahalt Mineral Source, Peterson Lava, Ross/Peterson Ridge, Road 600 and Happy Camp would have increased levels of dust and emissions at those locations compared to the other alternatives. Alternatives 2, 4 and 5 include a class II network that would be largely utilized by vehicles that run 4-cycle engines and that travel the trail at very low speeds. These factors would combine to produce less of the pollutants associated with 2-cycle engines as well as fugitive dust. On the other hand the trails would be slightly wider and thus could be exposed to slightly higher levels of wind erosion, except where the trails are on lava or constructed boulder trails which are resistant to wind erosion. Alternatives 3, 4 and 5 have more concentrated loops at the west end of the proposed system and thus, the opportunity for riders to encounter fugitive dust and associated dust particles with potential to affect human health would be greater in that area, as well as compared to the other alternatives. Although riders tend to utilize the trail systems during the seasons when dust can be avoided[7], the potential for exposure to dust is the greatest during the core summer season.

[7] 2009, communication with Vicki Ramming, COHVOPS Program Director

For all alternatives there may be some localized temporary air quality impairments from vehicle emissions and areas prone to dust. This would be particularly evident in staging areas where engines are started and warming up and where warm up loops and youth riding areas are provided. However, from an airshed perspective, the Ochoco Summit project area is far from the nearest area designated as potentially air quality impaired (Bend, Oregon), as well as from the nearest non-attainment and maintenance areas (Klamath Falls, Lakeview), and the DEQ smoke sensitive communities (Bend, Redmond and John Day). Any localized impairment would be diluted to a scale that would be impractical to measure and negligible at the scale of airsheds. A projected 2 to 5 percent yearly increase in riders would not change this condition.

Cumulative Effects

For all of the alternatives, smoke and smoke drift from prescribed burns would have the potential to impact the Ochoco Summit Trail System area. There is the potential for portions of the trail system to be closed on burn days due to reduced visibility from smoke and any possible health concerns. The prevailing winds are out of the southwest and normally would push the smoke east away from the proposed OHV area. The alternatives would have no direct or indirect effect on smoke emissions from Forest management activities, which are managed by the Oregon Department of Forestry as delegated by the Oregon Department of Environmental Quality.

Implementation of the Travel Management Rule across the Forest will reduce fugitive dust by restricting motorized cross county travel. Ongoing forest thinning projects in the project area could potentially reduce the time the dust is in the air by opening stands, thus allowing for increased air circulation and settling the dust more quickly. Fugitive dust and its effects would remain localized and would not change the disclosures for human health or water quality.

Potential cumulative effects include the vegetation and fuels management program that overlaps the project area, with a foreseeable action of up to 20,000 acres of prescribed fire across the project area (Spears, Canyon, Howard Elliot Johnson, Zane, Jackson and Gap project areas). Although it is acknowledged that prescribed burning releases common criteria pollutants, such as CO, the overlap of effects cannot be expressed as an aggregate. Smoke from prescribed fire contains much more particulate matter and travels a greater distance, and dispersion is highly dependent on prevailing winds, terrain and weather conditions. Effects to air quality from OHV use of a trail system tends be localized, with dispersion in proximity to the trail network and staging areas, rather than moving at landscape scales across airsheds.

Climate Change and Carbon Cycling

This section includes the entire Climate Change and Carbon Cycling analysis.

On January 16, 2009, the Washington Office of the Forest Service released guidance to National Forests to assess the effect of proposals on the climate into project-level NEPA documents. This guidance provides that units should consider two kinds of climate change effects. First, units may, where appropriate, consider the effect of a project on climate change. Second, units may, where appropriate, consider the effect of climate change on a proposal.

Assessing the Effect of the Ochoco Summit Trail System project on Climate Change

The Ochoco Summit project planning team considered relevant factors of how a designated trail system on a National Forest could potentially affect a change in global climate. It was determined that the relationship and contribution of exhaust emissions was a factor to consider. In addition, how this project would affect forests and their role in the carbon cycle was also considered.

The Intergovernmental Panel on Climate Change has summarized the contributions to climate change of global human activity sectors in its Fifth Assessment Report (IPCC 2014). In 2010, antropogenic (human-caused) contributors to greenhouse gas emissions came from several sectors:

- Industry, transportation and building (41%)
- Energy production (35%)
- Agriculture (12%)
- Forestry and other land uses (12%)

There is agreement that the forestry sector contribution has declined over the last decade (IPCC 2014; Smith et al. 2014; FAOSTAT 2013). The main activity in this sector associated with greenhouse gas (GHG) emissions is deforestation, which is defined as removal of all trees, most notably the conversion of forest and grassland into agricultural land or developed landscapes (IPCC 2000).

This recreation project, which involves designation of a motorized trail system with limited new trail construction, does not fall within any of these main contributors of GHG. Forested land will not be converted to a developed agricultural condition. Given the very limited circumstances when vegetation would be removed for a segment of new trail, it was determined that those activities would not be analyzed as a potential effect on global climate change. Areas of user-created trails to be rehabilitated and returned to a vegetative state would offset any actions that remove vegetative cover on proposed new trails or at staging areas. In addition, closed roads that are not needed for future administrative use, as determined by roads analysis, may be converted to trails where designated as part of the proposed trail system. Road to trail conversions would narrow the footprint of the route to the designated trail width, which would increase recovery of vegetation on the portions of the road bed that are not utilized for the trail. This would also offset the loss of vegetation associated with establishment of new trails and at staging areas.

Emissions from OHVs, particularly two-stroke engines (engines that use a gas and oil mixture in the combustion chamber) do not completely burn fuels. The result is an increase in emissions that contain nitrogen oxides (NOx), sulfur dioxide (SOx), carbon monoxide (CO) and ozone (O_3), which are also identified as GHG that contribute to warming of the atmosphere. These emissions are also what the Environmental Protection Agency (EPA) identifies as criteria pollutants in which they set National Air Quality Standards. These commonly found air pollutants are found all over the United States and beyond.

Because the Ochoco Summit Trail System area is not as close to large urban centers as some of the other OHV systems in Central Oregon, it is not expected to get high levels of use during peak periods such as those predicted for locations closer to Bend, Redmond and La Pine. The use estimated for the project area (see Recreation section in Chapter 3 of this document) is expected to be spread out over the season of use on the designated system and across the proposed trail system, as well as through the year and across the project area on the network of existing mixed-use roads. This annual use estimate equates to up to 5000 motor vehicles emitting GHG over the period of one year, plus additional vehicles used for transport to the staging areas or trailheads. This represents a very small fraction of the total internal combustion engines globally emitting GHG, even with the anticipated 2.5 to 5.6 percent increase in riders annually over the next decade. Therefore, this incremental contribution to global climate change is negligible.

Under this definition, there would be no measurable direct effect associated with any of the OHV action alternatives. The action alternatives do not authorize the emission of GHG; the action alternatives do not limit the emission of GHG; and, the action alternatives are unlikely to change the emission of GHG as compared to the no action alternative. Emissions of GHG from OHV use in the Ochoco Summit Trail System project area are not directly affected by the designation of routes in a project area with 659 miles of existing routes (mixed use roads), areas open to cross country travel (rock pits shown as open on MVUM), 140 miles of open road for highway legal vehicles, along with

commercial equipment operation. In other words, OHV use will continue to occur in the project area with or without trail system designation, and designation of OHV routes is not expected to increase the level of OHV use by a magnitude that would affect overall emissions of GHG within the project area.

The EPA is now implementing emissions standard requirements for two stroke (among other types of) engines (40 CFR 1051). As new engines are designed to meet these criteria, older and less clean OHVs would be phased out, likely to offset the contribution from predicted increases in riders.

Because the designation of motorized routes has no quantifiable direct or indirect effect on climate change, it cannot have a cumulative effect.

Assessing the Effect of Climate Change on the Ochoco Summit Trail System Project

Although El Niño/Southern Oscillation and the Pacific Decadal Oscillation comprise the primary factors for climate variability in the Pacific Northwest, the influence from global climate change is a growing concern. According to the Climate Impacts Group, based out of the University of Washington, climate modeling for the Pacific Northwest predicts a future rate of warming of approximately 0.5 degrees Fahrenheit per decade for the Pacific Northwest through at least 2050, relative to the 1970-1999 average temperature. Temperatures are projected to increase across all seasons, although most models project the largest temperature increases in summer (June-August), and the average temperatures could increase beyond the year-to-year variability observed in the Pacific Northwest during the 20th century as early as the 2020s. Warmer temperatures during the OHV season of use may increase the demand for recreational opportunities in a forested setting where the temperatures tend to be lower than in the surrounding low elevation areas.

Assessing the influence of these factors on impacts to soils and vegetation associated with trail construction, operation and maintenance activities within the project area: a warming and drying climate combined with less of a snowpack could potentially extend the season of access to the trail system. This could provide additional time for monitoring and maintenance activities prior to the season of use. Recreational OHV use would remain limited to an exact season use as described in Chapter 2. Dry soil conditions early in the year may reduce potential for impacts from OHV to sensitive resources that are vulnerable to damage under wet soil conditions (such as scabland habitat and seasonal drainages), thus potentially reducing maintenance needs. However, early access in the spring and later access in the fall/winter by non-motorized users and illegal motorized use could lead to subsequent associated effects.

Very little removal of vegetation would occur associated with trail construction and maintenance. Project design included a focus on, wherever possible, locating trails to overlay existing roads, existing user-created trails, and/or areas where vegetation and soil may be previously disturbed. The season of motorized use on the trail system would be limited in all action alternatives, as described in Chapter 2 of this document. Monitoring is also an important element described for many resources and summarized in Chapter 2. If undesired consequences associated with an extended season are encountered, then the Forest Service has the authority to immediate suspend operation of the trail system to protect resources. Designation of a trail system allows the Forest Service greater flexibility in monitoring and adapting the project to a changing environment.

Social and Economic Analysis

This section contains the entire Social and Economic Analysis.

Social and economic elements, which are interrelated and interdependent with ecological elements, comprise the human components of the ecosystem. The implications of resource management

decisions for the Ochoco Summit Trail System project to the social and economic values are of interest to the residents, business owners, and users of the area. For the purposes of describing socio-economic effects on the economy, this analysis focuses on the economy of central and southeastern Oregon. The effects to the local economies are based on the estimated number of jobs created. The bulk of the area and communities potentially influenced by actions on the Ochoco National Forest lie within Deschutes, Crook, and Jefferson, the southernmost part of Wheeler, eastern most part of Grant, and the northern most sections of Harney and Lake counties. This is referred to as the Zone of Influence.

General Information and Population Estimates

The following information was retrieved from the Oregon State Archives website[8] and from reports generated in December, 2015, from the "Economic Profile System-Human Dimensions Toolkit" (see project file, Ochoco National Forest, Prineville, Oregon, for the complete reports). Population estimates discussed in the following text are summarized in Table 180.

Crook County

Crook County was established on October 24, 1882. It was created from the southern part of Wasco County and named after U.S. Army Major-General George Crook, a hero of the Snake Indian Wars.

Crook County is situated in the geographic center of Oregon. It has been reduced from its original size of 8,600 square miles to 2,991 square miles by the creation of Jefferson County in 1914 and Deschutes County in 1916. The current boundaries were established in 1927. Crook County is bounded by Jefferson and Wheeler Counties to the north, Grant and Harney Counties to the east, and Deschutes County to the south and west.

In 1882 the Legislative Assembly established Prineville as the county seat. The voters confirmed the choice of Prineville, the only incorporated town in the county, in the 1884 general election. Prineville was named in honor of the town's first merchant, Barney Prine.

The first census in 1890 showed a population of 3,244 excluding the Indians. The last several censuses have shown an increase in inhabitants with the 2010 population of 21,515 representing a 12.2% increase from 2000. The fast pace of growth in the nearby Bend-Redmond area has played a role in the rising population of Crook County.

While the economy of the county historically was based on agriculture and forestry, currently manufacturing, retail trade, and education, health care and social assistance support the greatest number of jobs in Crook County.

Deschutes County

Deschutes County was created from the western portion of Crook County on December 13, 1916. The county encompasses 3,055 square miles and is located in the central portion of the state. Geographically, the county includes portions of the Cascade Mountains and the central high desert plateau. It is bounded by Jefferson County to the north, Crook County to the east, Klamath and Lake Counties to the south, and Lane and Linn counties to the west. The county seat is located in the city of Bend which was incorporated in 1905.

Principal industries in the county are tourism, timber, and agriculture, chiefly cattle and potatoes. The destination resort, Inn of the Seventh Mountain, and the resort communities of Black Butte and Sunriver, were developed during the 1970s. The Mount Bachelor ski area and High Desert Museum add to the tourism-based economy in the county as well. Numerous golf courses have been added in recent years.

[8] http://arcweb.sos.state.or.us/pages/records/local/county/histories.html

The first county census was taken in 1920 and counted a population of 9,622. The 2010 population of 154,568 represented an increase of 34.0% over 2000.

Grant County

Grant County was established on October 14, 1864, and named for General Ulysses S. Grant, commander of the Union Army during the Civil War. Earlier in his military career Grant had been stationed at Fort Vancouver and assigned to protect the increasing number of emigrants traveling the Oregon Trail. Grant County is located in eastern Oregon and was created out of Wasco and Umatilla Counties. At that time Grant County was the largest county in the state. Its size was later reduced by the transfer of land to Lake County and the creation of Harney and Wheeler Counties. Grant County shares boundaries with eight counties: Morrow, Umatilla, and Union to the north; Harney to the south; Malheur and Baker to the east; and Crook and Wheeler to the west. It has an area of 4,528 square miles.

Grant County contains the headwaters of the John Day River, which has more miles of wild and scenic designation than any other river in the United States. More than sixty percent of the county's land area is under public ownership, and the county contains parts of four national forests. Principal industries are agriculture, livestock, forestry, and recreation.

The first census was taken in 1870 and counted 2,251 persons. The population of Grant County in 2010 was 7,349. This represented a 7.4% decrease from 2000.

Harney County

Harney County was created from the southern two-thirds of Grant County on February 25, 1889. It is located in the high desert country in the southeast portion of the state and is the largest county in Oregon, comprising 10,228 square miles. Counties with contiguous borders include Malheur to the east; Lake, Deschutes, and Crook to the west; Grant to the north; and the State of Nevada to the south. The county was named after the lake that lies within its territory, which was named in honor of General William S. Harney, commander of the Department of Oregon of the U.S. Army in 1858-1859.

Harney County's population is primarily concentrated in a small urbanized sector of Burns-Hines with the remainder mostly in the Harney Basin. The county's population was recorded as 2,559 during the 1890 census and rose steadily until the decade of 1930-40, and then resumed an upward curve until the 1980s. The county experienced a net out migration of nearly fifteen percent in the 1980s primarily due to the closure of the lumber mill in Burns. The 2010 population of 7,364 represented a 3.2% decrease from 2000.

Jefferson County

Jefferson County was created on December 12, 1914, out of territory that was once part of Crook County. The county was named after Mount Jefferson, the second highest peak in Oregon with an elevation of 10,497 feet, which marks the county's western skyline. The county is bounded on the north by Wasco County, on the east by Wheeler and Crook Counties, on the south by Deschutes County, and on the west by Linn and Marion Counties. The county encompasses 1791 square miles.

The county's population at its first federal census in 1920 was 3,211. The 2010 population of 21,652 represented a 13.9% increase from 2000.

Lake County

Lake County was established on October 24, 1874. It was created from the southern part of Wasco County and the eastern part of Jackson County. It was named because of the numerous large lakes that are entirely or partly within its borders.

Lake County is situated in south central Oregon. The western boundary was changed with the creation of Klamath County in 1882. It regained some area when the southwestern part of Grant County was annexed in 1885. It currently has 8,275 square miles. Lake County is bounded on the north by Deschutes County, on the east by Harney County, on the south by the State of California, and on the west by Klamath County.

The 1875 Lake County census showed a population of 944, which jumped to 2,804 by 1880. Since then there has been some fluctuation in population, but with a fairly steady growth to a population of 7,882 in 2010. This represented a 6.2% increase over the 2000 population.

Wheeler County

Wheeler County was established on February 17, 1899. Formed from parts of Grant, Gilliam, and Crook Counties, there have been no boundary changes since its creation. The county shares boundaries with Gilliam and Morrow Counties to the north, Wasco and Jefferson to the west, Crook to the south, and Grant to the east. The county was named for Henry Wheeler, who operated the first stage line through the county. The area of the county is 1,713 square miles, and the county seat is located in the city of Fossil.

Wheeler County's 2010 population was 1,443. This represented a decrease of 6.7% from 2000.

Table 180. Population data in the seven Zone of Influence counties for the Ochoco Summit Trail System project.

County	Population		Change	Percent Change
	2000 Census Data	2013 Census Data		
Crook	19,182	20,894	1,712	8.9
Deschutes	115,367	160,565	45,198	39.2
Grant	7,935	7,359	-576	-7.3
Harney	7,609	7,314	-295	-3.9
Jefferson	19,009	21,461	2,452	12.9
Lake	7,422	7,862	440	5.9
Wheeler	1,547	1,292	-255	-16.5
Total	**178,071**	**226,747**	**48,676**	**27.3**
Information obtained from a report generated in December, 2015, from the "Economic Profile System-Human Dimensions Toolkit."				

Future population projections are expected to mimic that of the past decade. Deschutes, Crook, and Jefferson Counties are expected to continue with growth, whereas the more rural counties, Wheeler, Grant, Harney, and Lake are projected to grow quite slowly, if at all.

Employment

Table 181 summarizes the changes in the civilian labor force in Central Oregon over the last decade.

Table 181. Changes in civilian labor force in the Zone of Influence for the Ochoco Summit Trail System project.

County	Civilian Labor Force		Change	Percent Change
	2000 Census Data	2013 data		
Crook	8,764	7,677	-1,087	-12.4
Deschutes	58,836	69,789	10,935	18.6
Grant	3,792	2,924	-868	-22.9
Harney	3,765	3,083	-682	-18.1
Jefferson	8,918	7,871	-1,047	-11.7
Lake	3,371	3,285	-86	-2.5
Wheeler	662	571	-91	-13.7

Total	88,108	**95,200**	**7,092**	**8.0**
Information obtained from reports generated in December, 2015, from the "Economic Profile System-Human Dimensions Toolkit."				

The following information comes from a report generated by the "Economic Profile System-Human Dimensions Toolkit" in December, 2015. In Crook County, the three largest sectors were education, health care and social assistance, (1,427), retail trade (1,101), and manufacturing (894). In Deschutes County the three largest sectors were education, health care, and social assistance (13,274), arts, entertainment, recreation, accommodation, and food (10,113) and retail trade (8,805). In Grant County the three largest sectors were education, health care and social assistance (589), agriculture, forestry, fishing, hunting, and mining (524), and arts, entertainment, recreation, accommodation, and food (318). In Harney County, the three largest sectors were agriculture, forestry, fishing, hunting and mining (901), education, health care and social assistance (533) and public administration (404). In Jefferson County the three largest sectors were education, health care and social assistance (1,357), retail trade (1,070), and manufacturing (976). In Lake County the three largest sectors were agriculture, forestry, fishing, hunting and mining (889), education, health care and social assistance (567), and public administration (343). In Wheeler County the three largest sectors were agriculture, forestry, fishing, hunting and mining (119), education, health care and social assistance (107), and retail trade (71). Overall, the number of jobs in most sectors has declined in recent years; in Deschutes County, however, jobs increased in all sectors but wholesale trade.

As of November, 2015, the unemployment rate in Oregon as a whole was 5.7 percent; while unemployment rates in the individual counties were[9]:

- Crook, 8.3 percent;
- Deschutes, 5.8 percent;
- Grant, 8.6 percent;
- Harney, 7.3 percent;
- Jefferson, 7.6 percent;
- Lake, 7.2 percent; and
- Wheeler, 5.0 percent.

Population Characteristics of OHV Users

This section briefly describes the population characteristics of OHV users in the Pacific Region (Oregon, Washington, and California), Oregon, and the local Central Oregon area; the information is based on the 2008 report "Off-Highway Recreation in the United States and its Regions and States: An Updated National Report," which was produced by the National Survey on Recreation and Environment, Internet Research Information Series.

Population Characteristics of OHV Users in the Pacific Region

In the Pacific Region (Washington, Oregon, and California), the rate of OHV participation (18.7 percent) is nearly the same as the national rate. The 6.9 million OHV users living in the Pacific region are about 16 percent of the national total. Similar to other regions, participation declines with age. People under age 30 are about three times more likely to participate as those over 50. Males are also significantly more likely to be OHV users than females. American Indians have the highest participation rate (31 percent) among racial and ethnic groups, just as they do in every other region. Though the Hispanic rate (14 percent) is next to the lowest, the number of Pacific Hispanic OHV users (about 1.3 million) is second only to Whites. This is due to the large Hispanic population, especially in California.

[9] Retrieved on December 23, 2015, from http://www.qualityinfo.org.

People with family incomes over $50,000 all participated at similar rates (23 to 27 percent). Only 12 percent of the lowest income class participated. Similar to every other region, the highest educated strata participated at the lowest rates. Just 13 percent of people with post-graduate degrees were OHV users compared with 21 percent of high school graduates and those attending some college or technical school. Also similar to every other region, the participation rate for non-metropolitan residents (32 percent) was much higher than for metro-area dwellers (18 percent), however, since the population in the Pacific region is more than 90 percent metropolitan, this population group dominated the OHV users, accounting for about 89 percent of the 6.9 million participants.

Population Characteristics of OHV Users in Oregon

The data show that Oregon has a slightly higher percentage of OHV users than the Pacific region as a whole. The 2004 Oregon Statewide Motorized Trail User Survey was conducted over a four-month period from January to April 2004 by the University of Oregon's Survey Research Laboratory. The survey found that seven percent of Oregon households have a person reporting motorized trail use, amounting to 98,000 households in the state. ATV riding is the most popular activity, with 70 percent of motorized trail users having engaged in that activity during the past year followed by off-road motorcycling (44 percent). Most motorized respondents were male, and the median age was 40 – 49 years old. More than half had some college (62 percent), although most were not college graduates (21 percent). Median income was $40,000 to $69,999.

Population Characteristics of OHV Users in Central Oregon

Based on the initial data of the Central Oregon Off-Highway Vehicle Use Study conducted by Virginia State University during 2008, 77 percent of the visitors are returning users to Central Oregon OHV trails. Seventy percent of the visits are overnight use and average a three day trip. Thirty percent make day use trips averaging a six hour day. In a typical year, 12 days were spent recreating in Central Oregon, 24 days at other OHV areas. The average miles from the primary residence to this area was 129 miles.

The composition of the various groups visiting the area was 42 percent friends, 30 percent family and friends, 24 percent family, three percent single and 1½ percent organized club or organization. Forty one percent of the visitors were 31-40 years old.

A 2006 study (Outdoor Industry Foundation) estimated that 72 percent of Americans aged 16 and older participated in an outdoor activity in 2005, with hiking, running and bicycling on trails being three of the most frequently reported activities. Non-motorized recreation continues to be one of the most popular categories of recreation throughout the state and within the local region. National Visitor Use Monitoring (NVUM) findings show that most visitors participate in non-motorized activities (English et al., 2003). A description of visitor activities was compiled from the survey. Visitor's top picks while visiting the Ochoco National Forest were viewing wildlife, natural features and scenery; primitive camping; fishing, hunting, and developed camping. Each visitor also picked one of these activities as their primary activity for the current recreation visit to the Forest; the top primary activities on the Ochoco were developed camping, viewing wildlife/nature, hunting, horseback riding, and general relaxing. Dispersed camping and day use picnicking on the Ochoco account for about 27 percent of visitors' primary or secondary activities.

National Visitor Use Monitoring data indicate that big game hunting is a popular activity on the Ochoco National Forest, which is a regionally and even nationally popular destination for big game hunting. Approximately 22.6 percent of visitors identified hunting as either a primary or secondary activity on the Ochoco. Hunting was also in the top five most popular activities for visitors to the Ochoco.

Although many of these activities are often classified as "non-motorized," the lines between motorized and non-motorized uses begin to blur for many of these activities. For instance, viewing

natural features and hunting can be motorized or non-motorized activities. Primitive camping could be considered by some to be any camp outside of developed campgrounds that they may have accessed with motorized vehicles for generations, while other visitors taking the survey might consider primitive camping to be a campsite in a remote Wilderness area only accessible after many hours of hiking. Available survey data do not make any distinction for whether motorized use is associated with these activities, although there are data regarding OHV use specifically as both a primary and secondary activity.

Off-Highway Vehicle Uses

National Visitor Use Monitoring (NVUM) findings indicate that the Ochoco was not a major provider of OHV (Off-Highway Vehicle) recreation in the year surveyed. Nationally, about 2.5 percent of the 205 million annual recreation visits to National Forests identified OHV use as their primary activity, with a slightly higher percentage (3.1 percent) as a secondary activity. Data for the Ochoco National Forest indicate a secondary use of 3.1 percent. For the Ochoco National Forest, the survey found that there were no recreation visits that year that were primarily for OHV use; the Ochoco ranks in the bottom three out of twenty administrative units in the Pacific Northwest Region of the Forest Service (R6) for primary OHV uses.

A somewhat larger percentage of visitors indicated that they participated in OHV recreation even if it was not their primary reason for visiting the Forest. For the Ochoco National Forest, the total percentage of visitors that reported OHV use as a primary or secondary activity was 3.35 percent of all the visits, or roughly 19,900 visits. These data are considerably below the average percent participation for Oregon overall (22.2 percent participation) as reported in the National Survey on Recreation and the Environment (Cordell et al., 2008). Considering both primary and secondary percentages, the Deschutes ranks slightly lower than middle, while the Ochoco ranks near the middle.

These data do not necessarily reflect the apparent local and regional demand for motorized trail systems in the area. Central Oregon is a regional destination for OHV trails, with many hundreds of miles of trails that can be used throughout the year. Based on the initial data of the Central Oregon Off-Highway Vehicle Use Study conducted by Virginia State University during 2008, East Fort Rock is the most used area for OHV recreational purposes; second is Millican Valley.

Cost Estimates

As constructions costs can vary significantly, only rough cost estimates can be used to demonstrate the economic range between the alternatives. With each of the proposed trail systems, there will be rutting, surface concerns, design needs for steep slopes and stream adjacency design concerns which would add to the construction cost. As a way to compare the construction of the new routes proposed for each alternative, the following rough cost estimates, based on ground slope, were developed. Estimates were based on the use of a Sweco trail building machine, a generic mini-excavator, operators, several laborers and saws for clearing and construction of the Class I and Class 3 trails. These values are only for analysis purposes to show the economic comparison of the alternatives. The estimates were broken into three slope ranges and do not include design, layout, signage or any sort of special constructed features or techniques:

- 0 - 15% Ground slope: $1,760/Mile
- 16 - 25% Ground slope: $2,840/Mile
- 26% + Ground slope: $4,340/Mile.

For this project, the slope breaks in the slope erosion map are 0-20%, 21-35%, 36-50% and greater than 51%. Table 182 reflects a summary of the new routes length (miles) for each alternative, broken out by slope. In order to use the cost per mile, 0-20% equates to the 0-15% value, 21-35% = 16-25%,

>36% = 26%+. It was recognized that the flatter slope cost of $1,760/mile might be low for the 20% slope but this is a very rough estimate. For the purposes of this analysis, a rough estimate at $45,000 for each fiberglass bridge is assumed. The price for culverts might range from $10,000 - $20,000. For comparison purposes, the estimated costs for each alternative displayed in Table 182.

These estimates do not include design, contract development, installation nor construction inspection costs. An estimate for the boardwalks or fords was not developed. These costs also do not reflect development of the proposed staging areas, play areas, parking area or trail heads.

Alternative 2

In Alternative 2, for the majority of the new route construction, the slopes range from 0-20%. Cost for construction of new routes will vary by the slopes they cross. Based on cost estimates, the rough cost for actual construction of the new segments would run around $166,500, and bridges would cost $720,000, not including design costs.

Alternative 3

In Alternative 3, for the majority of the new route construction, the slopes range from 0-20%. Cost for construction of new routes will vary by the slopes they cross. Based on cost estimates, the rough cost for actual construction of the new segments would run around $101,960, and bridges would cost $630,000, not including design costs.

Alternative 4

In Alternative 4, for the majority of the new route construction, the slopes range from 0-20%. Cost for construction of new routes will vary by the slopes they cross. Based on cost estimates, the rough cost for actual construction of the new segments would run around $194,800, and bridges would cost $765,000.

Alternative 5

In Alternative 5, for the majority of the new route construction, the slopes range from 0-20%. Cost for construction of new routes will vary by the slopes they cross. Based on cost estimates, the rough cost for actual construction of the new segments would run around $113,000, and bridges would cost $1,035,000.

Table 182. Comparative costs per alternative based on new route length, ground slope and proposed culverts and bridges.

	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Class 1 (ATV)	31.06 miles/$62,627	21.92 miles/$47,991	51.09 miles/$105,029	18 miles/$37,000
Class 2 (Jeep)	12.39 miles/$53,772	0	11.24 miles/$48,797	7.8 miles/$34,000
Class 3 (Motorcycle)	25.67 miles/$50,027	28.40 miles/$53,971	22.14 miles/$40,937	25 miles/$42,000
Trail Cost Estimate	$166,500	$101,961	$194,762	$113,000
Culverts	92 cmps at $92,000	27 cmps at $27,000	111 cmps at $111,000	73 cmps at $73,000
Bridges	16 at $720,000	14 at $630,000	17 at $765,000	23 at $1,035,000
Total Cost Estimate	$978,500	$759,000	$1,071,000	$1,221,000

Effects of Forest Plan Amendments

This section includes the entire analysis of effects of Forest Plan amendments.

The description of the alternatives in Chapter 2 of this final EIS includes five Forest Plan amendments proposed for the implementation of Alternatives 2 and 4 and four Forest Plan amendments for Alternatives 3 and 5. The amendments relate to Forest Plan standards and guidelines within Old Growth Management Areas and on scablands.

Old Growth Management Area Forest Plan Amendments

As described in Chapter 2 of this EIS, Alternatives 2, 4 and 5 include site-specific Forest Plan amendments to standards and guidelines that apply within Management Area F6, Old Growth Management Areas (OGMA). Alternatives 3 and 5 include the same proposed amendments, except for #3 (amendment in OGMA OG-D2-11)

The following amendments are proposed:

- Amend standards and guidelines that apply to Old Growth Management Area (OG-D1-08) at Indian Butte to allow motorized recreation only on designated routes including one new trail segment to connect between roads 2200-306 and 2200-309.
- Amend standards and guidelines that apply to Old Growth Management Area (OG-D1-12) at East Porter to allow motorized recreation only on designated routes including one new trail segment at Looney Creek to connect between roads 4200-430 and 4200-440.
- Amend standards and guidelines that apply to Old Growth Management Area (OG-D2-11) near Chamberlin Spring to allow motorized recreation only on designated routes including one trail segment on existing disturbance (closed road 4250-700) to connect between roads 4250-610 and 1200-440.
- Amend standards and guidelines that apply to Old Growth Management Area (OG-D2-02) near Deep Creek to allow motorized recreation only on designated routes including one new trail segment.

As described in the Ochoco Forest Plan (page 4-48), there are about 19,570 acres of old growth mixed conifer and ponderosa pine stands identified as Old Growth Management Areas located on the Ochoco National Forest.

Management Emphasis in OGMA: To provide habitat for wildlife species dependent upon old growth stands.

Desired Condition: The Forest Plan indicates that old growth stands in OGMAs are not expected to change significantly in the 10-50 years following publication of the Plan (1989), barring a natural catastrophe. The desired condition is for the OGMAs to continue to provide habitat for dependent wildlife species including pileated and white-headed woodpeckers and flying squirrels, and non-dependent species such as deer and elk. Management activities and roads will generally not be evident.

Standards and Guidelines and Reasons for Amending

Forest-wide and management area Standards and Guidelines relevant to this project include the following: LRMP 4 -178 describes MA-F6 Old Growth as within the Recreation Opportunity Spectrum of Semiprimitive Nonmotorized, except snowmobiles operating on adequate snow base between December 1 and May 1; LRMP 4-188-189 states “no motorized or mechanized use allowed on trails” in MA-F6; LRMP 4-232 states “Constant service roads will remain open. Use on all other

roads across the management areas will be eliminated;" LRMP 4-234 states "Motorized use restricted to over-snow use only."

The amendments would allow the authorization of:

- Class I and III (50" tread for ATV and motorcycles) to cross through OG-D1-08 (Indian Butte) on one designated route (all action alternatives; see **Figure 23**);
- Class III (24" tread for motorcycles only) to cross through OG-D1-12 (East Porter) on one designated route (all action alternatives; see **Figure 24**);
- Class III (24" tread for motorcycles only) to cross through OG-D2-11 (Chamberlin Spring) on one designated route (Alternatives 2and 4 only; see Figure 25)
- Class III (24" tread for motorcycles only) to cross through OG-D2-02 (Deep Creek) on one designated route (all action alternatives; see Figure 26).

The proposed amendments are site-specific and apply only to the proposed segments of connecter trail. They are proposed in order to allow orderly and logical trail system design by linking existing roads that are proposed to be part of the designated trail system in each action alternative.

Effects of the Action Alternatives

The proposed trail segments in OGMAs are all within habitat blocks that are bordered by well-travelled existing open roads and all each proposed trail segment is in proximity to existing open roads; therefore the change in area within the allocation that is in proximity to motorized routes would be negligible. Each proposed trail segment would cross a linear timbered feature, less than ½ mile in width and surrounded by open areas; no proposed segment would cross a large block of interior forest habitat. Each proposed trail segment is limited to a specific tread width (3 segments would be 24" and one would be 50"); therefore the anticipated change in interior forest habitat within the allocation would be negligible. Effects of the proposed alternatives to OGMAs are also discussed in the "Wildlife" section in Chapter 3 of this final EIS. The estimate for clearing for new trails would range from 0.76 acres for Alternative 3 to 0.84 acres for Alternative 2. The remaining miles of proposed trails within OGMA are on existing road beds.

The Recreation Opportunity Spectrum (ROS) would be affected within these OGMAs in proximity to the proposed trails, as analyzed and disclosed in the Recreation section of this EIS (Table 48). A change in non-motorized visitation in these areas as a result of the proposed trail segments is unlikely; however, the trails would be available for use for other types of recreation, including mountain biking, hiking or horseback riding.

Scabland Forest Plan Amendments

There are 41,296 acres within the project area identified as shrub-scabland habitat (see Table 172). As described in Chapter 2 of this FEIS, all action alternatives include project-specific Forest Plan amendments to standards and guidelines that apply to scabland habitats. One amendment of the Forest Plan is proposed to make it possible to allow crossing of scablands on designated routes primarily on existing disturbance (old road beds).

Standards and Guidelines and Reasons for Amending

Forest-wide Standard and Guidelines for Recreation state "ORV use on scablands will be limited to snowmobiles operating on an adequate snow base" (LRMP 4-177).

The proposed amendments are site-specific and apply only to proposed segments of connecter trail, most of which are located on existing disturbance. These trail segments are proposed in order to allow orderly and logical trail system design by linking existing roads that are proposed to be part of the designated trail system in each action alternative.

Effects of the Action Alternatives

Potential impacts to scablands are analyzed and disclosed in the "Special Plant Habitats" section of this FEIS. Project Design Criteria for trails crossing scablands are included in Chapter 2 of this document. The project also includes monitoring, education and enforcement, which will help to ensure that riders stay on designated routes when crossing scablands.

Effects to shrub-scabland, including biological soil crust, would be long-term to permanent, but small in magnitude, with the most potential impact occurring near gathering areas. Acreage-wise there would be little scabland area affected, 21 acres, 8 acres, 26 acres and and 16 acres for Alternatives 2, 3, 4 and 5 respectively, out of 41,296 acres present within the project area.

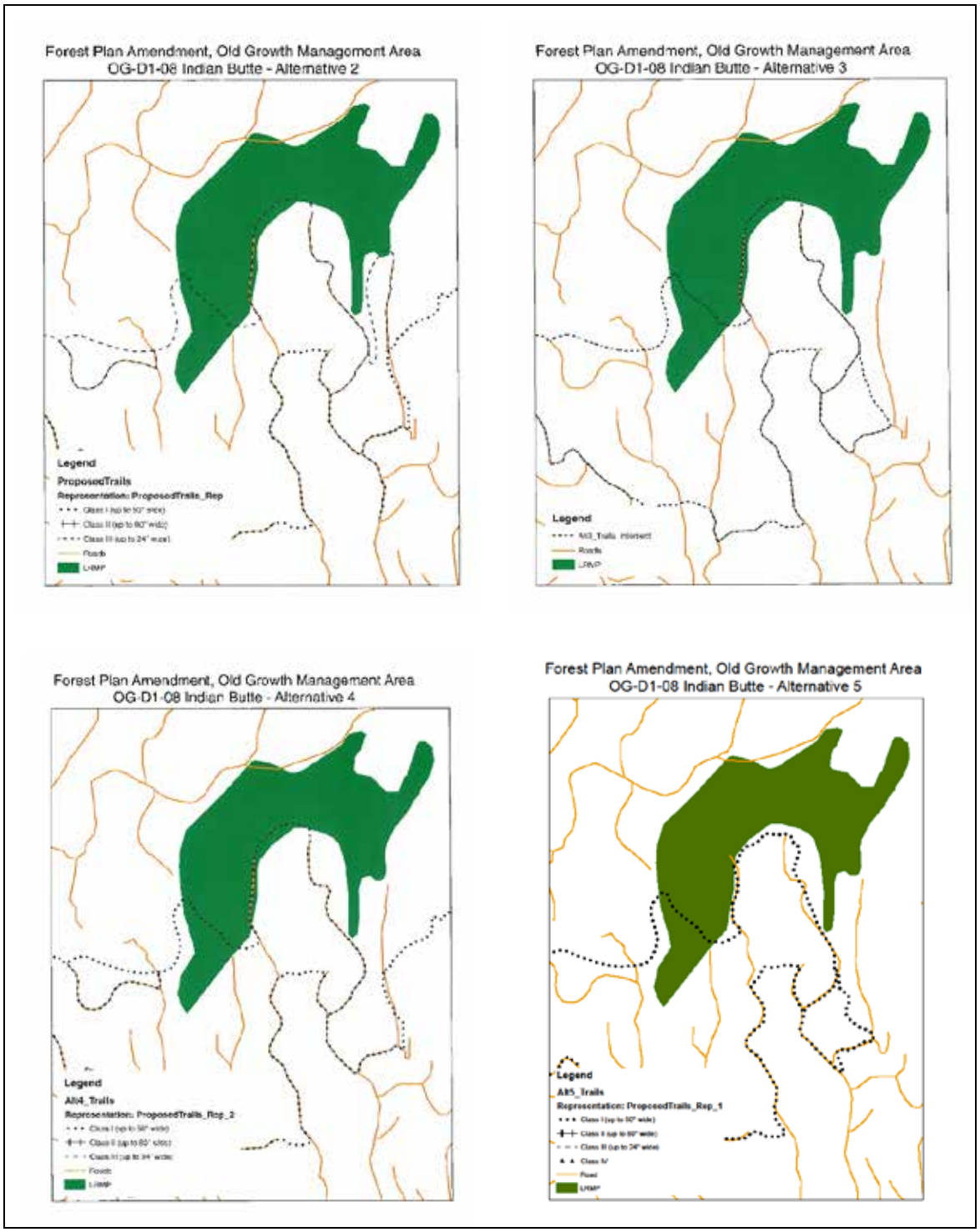


Figure 23. Proposed OHV trail in and in the vicinity of OG-D1-08, by alternative.

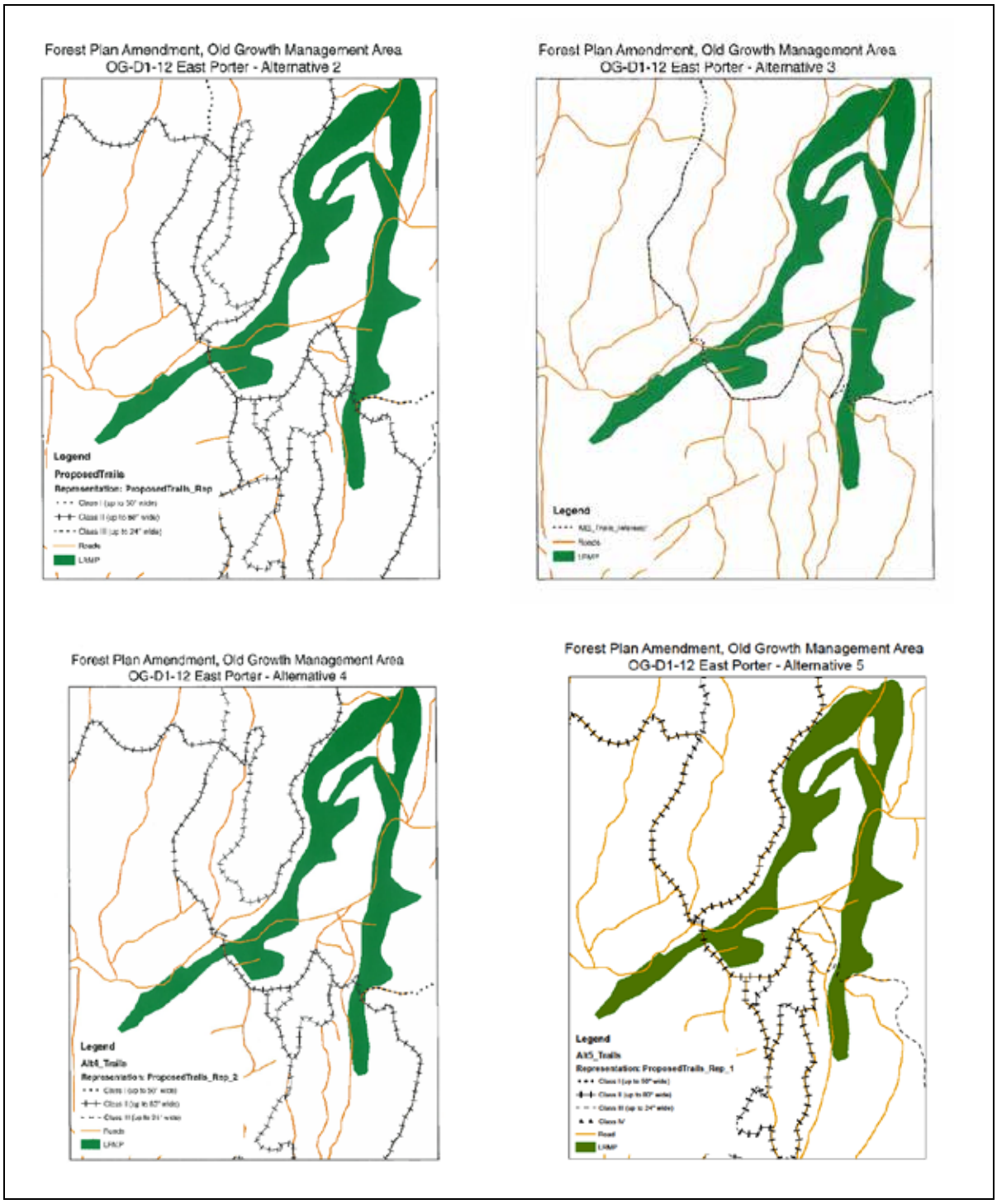


Figure 24. Proposed OHV trail in and in the vicinity of OG-D1-12, by alternative.

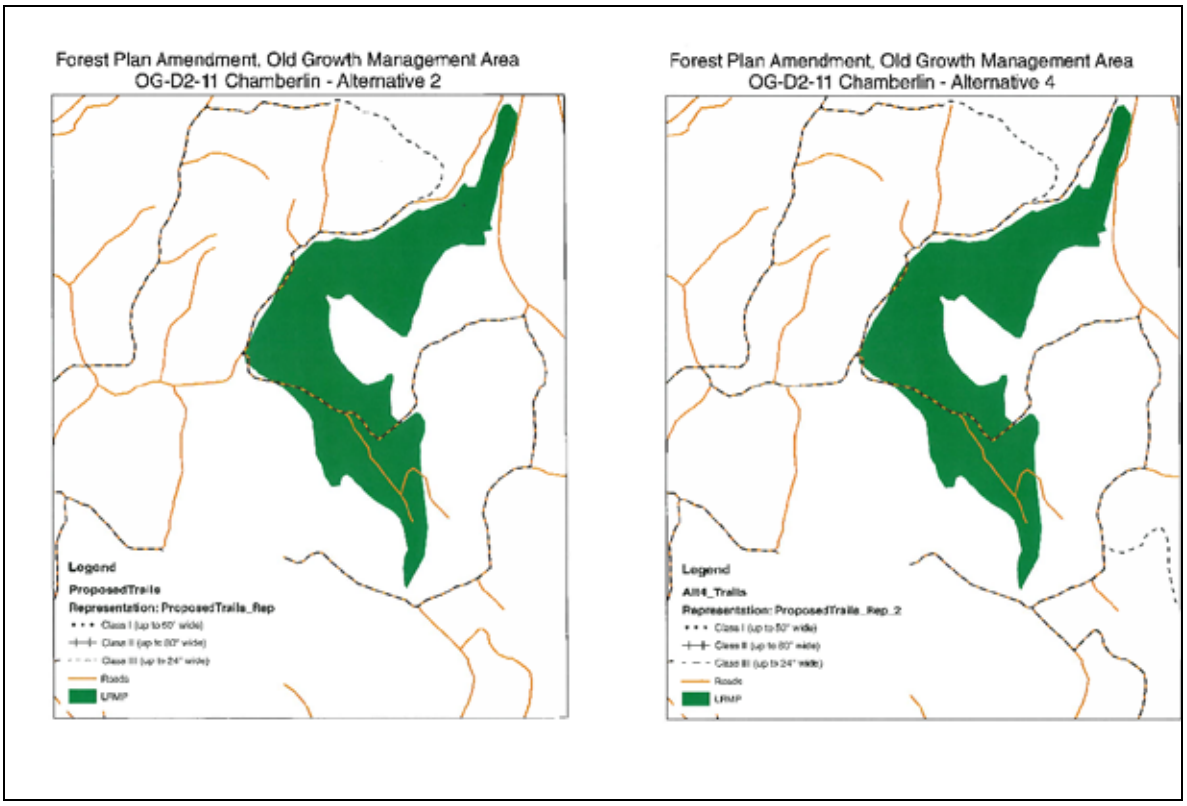


Figure 25. Proposed OHV trail in and in the vicinity of OG-D2-11, by alternative.

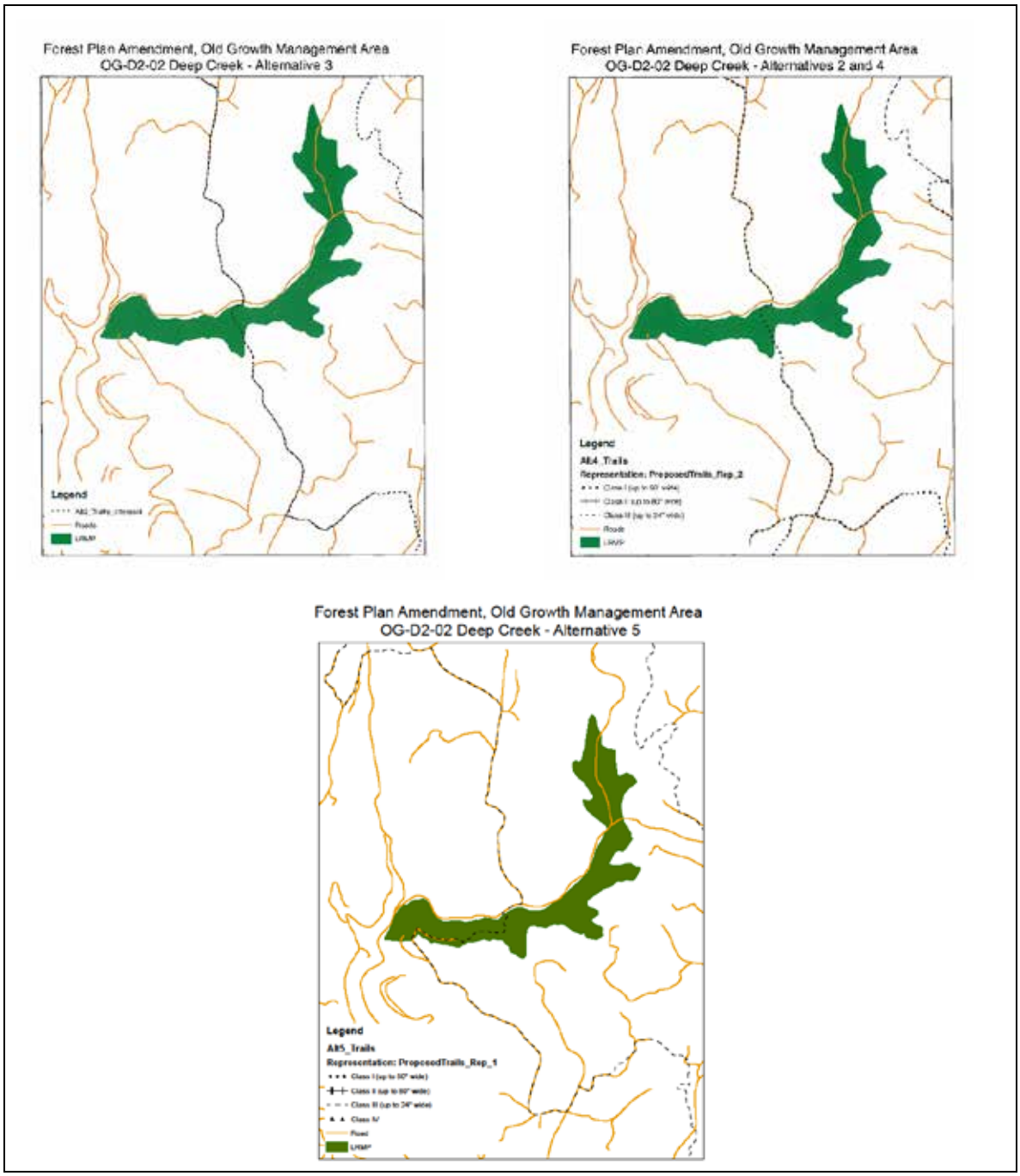


Figure 26. Proposed OHV trail in and in the vicinity of OG-D2-02, all action alternatives.

Civil Rights and Environmental Justice

Civil Rights legislations, especially the Civil Rights Act (CR) of 1964, Title VI, prohibit discrimination in Forest Service program delivery. The underlying principal behind the Civil Rights Act is that no activity shall negatively affect minorities, woman, or persons with disabilities by virtue of their race, color, sex, national origin, religion, age, disability, or material or familial status.

Environmental Justice, Executive Order 12898, demands the fair treatment and meaningful involvement of all people. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from the execution of our actions. Environmental Justice focuses on minority, low income groups, and subsistence lifestyles (including Native American Tribes). The purpose of involving these groups and analyzing the effects upon them is to determine whether adverse civil rights impacts are anticipated, or whether disparate or disproportionate impacts associated with the alternatives is anticipated on any of these groups.

With this project, there is no known potential for disparate or disproportionate effects, or to discriminate against or negatively impact any individual or subset of the population described above.

The reinforcement of existing road closures, given the nature of the project area and its extensive system of open roads, would not impede access throughout the project area. The actions proposed under Alternatives 2, 3, 4 and 5 would not have any measurable impacts on Tribal rights (ceded lands) or Tribal traditional uses. The project is not located in a minority community nor would it affect residents of low or moderate income. Potential impacts would not affect any specific subset of the American population at a disproportionately higher rate than others.

The effects of this project on the social and economic context of these groups are within those described in the Forest Plan. The benefits and risks associated with implementation of the proposed action are provided to all members of the public. Therefore, the project would not pose disproportionately high or adverse effects to minority communities or to low income groups. As a result, no formal Civil Rights Impact or Environmental Justice Analysis was undertaken.

Short-term Uses and Long-term Productivity

NEPA requires consideration of “the relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity” (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

The action alternatives propose development and designation of a trail system for motorized recreation. Much of the proposed trail in each alternative is located on existing disturbance; however, there would be some degree of new trail construction associated with each alternative. Once completed, the trail system would be expected to exist as a long-term recreation opportunity.

Recent trends of uncontrolled motorized recreation may not be sustainable over the long term. Proposed alternatives are intended to move conditions toward a balance of managed motorized recreation and sustainable vegetative, soil and watershed conditions. Soil and Water are two key factors in ecosystem productivity and protection of these resources is provided by the design criteria discussed in Chapter 2. Sustainable wildlife habitat, water quality and other resources depend on maintaining the long-term soil productivity upon which vegetation relies. No long-term effects to water resources are anticipated as a result of developing and designating a motorized trail system. All

alternatives provide fish and wildlife habitat at levels necessary to maintain viable populations of the species within the project area.

Unavoidable Adverse Effects

NEPA requires disclosure of "… any adverse environmental effects which cannot be avoided should the project be implemented…" (40 CFR 1502.16).

All of the alternatives considered result in some adverse effects. Many of these adverse effects would be minimized through implementation of design criteria and resource protection measures identified in Chapter 2 or through mitigation measures. Even with implementing these measures, there would still be adverse effects that cannot be avoided.

Soils

Additional detrimental soil conditions are expected as a result of implementing Alterative 2, 3, 4 or 5. The use of ground-based trail construction equipment would result in additional compaction and displacement. Use of OHV equipment and traffic by other users would keep the surface of the designated trail in a disturbed condition. Implementation of the design criteria and monitoring described in Chapter 2 would minimize these adverse effects. Proposed season of use is limited in order to reduce impacts to soils. The alternatives were designed to limit the amount of detrimental soil conditions consistent with R6 Supplement 2500-98-1 (Regional Guidelines), effective August 24, 1998 by focusing proposed trail location on existing disturbance where it is available. New trail construction is proposed on segments needed to connect between segments that are on existing disturbance.

Staging area and/or trail head construction would also result in adverse effects on soils. Parking area and road construction results in soil compaction and displacement. Development of campsites, toilets, picnic areas and signboards can also result in soil displacement, compaction and impacts to of vegetative cover. On closed and decommissioned roads and user created trails where reinforcement of existing closures, rehabilitation and/or concealment are proposed, the soil surface can be revegetated, but soil productivity may remain reduced due to compaction. See the Soils section for more details on potential impacts to soil resources.

Invasive Plants

The potential for introduction and spread of invasive plants exists under every alternative considered, including no action. A risk assessment concluded that the potential for introducing and spreading invasive plants cannot be completely avoided. All action alternatives create conditions that are conducive to the introduction and spread of invasive plants. Use of OHV equipment and traffic by other users would keep the designated trail surface in a non-vegetated condition, which would be vulnerable to introduction and spread of invasive plants. Implementation of design criteria and monitoring as described in Chapter 2 would minimize these adverse effects.

Proposed activities such as trail, staging area or trailhead construction, campsite and picnic area development, and reinforcement of closures on unwanted routes could result in conditions conducive to the introduction and spread of invasive plants. Under proposed action alternatives invasive plant spread would be monitored and new sites would be proposed for treatment with an early detection rapid response strategy under the 2012 Invasive Plant Treatments EIS. See the Botany section for more details on potential impacts from invasive plant species.

Sedimentation/Turbidity

All action alternatives propose new OHV routes, staging areas or trailheads, and public use areas such as campsites and picnic areas. Use of OHV equipment and traffic by other users would keep the

designated trail surface in a non-vegetated condition and would be a potential source of sediment. Most sediment delivered to streams would come from stream crossings, trail drainage close to streams and closure and rehabilitation of unwanted routes adjacent to Class IV streams and in ephemeral draws. Implementation of design criteria and monitoring as described in Chapter 2 would minimize these adverse effects.

Proposed activities such as trail, staging area or trailhead construction, campsite and picnic area development, and decommissioning of unwanted routes could result in conditions conducive to the release of sediment. Proposed season of use for OHVs on the trail system is limited in order to reduce potential for sediment release and transport. See the Hydrology section for more details on potential impacts to water quality.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights-of-way or road.

Irreversible commitments: Where over-sized materials (boulders) are removed from mineral sources and installed within the proposed trail network, they would be irreversibly committed to use for the purpose of development of this project, and they would no longer be available for other projects or for blasting and crushing to produce other aggregate materials such as riprap or gravel. Uses for such rock materials under this project would be as barriers to prevent travel on unwanted routes, width controlling devices to ensure trail use by appropriate vehicle class, obstacles to promote slow speed and improve technical challenge, constructed boulder crawls, trail surface hardening at selected locations, or as devices for defining campsites. Removing aggregate (gravel) from mineral material sources would result in an irreversible commitment of resources. Once aggregate is removed from material source sites and used in development of the proposed trail system, it cannot be renewed except over long periods of time. Use of materials such as gravel and riprap would occur at selected sites for the following purposes: selected hardening of the trail surface, construction of armored dips and fords, hardening of trailer parking areas or camp site parking, construction of bridge approaches, installation of culverts, installation of vault toilets, and hardening of areas with high foot traffic such as walkways at signboards, restrooms, and picnic sites.

Irretrievable commitments: Alternatives 2, 3, 4 and 5 propose trail construction and development of supporting areas and facilities. Construction of trails and stream crossings is an irreversible action as it involves construction of features in portions of the landscape where they do not currently exist. This results in forgone opportunities to provide primitive access to the specific locations where the features are constructed and during the time in which the features are in use, and a commitment of land to a non-vegetative state (on trail surfaces and at staging areas, parking areas and campsites) until such time that the trail system is abandoned and the disturbed sites returned back to productive capacity. Though some of these trails and facilities are already in place, some of them would be changes from the existing condition and would thus represent an irretrievable commitment of the sites to use under a designated OHV trail system during the proposed season of use. The areas and routes would be available to other uses year round, but the time that they would not be utilized by OHVs would be limited to the season when use by OHVs is prohibited. Refer to Chapter 2 for proposed season of use under each of the action alternatives.

The action alternatives would designate some mineral material sources as staging areas and/or play areas, but some of these areas have already been committed to extractive use (rock material source) by past actions. Some of these mineral material sources are no longer in use for extraction. Refer to the Geology section for more details on mineral material sources. In some cases, such as with Six

Corners, the area proposed for development of the staging area is separate from the area currently in use for mineral material extraction. In the active material sources, use of the area is primarily for mineral material sources, and motorized used proposed by this project is secondary. Thus, when extraction is occurring at a specific proposed staging area, the portions of that staging area needed for extraction, processing, loading and hauling would be closed to OHV use during the active period.

Incomplete and Unavailable Information

The Council on Environmental Quality's implementing regulations for NEPA require that an agency disclose information that is incomplete or unavailable when analyzing effects of activities in an environmental impact statement (40 CFR 1502.22).

Current estimates of OHV users are reliable using anecdotal data from riders, and from agency and law enforcement personnel. Assumptions on number of riders over time on the Ochoco Summit trail system is based on the number of riders using the area now, State of Oregon data, and anecdotal information from a similar designated trail system on the Willamette National Forest.

What is unknown is how implementation of the Travel Management Rule will affect local and regional OHV use, and in particular, if local use will be reduced or will become concentrated into the smaller areas where such use will be permitted. Under the previous travel plan Ochoco National Forest was open to cross-country travel unless designated closed. This may have attracted riders from other areas. It is unknown whether implementation of the Travel Management Rule across all Forests in the Region will alter the destinations to which OHV users travel or the distribution of OHV use across the areas where OHV opportunities are being developed across the region.

Motorized recreation opportunities, uses and trends in the Ochoco Summit trail system project area that have been summarized and disclosed in this EIS provide sufficient information about both motorized and non-motorized future uses for the decision-maker to reasonably distinguish between the alternatives.

Energy Requirements

Motorized recreation in particular, as well as recreation in general, results in the consumption of energy. For environmental impact statements, NEPA requires a discussion of the energy requirements and conservation potential of proposed alternatives and mitigation measures [40 CFR 1502.18(e)].

Many people travel in and through the Ochoco National Forest every year, to access recreation opportunities, commute and/or work, transport goods and livestock, or on their way to other destinations. Almost all visitors to Ochoco National Forest utilize some type of motorized vehicle to access the Forest. While there is no quantifiable estimate, motor vehicle use in and through the Forest is increasing, and therefore associated energy use is also increasing.

Energy-consuming activities associated with recreation use in the Ochoco Summit Trail System project area include motor vehicle use to transport OHVs to staging areas, use of power generators at camp sites, driving for pleasure on Forest roads, and use of OHVs themselves on and off trail systems. Additional energy-consuming activities associated with any of the action alternatives would include use of vehicles, on and off-road, to transport Forest workers, volunteers and law enforcement officers, and motorized equipment used for trail construction, development of staging areas, installation of sign boards, and reinforcement of existing closures at crossings with unauthorized and unwanted routes.

The action alternatives include designating a trail system on which OHVs may be used in an area where they were previously permitted to be driven cross-country, and are currently allowed to drive on 659 miles of mixed use roads. This change is unlikely to affect the energy consumption within the

project area. There are no irregular energy requirements involved in implementation of any action alternatives.

Implementation of the Travel Management Rule prohibits motorized recreation from occurring anywhere but on designated routes. This may displace some motorized recreation to other areas, and may focus use onto existing mixed use roads and trails, as well as onto any trail system implemented through the action alternatives analyzed in this EIS. The effects on energy consumption from these possible changes in use patterns are not expected to be measurable.

Effects on Laws, Regulations, Plans, Policies, and Procedures

The National Environmental Policy Act 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 section includes a brief summary of those laws, policies, and executive orders that are relevant to the proposed actions considered in this EIS.

The National Environmental Policy Act (NEPA)

NEPA establishes the format and content requirements of environmental analysis and documentation as well as requirements for public involvement and disclosure. The entire process of preparing this environmental impact statement was undertaken to comply with NEPA.

National Forest Management Act

The National Forest Management Act (NFMA) directs all action taken on National Forests to be consistent with the Forest Land and Resource Management Plans prepared in accordance with the regulations of the NFMA. The regulations in this subpart set forth a process for developing, adopting, and revising land and resource management plans for the national Forest System as required by the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended. These regulations prescribe how land and resource management planning is conducted on National Forest System lands. The resulting plans shall provide for multiple use and sustained yield of goods and services from the National Forest System in a way that maximizes the long-term net public benefits in an environmentally sound manner. Guidelines for modification of management areas or prescriptions are provided in the LRMP (4-47 and Chapter 5).

Forest Plan Consistency- Ochoco National Forest

Federal regulations (36 CFR 219.10(e)) require that permits, contracts, cooperative agreements, and other activities carried out on the Ochoco National Forest be consistent with the Ochoco National Forest Land and Resource Management Plan, as amended (see FEIS page 260). Alternatives presented in this document are consistent with the long term objectives as discussed in the Forest Plan as amended except as discussed below in the section titled "Forest Plan Amendments."

The Ochoco National Forest Plan has a variety of Standards and Guidelines that restrict some or all motorized access within certain Management Areas. In the past, this guidance was translated into Travel Plan maps that were published for summer and winter. The Motor Vehicle Use Map (MVUM) published after the release of the Record of Decision for the Travel Management Rule functions as the new Travel Map for the Ochoco National Forest. Separate trail system maps would be published after the Record of Decision has been signed for the Ochoco Summit Trail System project.

Non-Significant Forest Plan Amendments

Old Growth Management Areas: There are three site specific amendments to the Ochoco Land and Resource Management Plan for Alternatives 2, 3, 4 and 5, and one additional amendment that applies only to Alternatives 2 and 4. All of these are related to designation of motorized crossings in Old Growth Management Areas (MA-F6) allocated in the 1989 LRMP other than on constant service roads (4-232, 4-234):

- Old Growth Management Area (OG-D1-08) at Indian Butte to include motorized recreation only on designated routes including one new crossing to connect between roads 2200-306 and 2200-309. This amendment applies to Alternatives 2, 3, 4 and 5.
- Old Growth Management Area (OG-D1-12) at East Porter to include motorized recreation only on designated routes including one new crossing at Looney Creek to connect between roads 4200-430 and 4200-440. This amendment applies to Alternatives 2, 3, 4 and 5.
- Old Growth Management Area (OG-D2-11) near Chamberlin Spring to include motorized recreation only on designated routes including one crossing on closed road 4250-700 to connect between roads 4250-610 and 1200-440. This amendment applies to Alternatives 2 and 4.
- Old Growth Management Area (OG-D2-02) near Deep Creek to include motorized recreation only on designated routes including one new crossing. This amendment applies to Alternatives 2, 3, 4 and 5.

Scablands: One additional amendment would apply to all action alternatives, and would amend Forest Plan standards and guidelines that preclude motorized vehicle use on scablands.

Determination of Significance

The Secretary of Agriculture's implementing regulation indicates the determination of significance is to be "[b]ased on an analysis of the objectives, guidelines, and other contents of the forest plan" (36 CFR 219.8). The Forest Service has issued guidance for Plan amendments when using planning regulations in effect before November 9, 2000. This guidance, in Forest Service Manual (FSM) 1926.51 describes non- significant amendments as:

1. Actions that do not significantly alter the multiple-use goals and objectives for long-term land and resource management;
2. Adjustments of management area boundaries or management prescriptions resulting from further on-site analysis when the adjustments do not cause significant changes in the multiple-use goals and objectives for long-term land and resource management;
3. Minor changes in standards and guidelines; and/or
4. Opportunities for additional projects or activities that will contribute to achievement of the management prescriptions.

Each of these proposed amendments represents a minor change in the Forest Plan standards and guidelines that preclude motorized recreation in Old Growth Management Areas or scablands. These amendments would not alter the multiple use goals and objectives for long term land and resource management. See the section titled "Effects of Forest Plan Amendments" in Chapter 3 of this FEIS for analysis and disclosure of the effects of these proposed amendments.

Four additional factors were considered in this analysis: timing; location and size; goals, objectives, and outputs; and management prescriptions. An analysis of these four factors is presented below.

***Timing*:** The Forest Service Planning Handbook (1909.12, 5.32) indicates that a change is less likely to result in a significant plan amendment if the change is likely to take place after the plan period (the first decade).

All five of these plan amendments would take place in or after the 25th year of the Forest Plan, would take place within the timeframe of project implementation, and are specific to this project.

***Location and size*:** This factor takes into account the location and size of the area involved in the change and the affected area's relationship to the overall project area. Generally, the smaller the area affected, the less likely the change is to be a significant change in the Forest Plan.

All five amendments relate to new disturbance on short trail segments that would be constructed to connect existing roads. The acreage of new disturbance varies between alternatives but is extremely small, especially when compared to the project area as a whole; new disturbance in OGMAs would range from .76 to .84 acres, while disturbance in scablands would range from 16.4 acres to 42.5 acres, depending on alternative (see the section titled "Effects of Forest Plan Amendments" in Chapter 3 of this FEIS).

***Goals, Objectives and Outputs*:** This factor examines whether the change alters long-term relationships between the levels of goods and services projected by the Forest Plan. In most cases, changes in outputs are not likely to be a significant change in the Forest Plan unless the change would forego the opportunity to achieve an output in later years.

None of the proposed amendments would alter the multiple-use goals and objectives for long-term land and resource management.

***Management Prescriptions*:** This factor accounts for whether the change in a management prescription is only for a specific situation or whether it would apply to future decisions throughout the planning. It evaluates how the change alters the desired condition of the land and resources or the anticipated goods and services to be produced.

These five amendments are being proposed to allow construction of short trail segments to connect existing roads, in order to develop a logical trail system to meet the purpose and need of this project. They would apply only to implementation of the Ochoco Summit project and would not allow similar actions in the future. These amendments to the Ochoco Land and Resource Management Plan standards and guidelines would not change the desired future condition for land and resources or anticipated goods and services from what is described in the existing management direction in the Land and Resource Management Plan.

Part 212-Travel Management

Subpart A- Administration of the Forest Transportation System

212.5(b) Identification of the Road System

The responsible official has identified the minimum road system needed for safe and efficient travel and for administration, utilization, and protection of National Forest Lands. The interdiscplinary team and responsible official assessed roads within the project area on a route-by-route basis. A roads analysis for the Ochoco Summit Trail System project area was compiled, utilizing information from other projects that overlap the project area to the extent there were available, and then completing the roads analysis process for potentially affected watersheds for which a roads analysis was not available. Through an interdisciplinary process, a minimum system was identified that meets applicable statutory and regulatory requirements and reflects long-term funding expectations. This system was analyzed at the appropriate scale and is reflected in the identified routes and road closure reinforcement sites proposed in each alternative. An appropriate discussion for each resource identifies the potential adverse and beneficial environmental effects associated each road segment and overall recommendations for route designation, closure, decommissioning or maintenance are included in the roads analysis.

Subpart B- Designation of Roads, Trails, and Areas for Motor Vehicle Use

212.55 (a) and (b)Criteria for Designation of Roads, Trails and Areas

(1)Damage to soil, watershed, vegetation, and other forest resources

Chapter 3 of this document displays the effects in detail to specific resources. In summary:

Soil: Activities associated with route designation (including new trail construction) and staging areas will have an effect on the soil resource by focusing soil disturbance on a designated network that will be designed, constructed, monitored and maintained in accordance to project design criteria intended to minimize adverse effects. This will cause negative effects at the location where new trails are constructed. However, the trail design also places the trail in more ecologically suitable locations and closes unauthorized and unwanted routes that intersect the designated system, allowing natural and management-induced processes to lower the overall footprint of detrimental soil conditions across the project area. Additional detrimental soil conditions as a result of creation of new trails is limited in scope from 50-81 miles dependent upon the alternative selected. The remainder of the routes is on existing disturbance so that utilizing them as trails would not result in additional disturbance. In some cases the width of area impacted by detrimental soil conditions may be reduced in the long-run where existing compacted roads are converted to narrower trails. All alternatives have potential impacts to soil resources which are described in detail in the Soils section of this EIS.

Watershed: Key Issue #3 specifically responds to the designation of a motorized trail system that could potentially impact water quality and fish habitat. In response to this key issue Alternative 3 was developed. The overall design of the trail system is to pull motorized access away from aquatic resources compared to the existing pattern of disturbance and unauthorized routes that often run parallel to streams or through sensitive riparian areas. All action alternatives would reinforce closures of unauthorized routes that intersect the trail system. Where these unauthorized routes impact riparian areas, action alternatives may facilitate improvement of impacted areas compared to the existing condition. However, all alternatives have potential negative impacts to water resources which are described in detail in the Hydrology section of this EIS.

Vegetation: The Botany section of this EIS discloses the effects of development and use of an OHV trail system on rare plants, invasive plants (weeds) and special plant habitats. The analysis concluded the trail system and reinforcement of road closures may have a negative effect to rare and sensitive vegetation and to the risk of introduction and spread of invasive plants in the project area. In addition, action alternatives would potentially increase costs of future timber management in some circumstances because of the possible need to reuse road beds that get closure reinforcement or road-to-trail conversion. Since the majority of the area where the designated trails system is proposed has been recently managed for vegetation and fuels (Spears, Canyon, HEJ, Zane and Jackson), it would likely be more than ten years before these areas are revisited as a timber sale project. Where these projects are ongoing, or where a new project is being planned (Wolf) any potential road-to-trail conversions involving roads accessing active or planned harvest treatment units would not be implemented until affected harvest activity is completed. Also, due to the Project Design Features and objective of designing trails that are narrow and winding, removal of trees would be the exception rather than the standard and development of any of the proposed action alternatives would have a negligible impact on forested cover at the landscape scale.

Cultural Resources: Following guidelines in a 2003 Regional Programmatic Agreement (PA) among USDA-Forest Service, the Advisory Council on Historic Preservation, and the Oregon State Historic Preservation Office (SHPO), a finding of "*No Adverse Effect*" (No Historic Properties Affected) was recommended under Stipulation III (B) 5 of the Programmatic Agreement. The Forest finds that there are historic properties but the undertaking would have no adverse effect on them as defined by 36 CFR 800.16(i). Any potentially meaningful information that could contribute to the importance of a

site that might otherwise be lost would due to project implementation would be documented and reported to the SHPO. This finding is based on Project Design Features and mitigation measures that have been incorporated into the EIS to assure that no sites eligible to the National Register would be impacted by trail or staging area construction.

The Historic Summit trail (FS Road 2630 in the project area) has been evaluated and found to be eligible to the National Register of Historic Places (NRHP). The Ochoco Land and Resource Management Plan (LRMP) provides direction for the Historic Summit Trail, which includes maintaining the existing historic integrity. Segments of the proposed OHV trail system on or crossing over FS Road 2630 are on existing open road segments, but all development associated with alternatives would still be designed for consistency with emphasis and desired conditions for the Historic Summit Trail (LRMP 4-61, 4-125, 4-180, 4-182, 4-190, 4-192 and 4-193). Monitoring of this site is included in the EIS (Chapter 2) and in the SHPO report. For those cultural sites that were evaluated and not found eligible for NRHP, protection is not required.

Harassment of Wildlife and significant disruption of wildlife habitats: Chapter 3 discloses the effects of motorized use on a myriad of wildlife and their individual habitats. Key Issue #2 specifically responds to the designation of a motorized trail system that could potentially impact big game habitat. In response to this key issue Alternative 3 was developed. Development of additional motorized routes and effective closure of unauthorized and unwanted routes work in opposing ways, and may alter reproductive success, mortality, availability of habitat or habitat quality. The effects may stem from changes in access for predators and people, fragmentation of habitat, behavioral changes in response to human use, impacts due to noise, or physical alteration of habitat. Generally new routes that are in close proximity to existing open motorized routes have a less detrimental impact on wildlife than routes that are far away from existing open motorized routes. This is because the amount of habitat that has a low level of human disturbance (as measured by motorized access) is retained over more area if new routes are planned in areas that are already disturbed, rather than when they are built into areas that are currently undisturbed. Refer to the Wildlife section for a detailed discussion of disturbance bands and other effects analysis related to proposed alternatives and wildlife.

Conflicts between motor vehicle use and existing or proposed recreational uses of the National Forest System lands or neighboring Federal Lands: Key Issue #4 specifically responds to the designation of a motorized trail system that could potentially cause conflict between motorized and non-motorized recreation. Designation of a motorized trail system would contribute to the separation of uses and provide areas for quiet recreation away from the designated system, while reducing the quality of quiet recreation in proximity to the designated system. A noiseband analysis using projected noise levels of >45 bd as an indicator of where the sound of OHVs on the proposed trail system was conducted to determine if various recreational values would be affected. There would be no effect from any of the action alternatives on following developed recreation sites and trails: Walton Lake CG, Biggs Spring CG, Big Spring CG, Deep Creek CG, Cottonwood CG, Wolf Creek CG, Sugar Creek CG, Barnhouse CG, Wildwood CG, Walton Lake Trail, Lookout Mountain Recreation Area Trail Systems, Round Mountain National Recreation Trail, Ochoco Mt. Trail, Barnhouse Trail, Cold Springs Rental Cabin, Crystal Springs Organization Camp, Marks Creek Sledding Hill. There would also be no effect on Bridge Creek Wilderness, North Fork Wild and Scenic River corridor, Lookout Mountain Recreation Area, 50 miles of trails managed exclusively for non-motorized use within the project area (except for a maximum of 0.03 miles of Keeton Trail). There is also potential for competition for sites to camp or picnic. However, all action alternatives include some level of supporting areas associated with the trail system, which would help reduce conflict with existing dispersed recreation sites. Reference the Recreation section for a discussion on the types of uses that occur on the Ochoco National Forest and how they are affected by this project.

Conflict among different classes of motor vehicle uses on National Forest System lands or neighboring Federal lands: User conflict happens when a person's expectations for his or her

recreational experience are not met due to contact with another user or through disturbance from the sound or physical evidence left by another user. The potential for conflict exists among all user groups, and even within a user group. All three action alternatives were designed to provide some separation of the different classes of motor vehicles. However, all alternatives, including no action, incorporate use of OHVs on open mixed-use roads, so there is potential for conflict between OHV riders and standard motor vehicle drivers. Not all motorized conflicts on the National Forest are entirely recreation-based; the National Forest System provides a wide array of resource-based opportunities such as timber harvest, livestock grazing and mining all of which involve people traveling in motor vehicles. Reference the Recreation section for a discussion on the types of uses that occur on the Ochoco National Forest and how they are affected by this project.

*Compatibility of motor vehicle use with existing conditions in populated areas, taking into account sound, emissions, and other factor*s: The project analysis included sound and air quality (see Recreation and Air Quality sections in Chapter 3 of this document).

Public Safety: The analysis disclosed fugitive dust as a potential to affect health, although it would be localized and temporary. Trail construction would be engineered for curvilinear design to abate driver speed. Barriers, signs, and other trail delineators would be employed to reduce rider confusion. Crossings at highway-legal roads, and shared segments of open mixed use roads would be posted to alert drivers on the road of crossing or merging OHV traffic. Such intersections would also be posted with "STOP" signs and approaches that allow visibility of the cross traffic in both directions on the road for riders entering the road from either direction on the trail. Increasing use of the mixed-use routes over time would require monitoring of those routes to identify and address issues related to user safety.

Provision of Recreational Opportunities: As a result of implementation of the Travel Management Rule, this project develops a trail system and staging areas specifically for OHV enthusiasts and to provide a riding experience they have requested. This proposal would provide between 101 and 212 miles of designated interlinking trails and roads that would vary in skill level and density to provide an opportunity for beginner through advanced riders. The analysis also discloses the balance of motorized and non-motorized recreational opportunities, including the potential effect of noise on quiet recreation such as hiking in wilderness or inventoried roadless area. Designation of a motorized trail system should benefit the non-motorized user in portions of the landscape distant from the proposed motorized routes as it separates uses and provides an area for motorized use that is concentrated and managed rather than scattered and uncontrolled.

Access Needs: Section 504 of the Rehabilitation Act of 1973 says that no qualified individual with a disability can be denied participation in a Federal program that is available to all other people solely because of his or her disability. In conformance with section 504, wheelchairs or mobility devices are welcome on all NFS lands that are open to foot travel and they are specifically exempted from definition as a motor vehicle in section 212.1 of Travel Management Rule (36CFR 212.1). There is no legal requirement to allow persons with disabilities use of motor vehicles on roads, trails, or other areas that are closed to motor vehicles. Restrictions on motor vehicle use that are applied consistently to everyone are not discriminatory. This concern has already been decided by law.

Conflicts among Uses of National Forest System Lands: Chapter 3 of the EIS as a whole has a robust display of the tradeoffs associated with designation of a motorized trail system. For each resource area, there are potential conflicts as it is the nature of multiple use in the National Forest System. Key Issues drove alternatives to address the most notable conflicts and concerns. These issues include motorized use and its effect on big game habitat, water quality and fish habitat, potential conflict between motorized and non-motorized recreation and quality and quantity of recreational opportunities for OHV riders. For other conflicts among uses such as potential incursion into adjacent sensitive plant habitat or wet areas, impacts to cultural sites eligible for the National Register, project

design criteria, mitigations and monitoring are included in the EIS (Chapter 2) to reduce adverse effects and to ensure that the trail system is properly designed, constructed, maintained and operated to reduce these potential conflicts.

The Need for Maintenance and Administration of Roads, Trails, and Areas that would arise if the Uses under Consideration are designated; and The Availability of Resources for that Maintenance and Administration: The project design criteria (PDC) in Chapter 2 include design, construction and maintenance guidelines. Safety played a key role in the development of the trail design and maintenance standards. Education and enforcement are also addressed in the OHV Trail Design PDCs. and in the Recreation section of the EIS. Enforcement will be led by COHVOPS in cooperation with local law enforcement officers and volunteer patrols. Maintenance and monitoring will be conducted in accordance with all of the PDCs and will be led by COHVOPS in cooperation with local resource specialists, OHV groups and/or other interested agencies, groups or individuals. The mission of COHVOPS is to provide consistent, quality off-highway vehicle recreation opportunities that are focused on customer service and resource protection. COHVOPS manages the central Oregon OHV trail systems for the Deschutes and Ochoco National Forests and the Prineville BLM. The team implements existing OHV management plans, identifies future needs, recommends actions to management, and assists in future OHV planning efforts. COHVOPS is funded through a combination of direct support from the Forest Service, the BLM, and grant funding from the State of Oregon derived from the ATV Allocation Funds derived from the ATV Permit program and a portion of gas tax revenue.

212.55(c) Specific Criteria for Designation of Roads

(1) Speed, volume and composition on roads; and (2) Compatibility of vehicle class with road geometry and road surfacing: As part of implementation of the Travel Management Rule on the Ochoco National Forest, motorized mixed use analysis has been performed to establish the suitability of allowing motorized mixed use on roads in the context of their current setting in terms of alignment, width, typical user speed, and presence or absence of traffic control devices. Supplemental analysis has been performed on certain designated motorized mixed-use roads in the project area that have been determined to be unsuitable for a mixture of non-highway legal and highway-legal vehicles because of either their current setting or their designation as roads maintained for passenger car use (on which non-highway-legal vehicle use is prohibited). In particular, this supplemental Engineering Analysis was done on Rd 2200-150, Rd 2630 (to Indian Prairie), Rd 2630 (Scott's Camp for 2 miles west), Rd 4250, Rd 4270, Rd 4200-740, Rd 38, Rd 3810 and Rd 4276 to determine what mitigations would be necessary to reduce the crash probability and severity on these motorized mixed use roads to an acceptable level. It was disclosed that these routes would not be appropriate for mixed use due to safety concerns without modifications to alleviate those hazards. For this analysis those road segments along with all of the Maintenance Level 3, 4 and 5 roads were considered to be not available for designation as OHV routes and are not included in the proposed alternatives except a crossings of the trail over highway-legal roads. A sign plan would be developed that would include posting of all shared use routes within the Ochoco Summit Trail System with confirmation signing for the presence of OHVs as well as signs alerting traffic on highway-legal roads to the presence of OHV crossings.

No valid existing right-of-ways would be affected by the action alternatives. There has been no change or designation of motorized use in wilderness or primitive areas per CFR 212.6(b).

The National Historic Preservation Act

A cultural resource inventory was conducted in the project area. The Ochoco National Forest completed the "Project Review for Heritage Resources under the Terms of the 2004 Programmatic Agreement" with the Oregon State Historic Preservation Office (SHPO). The activities in the selected alternative have been designed to have no effect to cultural resource sites through both

protection and avoidance (see "Cultural Resources," Chapter 3 in this document). A finding of No Historic Propoerties Adversely Affected has been made for this project and the SHPO concurred with this finding on January 24, 2013. The project is compliant with SHPO regulations.

Endangered Species Act

Effects to Threatened, Endangered species are evaluated in the Aquatic Species, Botanical Resources, and Wildlife sections of Chapter 3 of this EIS. The Endangered Species Act of 1973 requires that actions of federal agencies do not jeopardize or adversely modify critical habitat of federally-listed species. The purposes of this Act are to "provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered and threatened species, and to take such steps as may be appropriate to achieve the purpose of the treaties and conventions set forth in subsection (a) of this section." The Act also states "It is further declared to be the policy of Congress that all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act."

There are no federally listed Threatened or Endangered fish, wildlife or native plant species on the Ochoco National Forest. There are two federal Candidates that have been found by USFWS to be "warranted but precluded" for listing as threatened under ESA. These are the greater sage-grouse and the California wolverine. These species are addressed in the Wildlife section.

Clean Water Act

The objective of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity of all waters to protect the beneficial uses as documented according to Oregon Department of Environmental Quality (ODEQ) criteria. A beneficial use is a resource or activity that would be directly affected by a change in water quality or quantity and are defined on a basin Action alternatives follow State of Oregon requirements in accordance with the Clean Water Act for protection of waters. Application of Best Management Practices (BMPs) are selected and designed on site-specific conditions for waters potentially affected in the Ochoco Summit Trail System project area. The interdisciplinary team has reviewed and incorporated applicable BMP water quality objectives in the design of alternatives and their mitigation measures. Standards and Guidelines for the Inland Native Fish Strategy where developed (in part) to maintain and restore aquatic ecosystems for dependent species (Chapter 3, Aquatic Species and Hydrology). These standards and guidelines afford the same or greater protection of stream courses as direction found in the 1988 USDA publication *General Water Quality – Best Management Practices.* Project design criteria for water quality and aquatic species are listed in Chapter 2.

Under Section 319 of the 1987 Clean Water Act Amendments, states are required to determine those waters that would not meet the goals of the Clean Water Act, determine those non-point source activities that are contributing pollution, and develop a process on how to reduce such pollution to the "maximum extent practicable." Section 303(d) of the Clean Water Act requires that a list be developed of all impaired or threatened waters within each state. The ODEQ is responsible for compiling the 303(d) list, assessing data, and submitting the 303(d) list to the Environmental Protection Agency (EPA) for federal approval.

Within the project area there are several streams with assessed water quality impairments related to summer water temperature. These include Double Corral Creek, Fox Creek, Happy Camp Creek, Howard Creek, Indian Creek, Jackson Creek, Little Summit Creek, Marks Creek, North Wolf Creek, Ochoco Creek, Peterson Creek, Porter Creek, and Toggle Creek. These streams are on Oregon's 2004/2006 Section 303(d) List of "Water Quality Limited Waterbodies." The Oregon State Water Quality Standards states that the seven-day-average maximum temperature of a stream identified as having salmon and trout rearing and migration use, which describes some streams within the project

area, may not exceed 18.0 degrees Celsius (64.4 degrees Fahrenheit). No measurable increase in water temperature from management practices is allowed in these streams.

All activities within the Ochoco Summit Trail System project area would not change the 303(d) parameters for which Double Corral Creek, Fox Creek, Happy Camp Creek, Howard Creek, Indian Creek, Jackson Creek, Little Summit Creek, Marks Creek, North Wolf Creek, Ochoco Creek, Peterson Creek, Porter Creek, and Toggle Creek are listed. Reference the Hydrology section (Chapter 3 of this document) for more detail.

The Clean Air Act

All action alternatives comply with the Clean Air Act. The Act prescribes air quality to be regulated by each individual state. Effects to air quality are as described in the "Air Quality" section in Chapter 3 of this FEIS; while localized air impairments may occur, any localized impairment would be diluted to a scale that would be impractical to measure and negligible at the scale of airsheds. A projected 2 to 5 percent yearly increase in riders would not change this condition.

Executive Orders

11644 of February 8, 1972

Use of Off-road Vehicles on the Public Lands

Sec. 3. *Zones of Use.* (a) Each respective agency head shall develop and issue regulations and administrative instructions, within six months of the date of this order, to provide for administrative designation of the specific areas and trails on public lands on which the use of off-road vehicles may be permitted, and areas in which the use of off-road vehicles may not be permitted, and set a date by which such designation of all public lands shall be completed. Those regulations shall direct that the designation of such areas and trails will be based upon the protection of the resources of the public lands, promotion of the safety of all users of those lands, and minimization of conflicts among the various uses of those lands. The regulations shall further require that the designation of such areas and trails shall be in accordance with the following--

(1) Areas and trails shall be located to minimize damage to soil, watershed, vegetation, or other resources of the public lands.

Chapter 3 of this document displays the effects in detail to these specific resources. Also, see response to the Travel Management Rule CFR 255(a) and (b) in this section.

(2) Areas and trails shall be located to minimize harassment of wildlife or significant disruption of wildlife habitats.

Chapter 3 discloses the effects of motorized use on wildlife and their individual habitats. The proposed action was initially designed to avoid known high-quality wildlife habitat. Significant Issue #2 specifically responds to the designation of a motorized trail system that could potentially alter effectiveness big game habitat. Alternatives 3 and 5 respond to this Significant Issue.

(3) Areas and trails shall be located to minimize conflicts between off-road vehicle use and other existing or proposed recreational uses of the same or neighboring public lands, and to ensure the compatibility of such uses with existing conditions in populated areas, taking into account noise and other factors.

All four action alternative provide for some degree of separation of use. Alternatives 2 and 4 would offer opportunities three classes of vehicles (ATVs, jeeps and 4-wheel drive vehicles, motorcycles). Alternative 3 would specifically provide opportunities for ATVs and motorcycles; side-by-sides, jeeps and 4x4s would still have access to all mixed-use roads. Alternative 5 would provide opportunities for ATVs, jeeps and 4x4s, motorcycles, and side-by-side buggies.

(4) Areas and trails shall not be located in officially designated Wilderness Areas or Primitive Areas. Areas and trails shall be located in areas of the National Park system, Natural Areas, or National Wildlife Refuges and Game Ranges only if the respective agency head determines that off-road vehicle use in such locations will not adversely affect their natural, aesthetic, or scenic values.

There are no trails located in Wilderness, Inventoried Roadless, or Potential Wilderness Areas. See the Recreation, the Visual Quality, and the Wilderness, Inventoried Roadless Area and Unroaded Area sections in Chapter 3 for more details.

(b) The respective agency head shall ensure adequate opportunity for public participation in the promulgation of such regulations and in the designation of areas and trails under this section.

The public participation process is outlined in Chapter 1 of this document.

(c) The limitations on off-road vehicle use imposed under this section shall not apply to official use.

Maintenance Level 1 roads would remain closed to the public; however administrative use is maintained.

11988 & 11990 of May 24, 1977

Protection of Floodplains and Wetlands

Executive Order 11988 requires the Forest Service to provide leadership and to take action to (1) minimize adverse impacts associated with occupancy and modification of floodplains and reduce risks of flood loss, (2) minimize impacts of floods on human safety, health, and welfare, and (3) restore and preserve the natural and beneficial values served by floodplains. Executive Order 11990 requires the Forest Service to take action to minimize destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.

Hydrology: The Forest Service is proposing to designate where and what types of motorized access would be allowed within the riparian influence zone in every alternative except Alternative 1, in which motorized access would be allowed in areas currently authorized by the Travel Management Plan. All action alternatives include design criteria for trail construction and monitoring within riparian areas.

Aquatic Biota: All alternatives comply with the intent of Executive Order 11990 and USDA Departmental Regulation 9500-3 by either not designating trail in riparian areas (Alternative 1) or providing a properly constructed designated trail system within riparian areas (Alternatives 2-5). See discussions related to this topic in Hydrology, Aquatic Species, and Soils resource sections in Chapter 3 for more information.

13186 of January 10, 2001, and the Migratory Bird Treaty Act of 1918

The purpose of the Migratory Bird Treaty Act is to establish an international framework for the protection and conservation of migratory birds. The Act makes it illegal, unless permitted by regulations, to “pursue, hunt, take, capture, deliver for shipment, ship, cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, including in this Convention…for the protection of migratory birds…or any part, nest, or egg of any such bird” (16USC 703). The original 1918 statute implemented the 1916 Convention between the United States and Great Britain (for Canada). Later amendments implemented treaties between the Unites States and Mexico, Japan, and the Soviet Union (now Russia).

Executive Order 13186, signed January 10, 2001, directs federal agencies to protect migratory birds by integrating bird conservation principles, measures, and practices into agency activities and by avoiding or minimizing, to the extent practical, adverse impacts on migratory birds’ resources when

conducting agency actions. This order directs agencies to further comply with the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and other pertinent statutes. This analysis is compliant with the National Memorandum of Understanding between the USDA Forest Service and the U.S. FWS to promote the conservation of migratory birds (USDA 2008g).

For a more detailed analysis see the Wildlife section in Chapter 3.

13443 of August 16, 2007

Facilitation of Hunting Heritage and Wildlife Conservation

This order directs federal agencies that have programs and activities that have a measurable effect on public land management, outdoor recreation, and wildlife management to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat.

This EIS has considered the management of wildlife habitats trends in and effects on hunting opportunities, and economic and recreational values of hunting. Resource specialists have considered the programs and plans of other state and federal wildlife agencies, have worked collaboratively with them in their professional roles, and have coordinated with them in development of Ochoco Summit Trail System project. These other agencies have been kept abreast of these proposed actions. The Ochoco National Forest currently has in place various cooperative seasonal motorized use closures, including winter range motorized closure areas, a year-round Cooperative Travel Management area (South Boundary) and the "Green Dot" hunting season road closures (Rager Travel Management Area). Proposed alternatives were developed with consideration of these areas and seasons.

12898 of February 11, 1994

Environmental Justice in Minority Populations and Low-income Populations

Executive Order 12898 directs the agency to identify and address, "...as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations...." The intent of the order is to assure the fair treatment and meaningful involvement and consideration of all people. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from the execution of a federal actions. Outreach and public involvement for this project has been extensive and at various scales within various communities of interest.

In order to identify and address environmental justice concerns, the EO states that each agency shall analyze the environmental effects, including human health, economic, and social effects of Federal actions, including effects on minority populations, low-income populations, and native Americans as part of the NEPA process.

As a result of outreach and scoping (public involvement) processes, there were no potentially disproportionately high and adverse human-health, environmental, or social effects to minority or low-income populations identified. Based on the Social and Economic analysis presented in Chapter 3, there is no known potential for disparate or disproportionate effects on minority or low-income populations.

USDA Civil Rights Policy

The Civil Rights Policy for the USDA, Departmental Regulation 4300-4 dated May 30, 2003, states that the following are among the civil rights strategic goals; (1) managers, supervisors, and other employees are held accountable for ensuring that USDA customers are treated fairly and equitably, with dignity and respect; and (2) equal access is assured and equal treatment is provided in the delivery of USDA programs and services for all customers. This is the standard for service to all customers regardless of race, sex, national origin, age, or disabilities.

The project alternatives, given the size of potential social and economic effects, are not likely to result in civil rights impacts to Forest Service employees or customers of its program.

Persons with Disabilities

Some comments received during the Ochoco Summit Trail System planning process expressed concern that changes to motorized access would prevent future access to National Forest system lands for those with disabilities. In response to these comments, a review of the project alternatives has been conducted to ensure that they apply equally to all groups. Therefore, the Ochoco Summit Trail System project is not discriminatory towards persons with disabilities, because it applies equally to all groups.

Under section 504 of the Rehabilitation Act of 1973, no person with a disability can be denied participation in a Federal program that is available to all other people solely because of his or her disability. There is no legal requirement to allow people with disabilities use of motor vehicles on roads, trails, or other areas that are closed to motor vehicles. Restrictions on motor vehicle use that are applied consistently to everyone are not discriminatory.

Prime Farmland, Rangeland, and Forest Land

The Secretary of Agriculture issued memorandum 1827 which is intended to protect prime forest land, farm lands and rangelands from conversion to other uses. The Ochoco Summit Trail System project area does not contain any prime farmlands or rangelands. The project would not convert any forest land to other uses.

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Glossary

A

Access Management- Management of the ingress and egress of people on National Forest System lands. Generally used to describe motorized use allowed.

Adaptive Management- A type of natural resource management that implies making decisions as part of an on-going process. Monitoring the results of actions would provide flow of information that may indicate the need to change a curse of action. Scientific findings and the needs of society may also indicate the need to adapt resource management to the new information.

Administrative Use - Motorized use of a road, trail or area for limited administrative use by the Forest Service; use of any fire, military, emergency or law enforcement vehicle for emergency purposes. Authorized use of any combat or combat support vehicles for national defense purposes; Law enforcement response to violations of the law, including pursuit; and, Permitted use and occupancy of National Forest System lands (USDA- Forest Service. 2004. 36 CFR part 212, 251, 261, and 295).

Advanced Regeneration - Small trees, usually less than one inch in diameter, that are growing under mature trees prior to planned harvest activities.

Affected Environment - The natural environment that exists at the present time in an area being analyzed.

Air Shed- A geographical area that, because of topography, meteorology and climate, shares the same air.

All-terrain Vehicle (ATV) - Any motorized, off-highway vehicle 50 inches or less in width, having a dry weight of 600 pounds or less that travels on three or more low-pressure tires with a seat designated to be straddled by the operator. Low-pressure tires are 6 inches or more in width and designed for use on wheel rim diameters of 12 inches or less, utilizing an operating pressure of 10 pounds per square inch (psi) or less as recommended by the vehicle manufacturer (FSH 2309.18). In this document ATV trail is often used to discuss a motorized trail that can be used for motorcycles also.

The Forest Service does not classify as ATVs the new ‘golf cart’ sized light off-road utility vehicles as they usually have a wider track and overall length than ATVs.

Alternative- One of several policies, plans or projects proposed for the decision-making.

Aquatic Ecosystem-The stream channel, lake or estuary bed, water, biotic communities and the habitat features that occur within.

Archaeological- A term used to describe any cultural resources deposited on or in soil strata from past human activities. However, these cultural deposits generally must be at least 50 years old to be considered archaeological.

Area- A discrete, specifically delineated space that is smaller, and in most cases much smaller, than a Ranger District.

Arterial Road- A forest road that provides service to large land areas and usually connects with other arterial roads or public highways. (FSH 7709.54 – Forest Transportation Terminology Handbook, no longer in print).

B

Best Management Practices (BMP)- Practices designed to prevent or reduce water pollution. Also referred to as Soil and Water Conservation Practices (SWCPs).

Big Game- Those species of large mammals normally managed for sport hunting.

Biological Diversity- The number and abundance of species found within a common environment. This includes the variety of genes, species, ecosystems and ecological processes that connect everything in a common environment.

Borrow Source- An area from which sand, gravel or stone is taken for use in another area.

Bridge- A road or trail structure, including supports, erected over a depression or obstruction such as water, a road, trail or railway and having a deck for carrying traffic or other loads.

C

Canopy- the upper most spreading branchy layer of a forest.

Canopy Base Height- The height above the ground of the first canopy layer where the density of the crown mass within the layer is high enough to support vertical movement of a fire. Low canopy base heights have been shown to initiate crown fire behavior.

Capability- The potential of an area of land to produce resources, supply goods and services and to allow resource uses under an assumed set of management practices and at a given level of management intensity. Capability depends on 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.

Chain- A standard measurement for rate of fire spread (approximately 66')

Classified Road- Road wholly or partially within or adjacent to National Forest System lands that are determined to be needed for long-term motor vehicle access, including State roads, county roads, privately owned roads, national Forest System roads and other roads authorized for motor vehicle use pursuant to 36 CFR 212.51 on a Motor Vehicle Use Map (MVUM). (36 CFR 212.1, FSM 7705 - Transportation System). A road under Forest Service jurisdiction.

Clean Air Act -(42 U. S. C. 7609). Section 309 provides authority for the Environmental Protection Agency to review other agency environmental impact statements.

Closed Roads- Roads on the Forest Transportation system available for motorized administrative or emergency use, but not open to public motorized use. Also called long-term intermittent and is classified as a Maintenance Level I road.

Collector Road- A forest road that serves smaller land areas than an arterial road. Usually connects forest arterial roads to local forest roads or terminal (FSH 7709.54- Forest Transportation Terminology Handbook, no longer in print).

Concern- (Also management concern). An issue, problem or condition which constrains the range of management practices identified by the Forest Service in the planning process.

Concentrated Use – The Forest Plan page 4-135 under Intensive Recreation defines concentrated use as: "Generally, high concentrations of visitors will occur around developments."

Condition Classes- A function of the degree of departure from historical fire regimes. Condition Class I is within or near historical conditions; Class III is significantly altered from historical regimes.

Connectivity (of habitats)- The linkage of similar but separated vegetation stands by patches, corridors or 'stepping stone' of like vegetation. This term can also refer to the degree to which similar habitats are linked.

Corridor- Elements of the landscape that connect similar areas. Streamside vegetation may create a corridor of willows and hardwoods between meadows where wildlife feed.

Council of Environmental Quality (CEQ)- The Council issues regulations binding all federal agencies, to implement the procedural provisions of the national Environmental Quality Act (NEPA). The regulations address the administration of the NEPA process, including the preparation of Environmental Impact Statements (EIS) for major federal actions which significantly affect the quality of the human environment.

Cover- Any feature that conceals wildlife or fish. Cover may be dead or live vegetation, boulders or undercut streambanks. Animals use cover to escape from predators, rest or feed.

Cross-country Travel- Travel over terrain not on designated roads and/or trails.

Cultural Resource- An umbrella term used to describe a variety of resources, including archaeological or historic remains, folklore and oral traditions and geographic areas traditionally ascribed to have historical significance to a given culture.

Cumulative Effects or Impacts- The impact on the environment that results from incremental impact of an action when added to other past, present and reasonably foreseeable future actions regardless of what agency or person undertakes such other action. Cumulative effects or impacts can result from individual minor but collectively significant actions taking place over a period of time.

D

Draft Environmental Impact Statement (DEIS) - The draft version of the Environmental Impact Statement that is released to the public and other agencies for review and comment.

Designated road, trail or area- A National Forest System road, a National Forest System trail, or an area on National Forest System lands that is designated for motor vehicle use pursuant to §212.51 on a motor vehicle use map.

Detrimental Soil Disturbance- Compacted, displaced, eroded or burned soil conditions incurred by management, recreational or natural activities that are capable of reducing the productivity of the soil resource.

Developed Recreation- Recreation that requires facilities that, in turn, result in concentrated use of the area. The Forest Plan on page G-4 defines developed recreation: “Recreation use that occurs within a site or facility specifically established and constructed for public recreation purposes. Activities commonly included are camping, picnicking, resort use, downhill skiing, but also include parking areas, trailheads, boat launching sites, etc.

Difficulty Level - The degree of challenge a trail presents to an average user's physical ability and skill, based on trail condition and route location factors such as alignment, steepness of grades, gain and loss of elevation, and amount and kind of natural barriers that must be crossed, and which may temporarily change due to weather. (FSM 2353.05):

a. Easiest. A trail requiring limited physical ability and skill to travel.

b. More Difficult. A trail requiring some physical ability and skill to travel.

c. Most Difficult. A trail requiring a high degree of physical ability and skill to travel.

Dispersed Recreation- Recreation with few developed amenities such as structures, developed campsites or toilets. Dispersed recreation is generally less directly constrained by management controls on movement or by enforcement activities, but must comply with posted orders or restrictions for areas under management. Dispersed campers for instance, can choose to camp in places that are underdeveloped, so long as they meet the general posted rules for site protection. The

term dispersed recreation usually implies lower visitor use densities. Dispersed recreation may be motorized or non-motorized and that is defined in the Forest Plan on page 4-4: "Activities which disperse recreation throughout the forest include Nordic skiing, river rafting, mountain bicycling, and off-highwau use." Page G-4 of the Forest Plan defines dispersed recreation as "Recreation use outside of developed recreation site, ranging from scenic driving to backpacking."

Disturbance- Events that such as a forest fire or insect infestation that alters stand structure composition or function of an ecosystem.

Dual Sport-Class III (motorcycle) ATV specificially designed to be street legal and used off road.

E

Early Seral- Plants which inhabit a disturbed site within the first few years subsequent to the disturbance.

Ecosystem- An arrangement of living and nonliving things and the forces that move among them. Living things include plants and animals. Non-living parts of ecosystems may be rocks and minerals. Weather and wildfire are two of the forces that act within ecosystems.

Effects- Environmental consequences as a result of a proposed 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, water and other natural systems including ecosystems.

Emergency Need- An urgent maintenance need that may result in injury, illness, or loss of life, natural resource or property; and must be satisfied immediately. Emergency needs generally require a declaration of emergency or disaster, or a finding by a line office that an emergency exists.

Endangered Species-Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range. Plant or animal species identified by the Secretary of the Interior and endangered in accordance with the 1973 Endangered Species Act.

Endangered Species Act- The Act which requires consultation with U.S. Fish and Wildlife Service if practices on National Forest System lands may impact a threatened or endangered plant or animal species.

Engineering Analysis- An analysis and evaluation conducted by a qualified engineer or under the supervision of a qualified engineer of a NFS road, road segment or road being considered for mixed motorized use. The analysis and evaluation may include recommended mitigation measures. The analysis may simply be simply documentation of engineering judgment or maybe a more complex engineering report that includes many factors related to mixed motorized use.

Environmental Analysis- An analysis of alternative actions and their predictable long and short-term effects. Environmental analysis include physical, biological, social and economic factors.

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) of 1969 and released to the public and other agencies for comment and review. It is a formal document that must follow the requirements of NEPA, the Council for Environmental Quality (CEQ) guidelines and directives of the agency responsible for the project proposal.

F

Facilities- Transportation planning, road management and operation, fleet equipment and engineering services (for example: administrative buildings, water and sanitation systems, sanitary landfills, dams, bridges and communication systems).

Fauna- The animal life of an area.

Fugitive Dust- Dust generated from open sources is termed 'fugitive' because it is not discharged to the atmosphere in a confined flow stream.

Fire Management- All activities required for the protection of resources from fire and the use of fire to meet land management goals and objectives.

Fire regime- A function of the historical frequency of fire and the degree of severity of those fires.

Flood Plain- A lowland adjoining a watercourse. At a minimum the area is subject to a 1% or greater chance of flooding in a given year.

Forage- All browse and non-woody plants that are eaten by wildlife or livestock.

Forb- A broadleaf plant that has little or no woody material in it.

Forest Road or Trail- A road or trail wholly or partly within or adjacent to and serving the National Forest System that the Forest Service determines is necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources.

Forest Supervisor- The official responsible for administering National Forest lands on an administrative unit, usually consisting of one or more Ranger Districts which comprise the National Forest. The Forest Supervisor reports to the Regional Forester.

Fuels- Vegetative matter, dead or alive, that burns in a fire. It is broadly categorized by the following categories:

Surface or ground fuels are within a foot of the ground.
Ladder fuels exist when you have a continuous vertical arrangement of fuel that easily allows fire to go from ground level into the tree canopy.
Crown fuels are the tree limbs and leaves that can burn with enough heat and/or wind.
Live fuels are the green (live) herbs and shrubs.

Fuel Models- Fuel models are a tool used to standardize discussion of fuel conditions on a landscape.

Fuel conditions, defined by quantity and arrangement, have been categorized into 40 standard descriptive fuel models (Scott and Burgan 2005).

Fuel Treatment- Manipulation or removal of fuels to reduce the likelihood of ignition and/or lessen potential damage and resistance to control (e.g. lopping, pruning, chipping, crushing, mastication, piling and burning).

G

Game Species- Any species of wildlife or fish that is harvested according to prescribed limits and seasons.

Geographical Information Systems (GIS)- GIS is a computer technology that uses a geographic information system as an analytic framework for managing and integrating date, solving a problem or understanding a past, present or future situation.

H

Habitat- The area where a plant or animal lives and grows under natural conditions.

Habitat Capacity- The ability of a land area or plant community to support a given species of wildlife.

Hiding Cover- The vegetation that would hide ninety percent of an elk from the view of a human at a distance of 200 feet or less. The distance which the animal is essentially hidden is called sight distance.

High Clearance Vehicle- Generally a truck, pickup truck, SUV or ATV with a road clearance that allows travel on low standard roads without vehicle damage. Usually greater clearance than a standard passenger vehicle.

Highway Legal Vehicle- Any motor vehicle that is licensed or certified under state law for general operation on all public roads in the state. Operators of highway-legal vehicles are subject to state traffic law including requirements for operating licensing.

Historic Property- Any prehistoric or historic district, site, building, structure or object included in, or eligible for inclusion in, the National Register for 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 for Historic Places criteria.

Hydrology- The science of dealing with the study of water on the surface of the land, in the soil and underlying rocks and in the atmosphere.

I

Initial Attack- The fire suppression effort that takes place as soon as possible following a wildland fire report.

Interdisciplinary Team- A team of individuals with skills from different disciplines that focuses on the same task or project.

Intermittent Stream- A stream that goes dry at some point each year but flows continuously at least 30 days a year when it received water, usually from a seasonal groundwater, but may also include some surface source more persistent than a rainstorm, such as melting snow.

Invasive Species- A plant species moving into areas outside of its former range.

Inventoried Roadless Area- (West of the 100th meridian). An area which meets the statutory definition of wilderness, does not contain improved roads maintained for travel by standard passenger type vehicle and meets one or more of the following criteria:

Contains 5,000 acres or more

Contains less than 5,000 acres but:

Due to physiography or vegetation, is manageable in a natural condition

Is a self-contained ecosystem such as an island

Is contiguous to existing wilderness, primitive area, Administration-endorsed wilderness or roadless area in other Federal ownership, regardless of size.

Irretrievable- Applies to losses of production, harvest or commitment of renewable natural resources. For example, some of the timber production from an area is irretrievably lost during the time an area is used as a winter sports site. If the use I changed, the timber production can be resumed. The production lost is irretrievable, but the action is not irreversible.

Irreversible- Applies primarily to the use of non-renewable resources, such as minerals or cultural resources or to those factors that are renewable only over long time spans, such as soil productivity. Irreversible also includes loss of future options.

Issue- A point, matter or question of public discussion or interest to be addressed or decided through the planning process. *Preliminary issue* is an issue identified early in the scoping phase and is sometimes referred to as a tentative issue. *Significant issue* is an issue within the scope of the proposed action which is used to formulate alternatives in an Environmental Assessment (EA) or Environmental Impact Statement (EIS).

L

Ladder Fuels - Fuels that provide vertical continuity between the ground fuels and tree crowns, thus creating a pathway for the surface fire to move into the overstory tree crowns.

Legal Notice- A notice of a decision which can be appealed that is published in the Federal Register or in the legal notice section of a newspaper or general circulation.

Lek- An area used habitually by grouse species where the males display for the females each spring. Number of males are counted on the lek each spring to estimate general population trends.

M

Maintenance Level- Defines the level of service provided by and maintenance required for a specific road, consistent with road management objectives and maintenance criteria. (FSH 7709.58, Sec 12.3-Transportation System Maintenance Handbook).

Maintenance Level 1- Assigned to intermittent service roads during times they are closed to vehicular traffic. The closure period must exceed one year. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level and 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 maintenance strategies are ‘prohibit’ and ‘eliminate’. Roads receiving level 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 level 1, they are closed to vehicular traffic, but maybe open and suitable for non-motorized uses.

Maintenance Level 2- Assigned to roads open for se by high clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation or other specialized uses. Log haul may occur at this level. Appropriate traffic management strategies are either: 1) discourage or prohibit passenger cars or 2) accept or discourage high clearance vehicles.

Maintenance Level 3- Assigned to roads open and maintained for travel by prudent driver in a standard passenger car. 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 either ‘encourage’ or ‘accept’. ‘Discourage’ or ‘prohibit’ strategies maybe employed for certain class of vehicles or users.

Maintenance 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 surface. However, some roads maybe single lane. Some roads maybe paved and/or dust abated. The most appropriate traffic management strategy is ‘encourage’. However, ‘prohibit’ strategy may be apply to specific classes of vehicles or users at certain times.

Maintenance Level 5- Assigned to roads that provide a high degree of user comfort and convenience. Normally, roads are double lane, paved facilities. Some maybe aggregate surfaced and dust abated. The most appropriate traffic management strategy is 'encourage'.

Mitigation Measures- Modifications of actions taken to:

Avoid impacts by not taking a certain action or parts of an action,

Minimize impacts by limiting the degree or magnitude of the action and its implementation;

Rectify impacts by repairing, rehabilitating or restoring the affected environment;

Reduce or eliminate impacts over time by preservation and maintenance operations during the life of the action; or,

Compensate for impacts by replacing or providing substitute resources or environments.

Mixed Use – Roads on which both highway legal and non-highway legal vehicles are operating.

Monitoring- A process of collecting information to evaluate if objectives and anticipated or assumed results of a management plan are being realized or if implementation is proceeding as planned.

Motor vehicle - Any vehicle which is self-propelled, other than: (1) a vehicle operated on rails; and (2) any wheelchair or mobility device, including one that is batter-powered, that is designed solely for use by a mobility-impaired person for locomotion, and that is suitable for use in an indoor pedestrian area.

Motor vehicle use map (MVUM)- A map reflecting designated roads, trails, and areas on an administrative unit or a Ranger District of the National Forest System.

Motorized Mixed Use- Designation of a national Forest System (NFS) road for use by both highway-legal and non-highway legal motor vehicles (FSM Engineering 7700-30).

Motorized Trail-A route over 50 inches in width or a route over 50 inches wide that is identified and managed as a trail.

N

National Environmental Policy Act (NEPA)- An Act passed in 1969 to declare a national policy that encourages productive and enjoyable harmony between humankind and the environment, promotes efforts that prevent or eliminate damage to the environment and biosphere, stimulates the health and welfare of humanity, enriches the understanding of the ecological systems and natural resources important to the nation, establishes a Council on Environmental Quality.

National Forest Management Act- A law passed in 1976as an amendment to the Forest and Rangeland Renewable Resources Planning Act, requiring preparation of Forest Plans and the preparation of regulations to guide that development.

National Forest System- All National Forest land reserved or withdrawn from the public domain of the U.S.; 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; and all other lands. Waters, interests therein that are administered by the Forest Service or are designated for administration though the Forest Service as part of the system (36 CFR 212.1).

National Forest System Road- A forest road other than a road which has been authorized by a legally documented right-of-way held by State, county or other local public road authority.

National Historic Preservation Act- Legislation intended to preserve historical and archaeological sites in the United States of America. Signed into law October 15, 1966.

National Survey on Recreation and the Environment (NSRE) - Part of the National Recreation Survey (NRS) program that was started in 1960

National Forest Visitor Use Monitoring (NUVM) - A permanent, ongoing sampling system which measures national forest visitor demographics, experiences, preferences and impressions. A stratified random sample is done for 25% of the national Forest system each year according to a national research protocol. NVUM responds to the need to better understand the use and importance, satisfaction with, national forest recreation opportunities.

National Register of Historic Places- A register of districts, sites, buildings, structures and objects significant in American history, architecture, archaeology and culture. The register was established by the National Historic Preservation Act of 1966 and is maintained by the Secretary of the Interior.

Native Species- With respect to a particular ecosystem, a species that other than as a result of introduction, historically occurred or currently occurs in that ecosystem (Executive Order 13122, 2/3/99).

Non-Motorized Travel- Modes of travel include hiking, equestrian and mountain bikes and exclude all motorized use.

Noxious Weeds (Invasive species)- Non-native plants listed by the State that generally have either economic or ecosystem impacts, or are poisonous to wildlife and/or livestock. They aggressively invade disturbed areas such as fires, road slides, landslides and construction areas.

O

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.

Off-road Vehicle (ORV) - Any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, snow, ice or other natural terrain.

Operation Permit - Sticker placed on an OHV that allows access to public lands in designated areas in the State of Oregon.

Over-snow vehicle - A motor vehicle that is designed for use over snow and that runs on a track or tracks and/or a ski or skis, while in use over snow.

P

Perennial - A plant species having a life span of more than two years.

Percentile Weather- The weather conditions that can be expected of X% of days during the fire season. The standard percents are Low (0%-15%), Moderate (16%-89%), High (90%- 96%) and Extreme (97% +). So low percentile weather is the average suite of weather conditions that would occur less than 15% of the time.

Play Area – limited area allowing for cross-country travel.

Prescribed Fire - Fire which is planned and used as a tool to meet specific management objectives.

Problem Fire- problem fires are wildfires that, because of extreme fire behavior, present a high risk to human safety and loss of forest resources

Project Design Criteria (PDC)- A set of required, implementation design criteria applied to projects to ensure that the project is done according to environmental standards ad adverse effects are within the scope of those predicted in this environmental impact statement.

Proposed Species- Any plant or animal species that is proposed by the Fish and Wildlife Service or NOAA Fisheries in the *Federal Register* notice to be listed as threatened or endangered.

R

Ranger District- An administrative subdivision of a national forest, supervised by a district ranger who reports to the forest supervisor.

Reserved Rights- Rights tribes kept, or reserved during the treaty-making out of a greater number of rights they already owned.

Resolved Issue- Significant issues identified by the public that have been fully mitigated during the development of alternatives or project design criteria.

Restoration- Ecological restoration is the process of assisting the recovery and management of ecological integrity. Ecological integrity includes a critical range of variability in biodiversity ecological processes and structures, regional and historical context and sustainable cultural practices.

Revegetation- The re-establishment of plants on a site. The term does not imply native or nonnative; does not imply that the site can ever support any other types of plants or species and is not at all concerned with how the site 'functions' as an ecosystem.

Rill - A narrow and shallow incision into soil resulting from erosion by overland flow that has been focused into a thin thread by soil surface roughness.

Right-of-Way- An accurately located strip of land with defined width, beginning of point and point of ending. It is the area within which the user has the authority to conduct operations approved or granted by the landowner in an authorizing document, such as a permit, easement, lease, license or Memorandum of Understanding (MOU).

Riparian Area- A geographic area containing an aquatic ecosystem and adjacent upland areas that directly affect it.

Road - A motor vehicle route over 50 inches wide, unless identified and managed as a trail.

Road Maintenance- Maintaining or keeping an existing constructed road in an acceptable condition so as to continue to provide acceptable service and achieve its expected life (FSM 7712.3).

Road Maintenance Objective- defines the intended purpose of an individual road based on management area direction and access management objectives, Road management objectives contain design criteria, operations criteria and maintenance criteria (FSH 7709.55 Sec 33- Transportation Planning Handbook).

Road-to-Trail Conversion – Previous road, modified and managed as a trail; this includes width controlling devices and installation of roughness and obstacles to increase technical challenge and provide a trail experience.

Rock Crawler – Class II ATV (jeeps, other 4-wheel drive vehicles) specifically designed to climb over rocks and boulders.

S

Saddle Time- Total time spend riding by an OHV recreationist- usually in one day.

Scenic- Of or relating to landscape scenery; pertaining to natural or natural-appearing scenery; constituting or affording pleasant views of natural landscape attributes or positive cultural elements.

Scenic Integrity- State of naturalness, or conversely, the state of disturbance created by human activities or alteration. Integrity is stated in degrees of deviation from existing landscape character in a National Forest.

Scenic Quality- the essential attributes of landscape that when viewed by people elicit psychological and physiological benefits to individuals and society as a whole.

Scenic River- A classification within the national Wild and Scenic River System. Scenic rivers are those rivers, or sections of rivers, that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible by roads.

Seasonal Closures- A route or area closed part of the year. The season of closure is defined by the reason for the closure (e.g. winter range, snow etc.).

Sediment- Any material carried in suspension by water that would ultimately settle to the bottom. Sediment has two main sources: from the channel area itself and from disturbed sites.

Sensitive Species- Species identified by the Regional Forester for which population variability is a concern, as evidenced by significant current or predicted downward trend in population numbers or density; or significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

Seral Stages- Seral stages describe the phase of development of a plant community. Early seral species are those species you would expect to find on a site soon after a major disturbance, like fire. These are species such as pines, Douglas-fir, snowbrush, fireweed etc. They are generally shade intolerant species. Late seral are the species under a fully developed vegetative canopy, such as true firs, prince's pine, lichens etc.

Shared use- Shared use roads are those roads on which both highway legal and non-highway legal vehicles may be operated.

Silviculture- The theory and practice of directing forest establishment, composition and growth for the production of forest resources to meet specific management objectives.

Site- A specific location where management activity is considered, planned or operating.

Site preparation- The removing or rearranging of vegetation or woody debris to meet specific management objectives. Most often it is used to describe the process(s) used to expose mineral soil areas suitable for planting or seeding desirable species of plants.

State Historic Preservation Office- Established in 1967 to manage and administer programs for the protection of the state's historic and cultural resources.

T

Trail - A route of specified width that is identified and managed as a trail.

Trail Definitions by Width –

Single track motorcycle trail- width of 6-24 inches

ATV Trail – width of 50 inches or less

Jeep Trail – width of 80 inches or less

Trail Difficulty Level- The degree of challenge a trail presents to an average user's physical ability and skill, based on trail condition and route location factors such as alignment, steepness of grades, gain and elevation, and amount and kind of natural barriers that must be crossed, and which may temporarily change due to weather.

Easiest: A trail requiring limited physical ability and skill to travel.

More Difficult: A trail requiring some physical ability and skill to travel.

Most Difficult: A trail requiring a high degree of physical ability and skill to travel.

Travel Management Rule of 11/2/2005 (36 CFR parts 212, 251, 261 and 295)- Regulations that directs each national forest in the country to designate roads, trails and areas that would be open to motor vehicle use by vehicle class. The result of this process would be a standardized map which designates roads and trails that are open to motorized use. After a map is produced all other areas are closed to motorized use. The map would be updated annually.

Tribe- term used to designate a federally-recognized group of American Indians and their governing body. Tribes may be comprised of one or more Band.

Tribal and Treaty Rights- Native American treaty or other rights or interests recognized by treaties, statutes, laws, executive orders, or other government action, or federal court decisions.

Treaty- A contract or compact between nations. It is an agreement that is binding upon nations that sign the treaty.

U

Unauthorized Road or Trail- A road or trail that is not a Forest System road or trail or a temporary road or trail and that is not included in a Forest Transportation Atlas (36 CFR 212.1). The term 'unclassified' was used in some of the earlier project file documentation that predated the Travel Management Rule.

Undesignated Road or Trail- Roads and trails that have not yet gone through site-specific travel planning to determine if they should be open, closed or restricted to motorized vehicle use, or roads and trails that have gone through travel planning and determined that motorized vehicle use is not appropriate and is not allowed.

U.S. Fish and Wildlife Service (USFWS)- The federal agency that is the listing authority for species other than marine mammals and anadromous fish under the ESA.

U.S. Forest Service (USDA FS or USFS)- The federal agency responsible for management of the nation's National Forest lands.

Underburn- Using prescribed fire under the canopy of an existing stand of trees.

V

Viability- Ability of a wildlife or plant population to maintain sufficient size to persist over time in spite of normal fluctuations in numbers**,** usually expressed as a probability of maintaining a specific population for a specified period.

Viable Population- A wildlife or plant population that contains an adequate number of reproductive individuals appropriately distributed on a planning area to ensure long-term existence of the species.

Viewshed- Total visible area from a single observer position, or total visible area from multiple observer positions. Viewsheds are accumulated seen-areas from highways, trails, campgrounds, towns, cities or other viewer locations. Examples are: corridor, feature or basin Viewsheds.

Visual Quality Objective- A desired level of excellence based on physical and sociological characteristics of an area. Refers to the degree of acceptable alteration of the characteristic landscape.

W

Watershed- A land area that contributes all its water to one drainage system, basin, stream or river. Watersheds can be described at multiple levels.

Wetland- An area that is regularly saturated by surface or ground water and subsequently is characterized by a prevalence of vegetation that is adapted for life in saturated soil conditions. Examples include: swamps, bogs, fens, marshes and estuaries.

Wild and Scenic River System- The Wild and Scenic Rivers Act of 1968 established a system of selected rivers in the United States, which possess outstanding remarkable values, to be preserved in a free-flowing condition. Within the national system of rivers, three classifications define the general character of designated rivers: Wild, Scenic and Recreational. Classifications reflect levels of development and natural conditions along a stretch of river. Classifications are used to help develop management goals for the river.

Wilderness- Areas designated by Congressional action under the 1964 Wilderness Act. Wilderness is defined as undeveloped federal land retaining its primeval character and influence without permanent improvements or human habitation. Wilderness areas are protected and managed to preserve their natural conditions, which generally appear to have been affected primarily by the forces of nature with the imprint of human activity substantially unnoticeable; have outstanding opportunities for solitude or for a primitive and confined type of recreation; including at least 5,000 acres, or are of sufficient size to make practical their preservation, enjoyment, and use in an unimpaired condition; and may contain features of scientific, educational, scenic, or historical value as well as ecological and geologic interest.

Wildland Fire- Any non-structure fire that occurs in the wildland. There are three types of wildland fire: wildfire, wildland fire use and prescribed fire.

Wildfire- An unplanned, unwanted wildland fire, including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other wildland ire where the objective is to put the fire out.

Winter Range- A range, usually at lower elevation, used by migratory deer and elk during the winter months; usually better defined and smaller than summer range.

Woody Debris- Dead pieces of woody vegetation such as stems, limbs or leaves which are on a site.

X

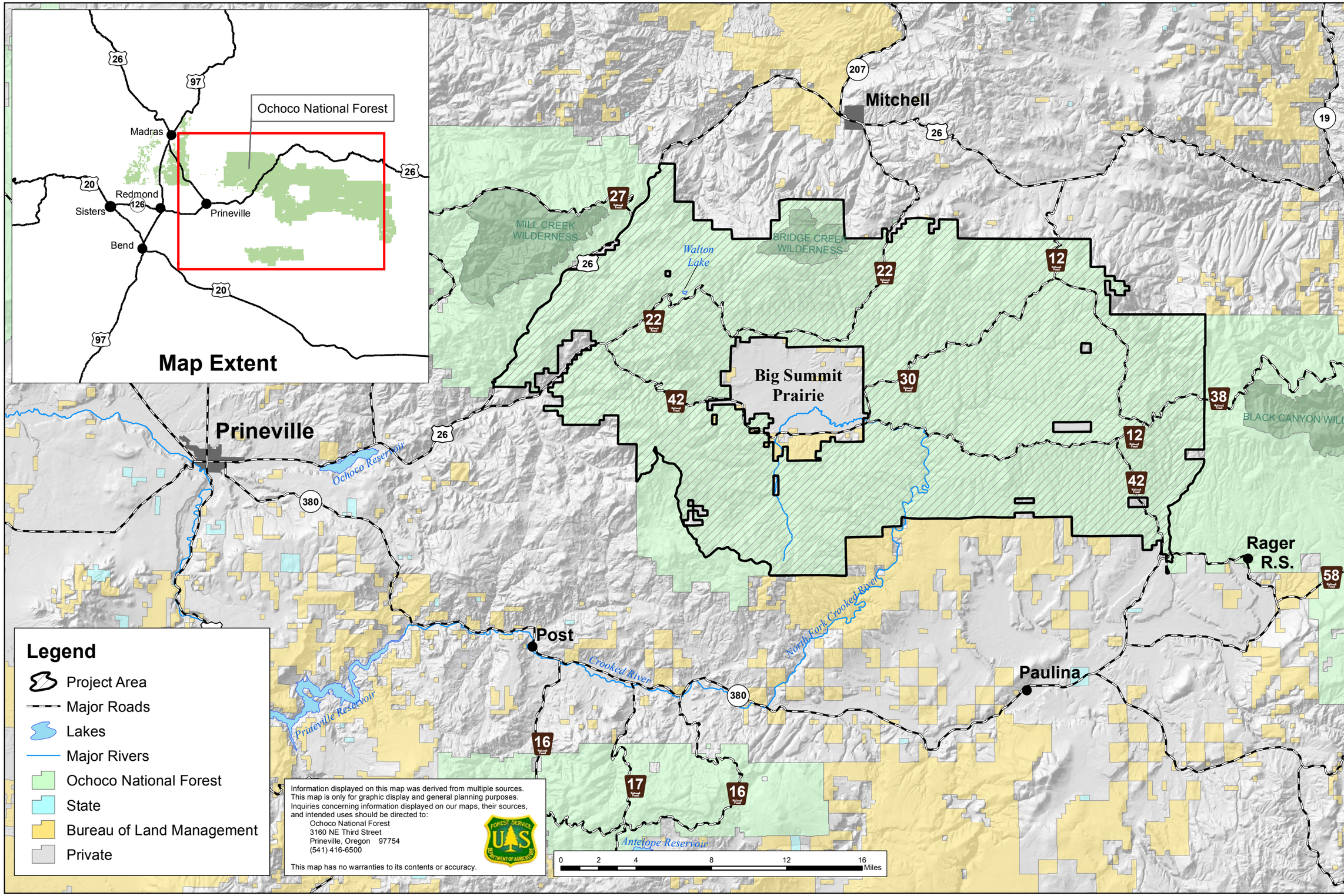
Xeric- A soil moisture regime in which soil is dry for 45 or more consecutive days in the 4 months following the summer solstice, and moist for 45 or more consecutive days in the 4 months following the winter solstice.

Index

ATV, ii, vi, 8, 9, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 38, 47, 60, 65, 66, 69, 71, 75, 76, 77, 80, 81, 82, 87, 88, 89, 97, 98, 105, 106, 107, 118, 120, 141, 180, 181, 182, 204, 205, 210, 211, 218, 230, 236, 239, 244, 246, 289, 290, 291, 359, 366, 431, 433, 435, 451, 476, 478, 481, 483, 487, 488
big game, x, xiii, 3, 4, 6, 9, 29, 49, 78, 96, 118, 162, 204, 217, 284, 287, 288, 290, 291, 292, 294, 297, 299, 301, 304, 305, 306, 307, 308, 313, 320, 331, 347, 366, 395, 396, 412, 431, 449, 450, 453
eagle, x, 34, 45, 256, 257, 258, 272, 273, 274, 308, 309, 310, 320, 327, 472
INFISH, ii, iii, vii, 3, 5, 32, 44, 119, 123, 127, 128, 129, 130, 134, 135, 137, 141, 184, 207, 214, 221, 242
jeep, 8, 9, 14, 15, 18, 21, 22, 24, 26, 76, 181, 182, 190, 191, 193, 205, 211, 212, 218, 238, 244
livestock, 7, 30, 36, 39, 55, 86, 120, 145, 146, 149, 162, 226, 227, 229, 271, 343, 345, 348, 354, 358, 374, 375, 388, 405, 407, 408, 409, 411, 428, 444, 450, 482, 486
motorcycle, 9, 14, 15, 17, 18, 20, 21, 22, 23, 24, 27, 30, 60, 75, 80, 82, 85, 97, 117, 180, 182, 185, 204, 205, 210, 211, 218, 238, 244, 247, 363, 366, 371, 382, 390, 391, 467, 476, 481, 488
nest, v, x, xvi, 29, 34, 35, 45, 49, 245, 246, 248, 256, 257, 258, 259, 261, 262, 263, 264, 265, 271, 272, 275, 276, 277, 279, 281, 284, 309, 310, 311, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 345, 454, 468, 470, 473
Old Growth, i, iv, xiii, xvi, 3, 10, 11, 16, 19, 23, 28, 49, 274, 282, 434, 446
old-growth, 3, 257, 270, 276, 281, 284, 334, 462
Snopark, 14, 15, 18, 21, 22, 26, 27, 47, 74, 88, 89, 91, 105, 106, 118, 129, 205, 394, 396
water quality, v, xiii, xiv, 5, 6, 10, 16, 24, 30, 32, 44, 55, 78, 109, 123, 124, 126, 128, 129, 132, 133, 134, 136, 137, 141, 142, 162, 178, 180, 183, 184, 185, 204, 206, 207, 212, 213, 214, 217, 218, 219, 220, 226, 242, 362, 366, 367, 369, 372, 424, 441, 443, 448, 450, 452
Wilderness, ii, iv, xvi, 4, 10, 11, 60, 78, 85, 87, 101, 119, 234, 267, 269, 277, 389, 412, 413, 414, 415, 420, 432, 449, 454, 459, 490
Winter range, 3

APPENDIX A – MAPS

- Map 1 – Ochoco Summit Trail System Project Area
- Map 2 – Forest Plan Management Areas
- Map 3 – Alternative 2 (Proposed Action) – East Side
- Map 4 – Alternative 2 (Proposed Action) – West Side
- Map 5 – Alternative 3 – East Side
- Map 6 – Alternative 3 – West Side
- Map 7 – Alternative 4 – East Side
- Map 8 – Alternative 4 – West Side
- Map 9 – Alternative 5 – East Side
- Map 10 – Alternative 5 – West Side
- Map 11 – Watershed Boundaries
- Map 12 – Riparian Habitat Conservation Areas (RHCAs)
- Maps of Implementation Areas and OHV Management Areas, by Alternative



Map 1

Ochoco National Forest Lookout Mountain and Paulina Ranger Districts

Ochoco Summit Trail System Project Area

Ochoco Summit Trail System EIS

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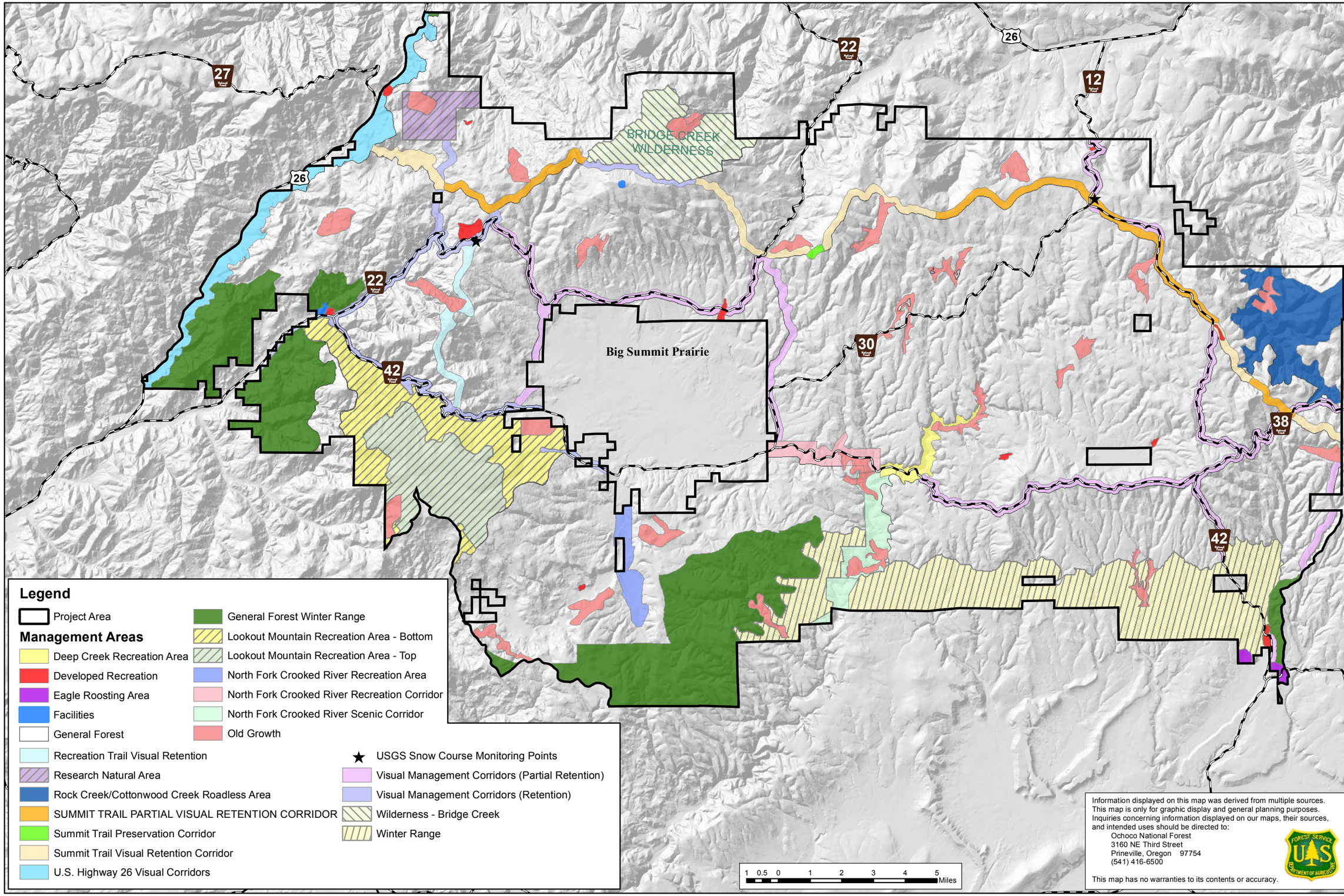

Map 2

Ochoco National Forest Lookout Mountain and Paulina Ranger Districts

Forest Plan Management Areas

Ochoco Summit Trail System EIS

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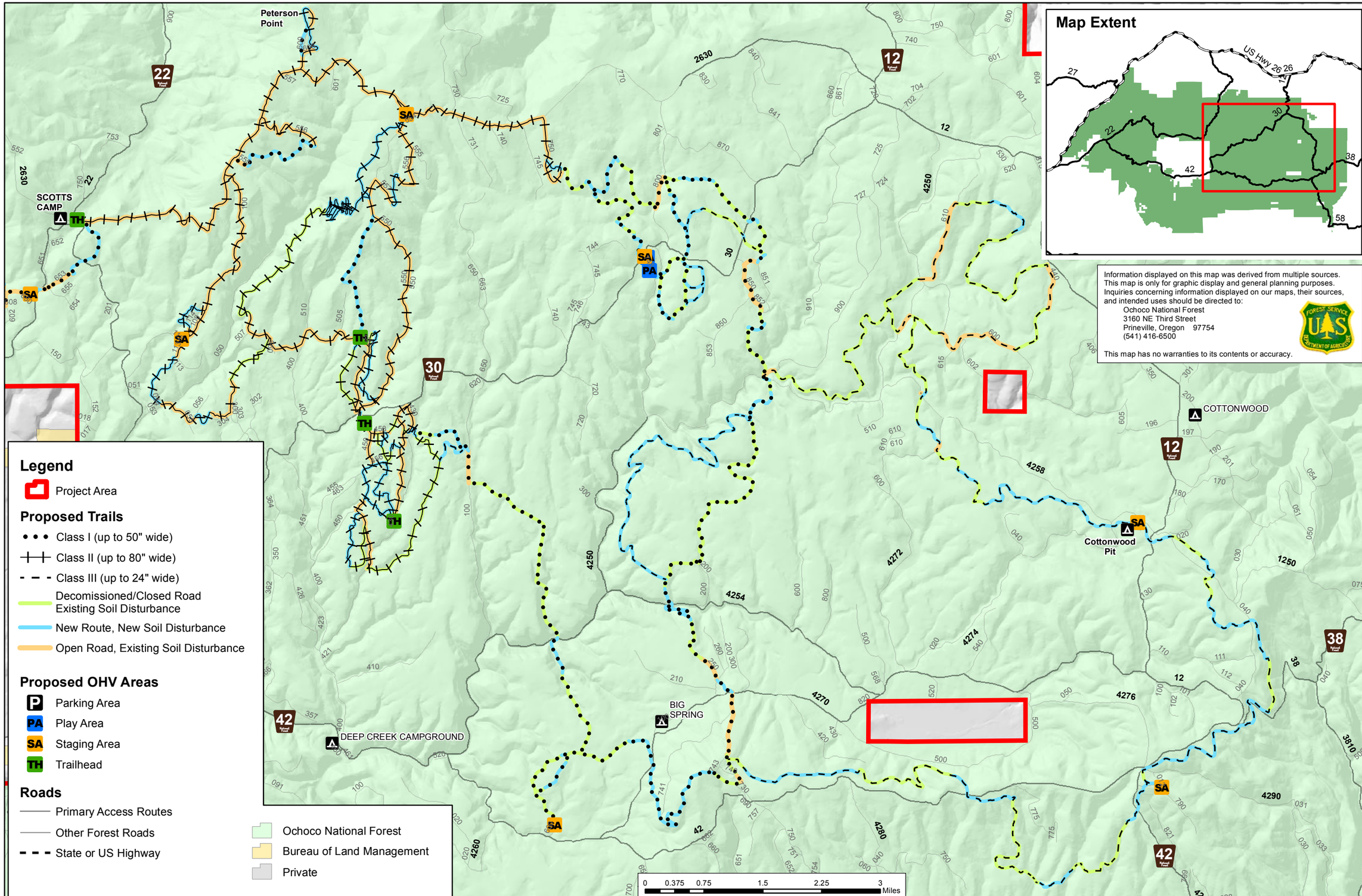
Ochoco National Forest Lookout Mountain and Paulina Ranger Districts

Ochoco Summit Trail System EIS Alternative 2 (Proposed Action) - East Side

Map 3



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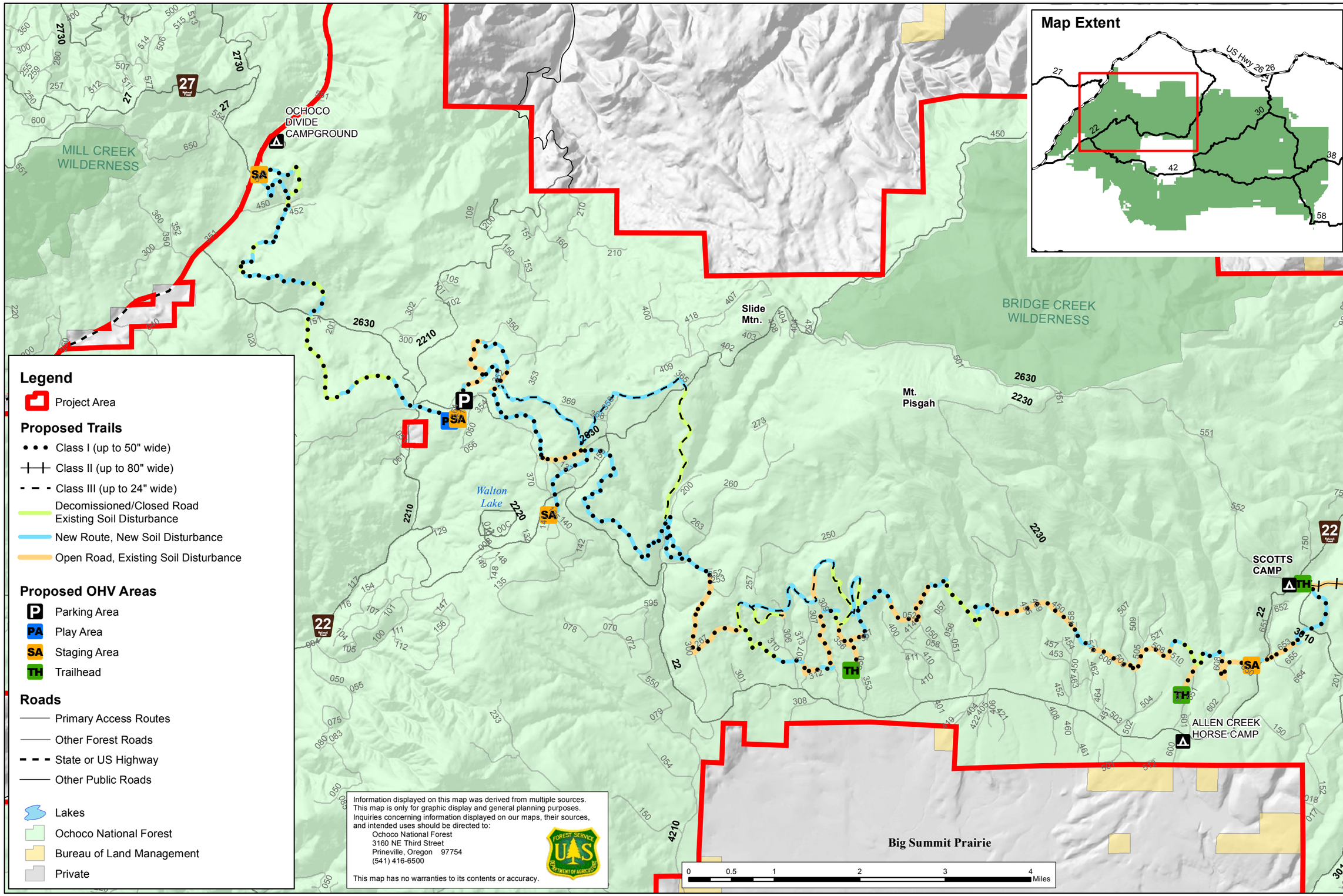
Ochoco Summit Trail System EIS

Alternative 2 (Proposed Action) - West Side

Ochoco National Forest Lookout Mountain and Paulina Ranger Districts

Map 4



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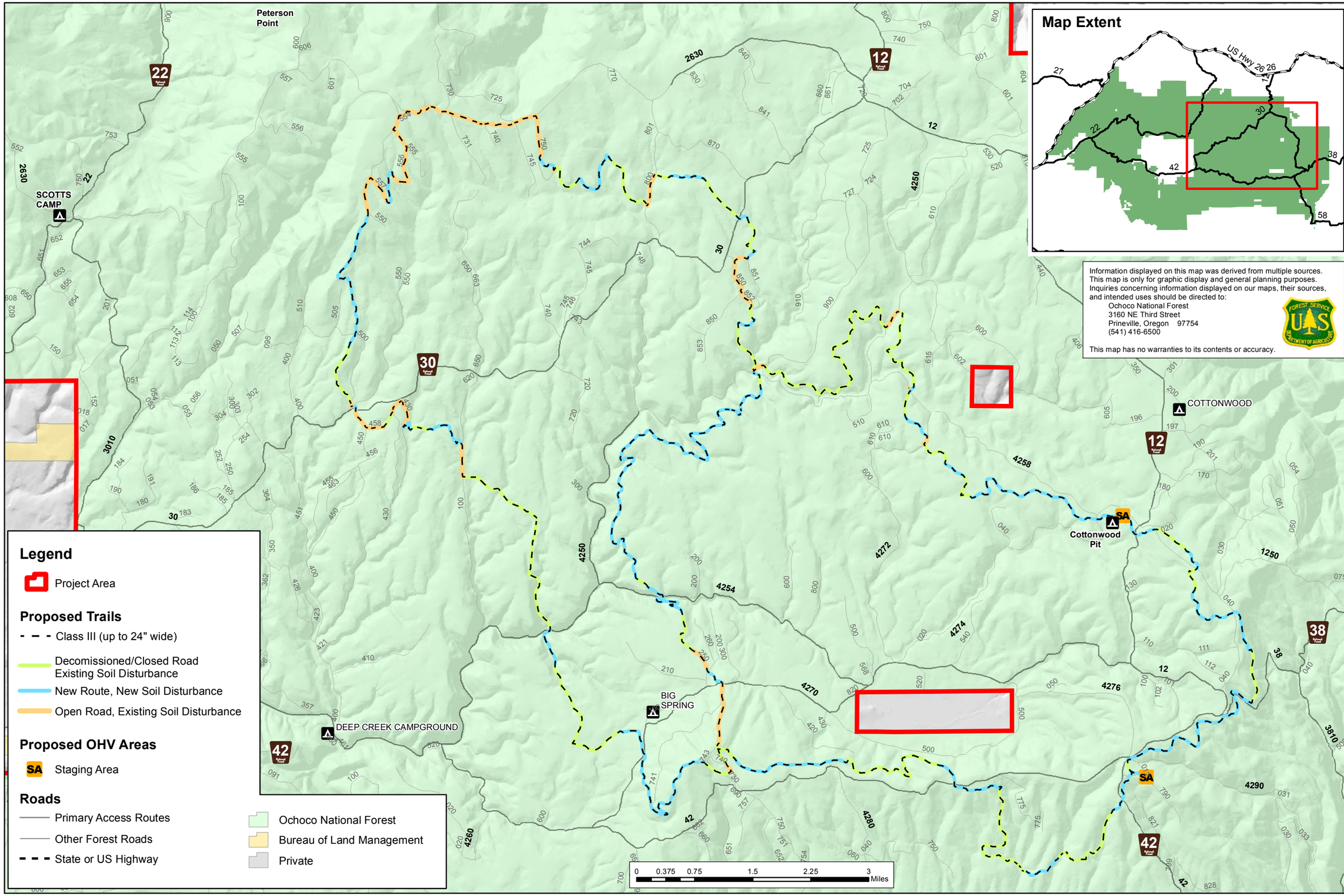

Map 5

Ochoco National Forest Lookout Mountain and Paulina Ranger Districts

Alternative 3 - East Side

Ochoco Summit Trail System EIS

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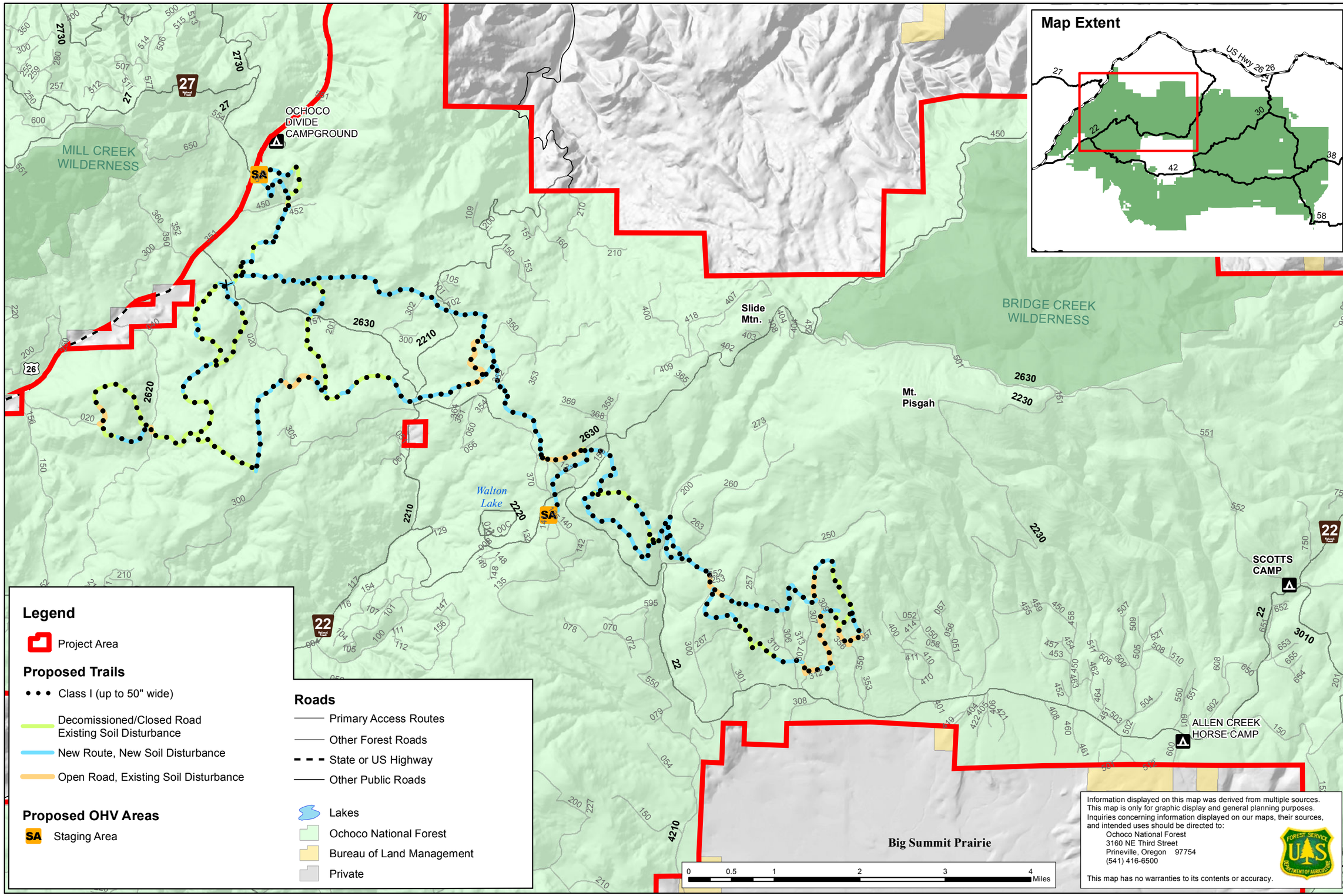

Map 6

Ochoco National Forest Lookout Mountain and Paulina Ranger Districts

Alternative 3 - West Side

Ochoco Summit Trail System EIS

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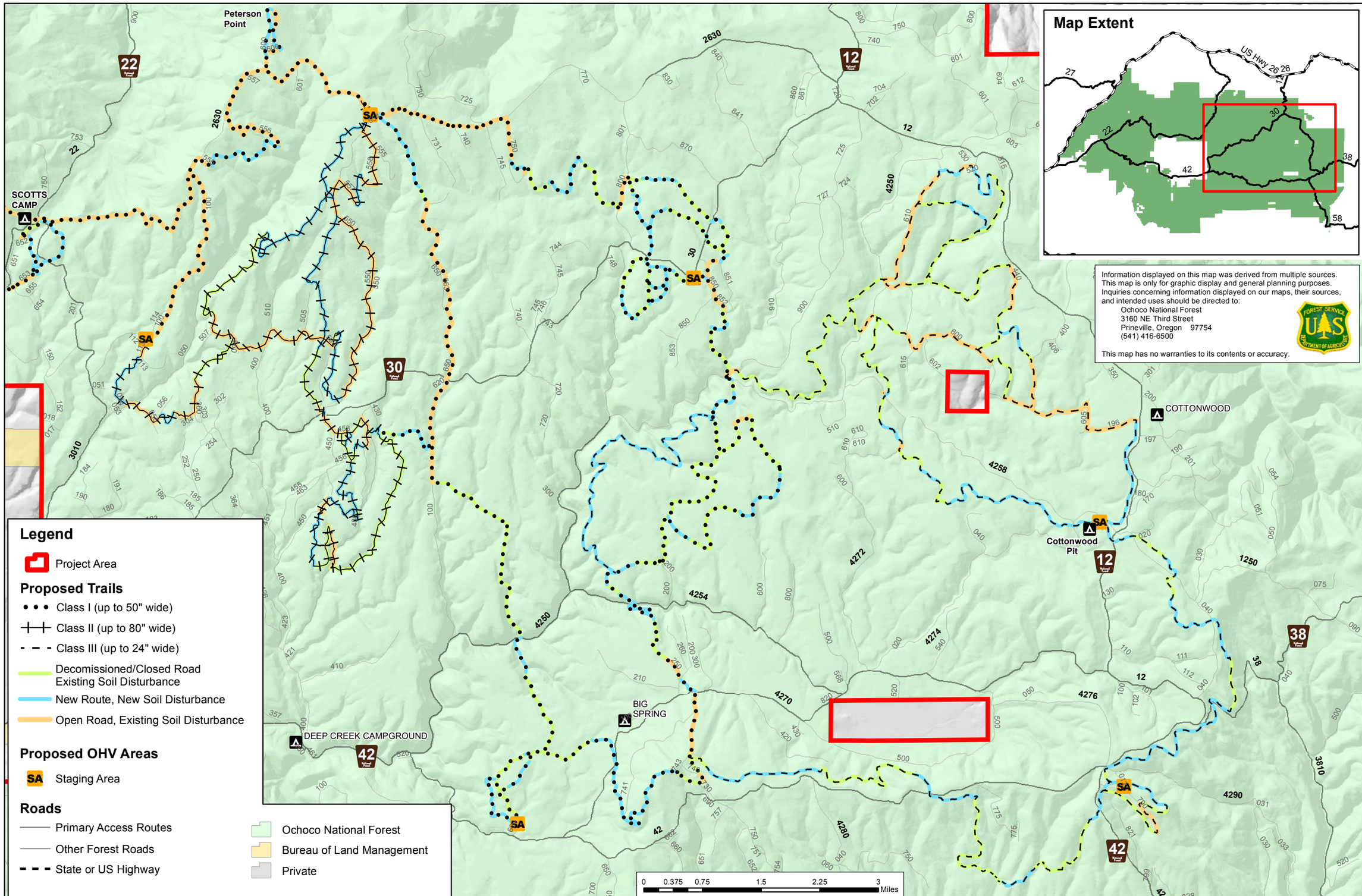
Map 7

Ochoco National Forest Lookout Mountain and Paulina Ranger Districts

Alternative 4 - East Side

Ochoco Summit Trail System EIS



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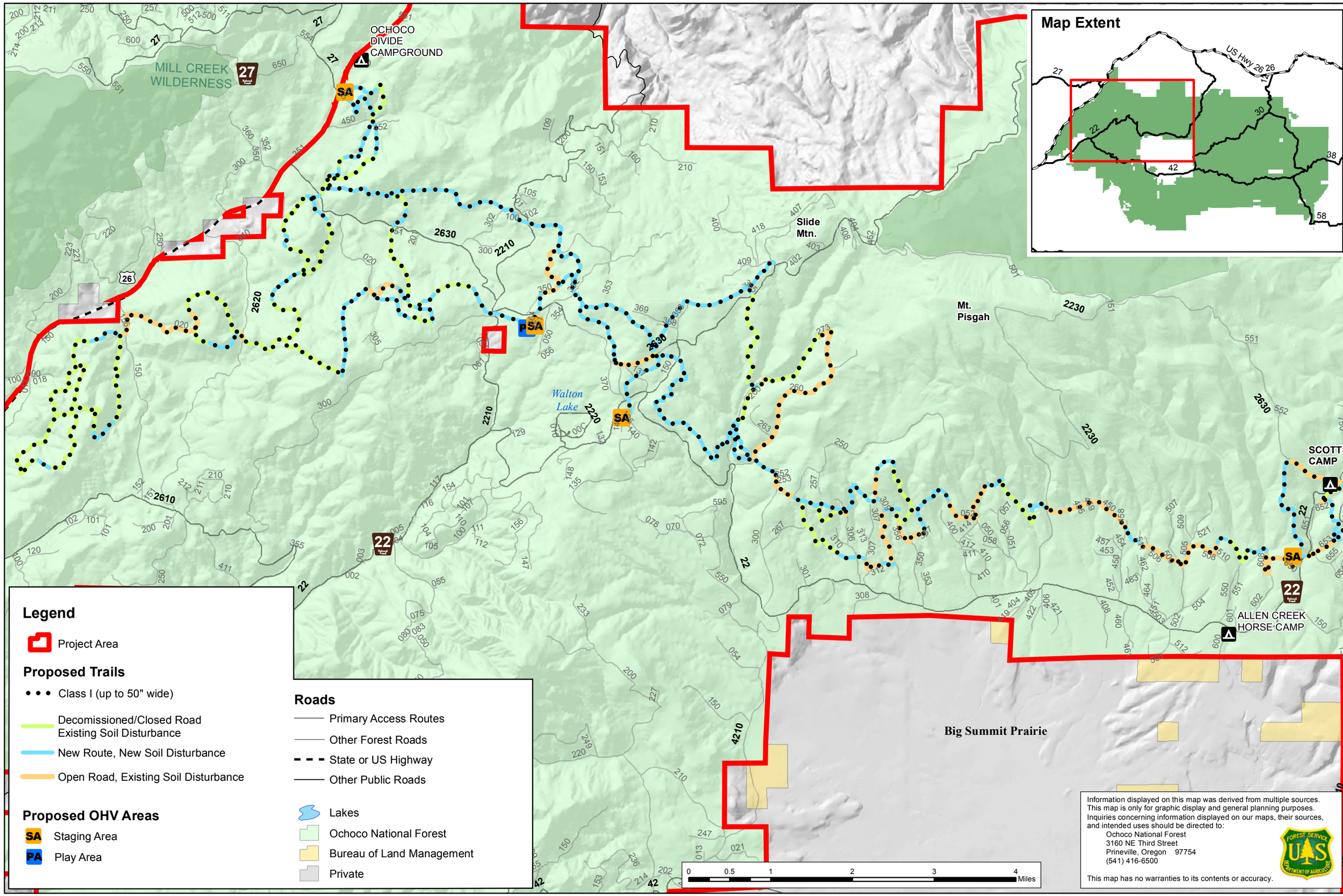

Map 8

Ochoco National Forest Lookout Mountain and Paulina Ranger Districts

Alternative 4 - West Side

Ochoco Summit Trail System EIS

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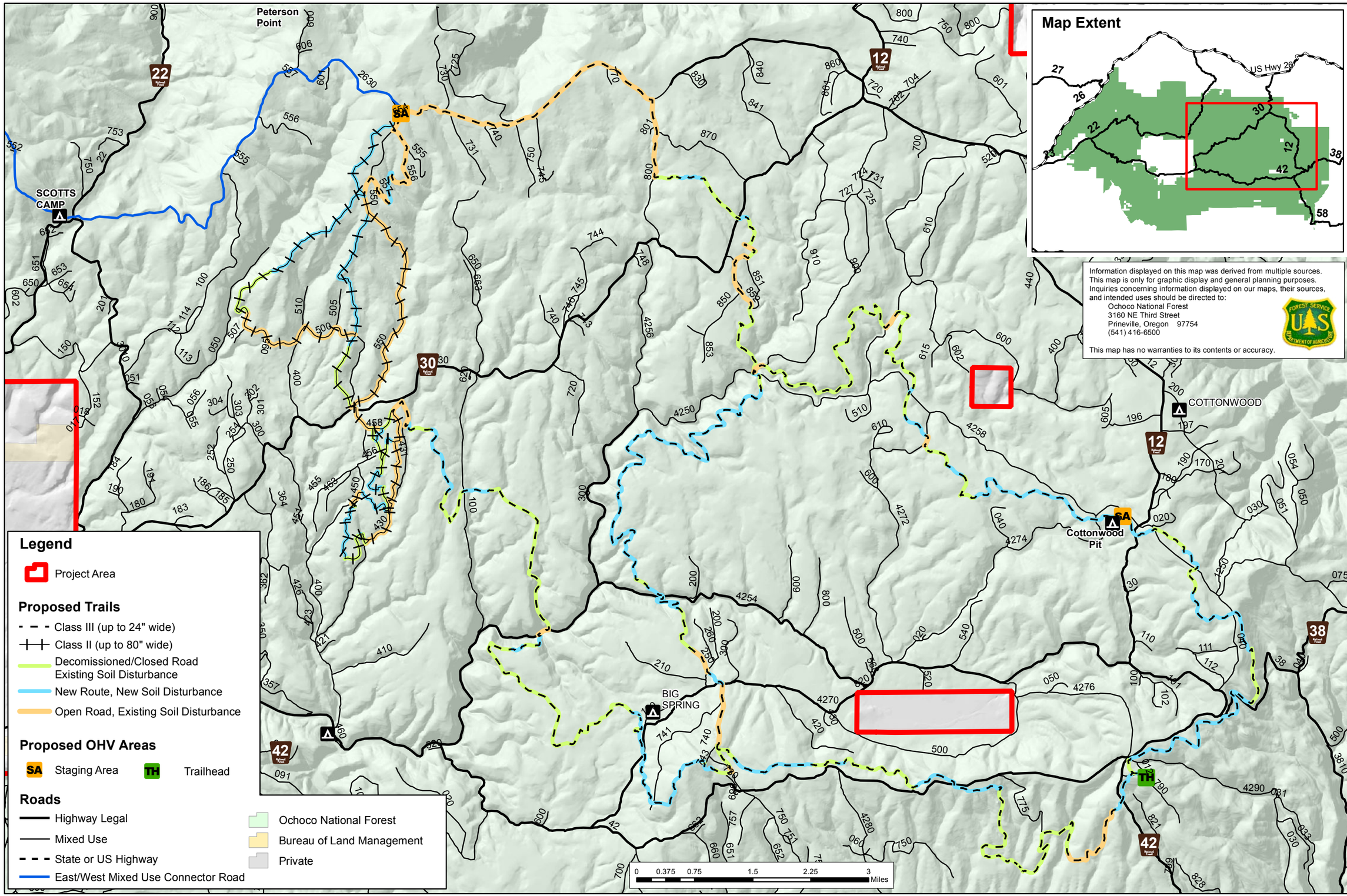

Map 9

Ochoco National Forest Lookout Mountain and Paulina Ranger Districts

Alternative 5 - East Side

Ochoco Summit Trail System SEIS

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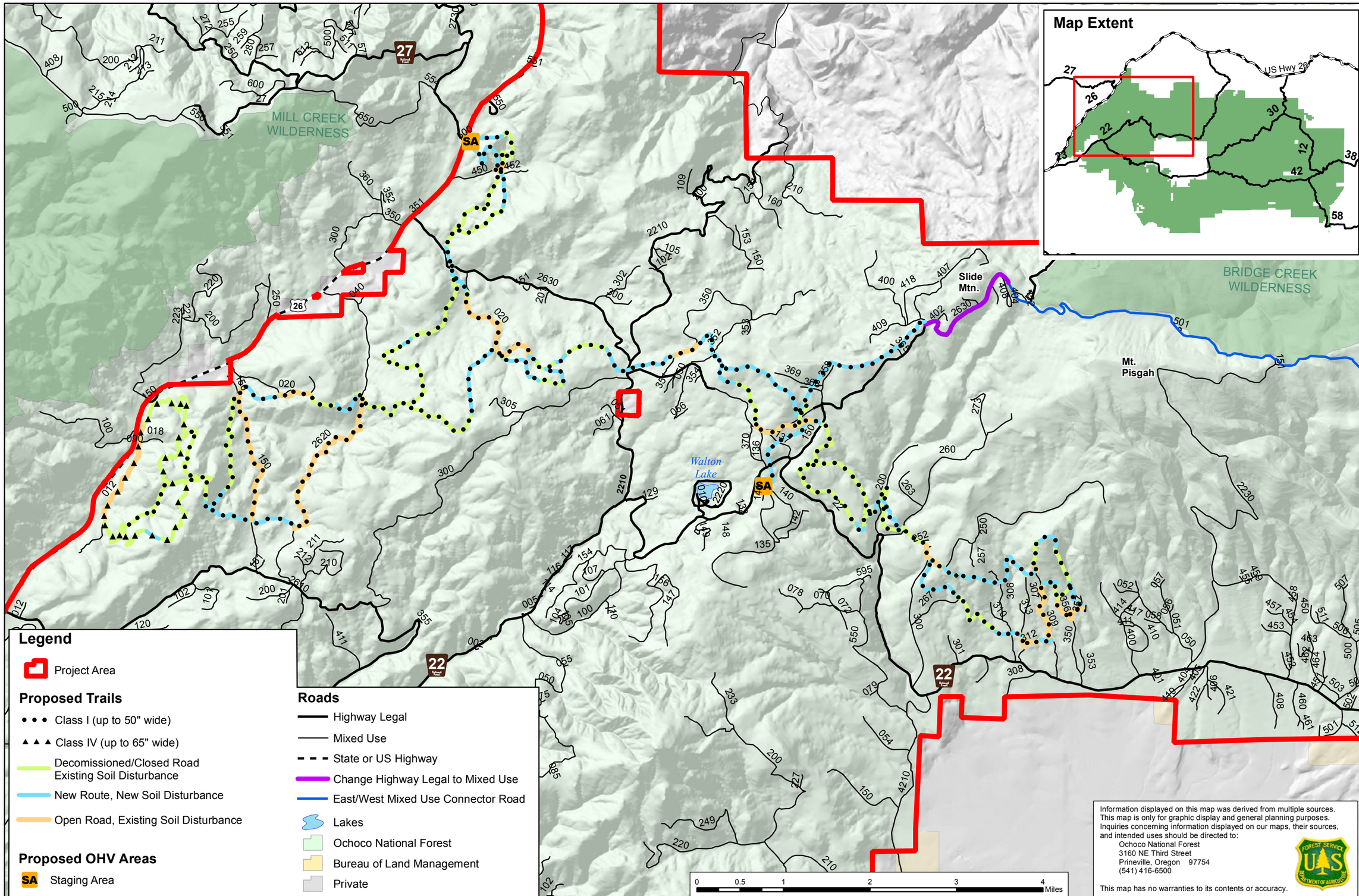
Ochoco National Forest
Ochoco Summit Trail System SEIS

Map 10
Lookout Mountain and Paulina Ranger Districts

Alternative 5 - West Side



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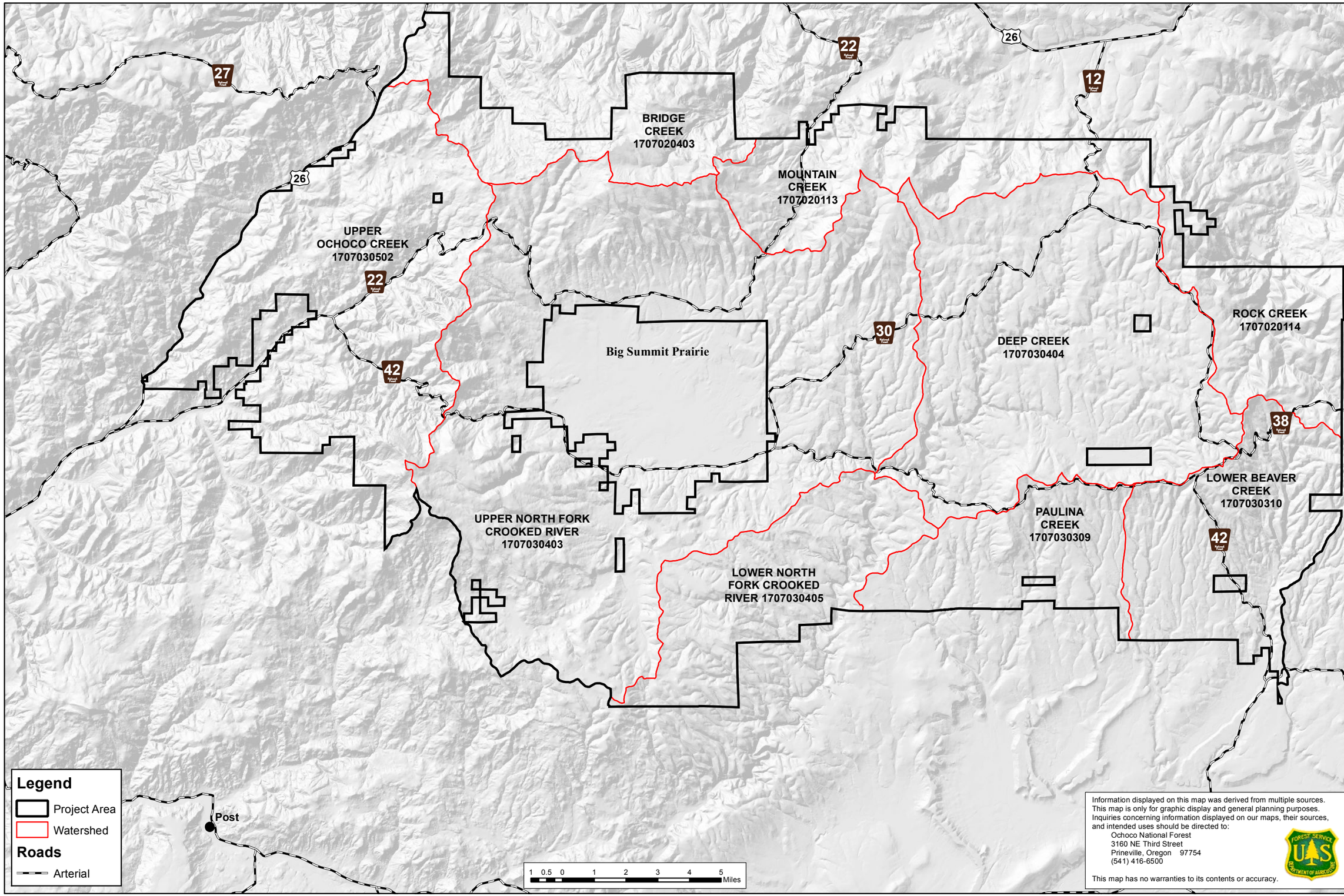

Map 11

Ochoco National Forest Lookout Mountain and Paulina Ranger Districts

Watershed Boundaries

Ochoco Summit Trail System EIS

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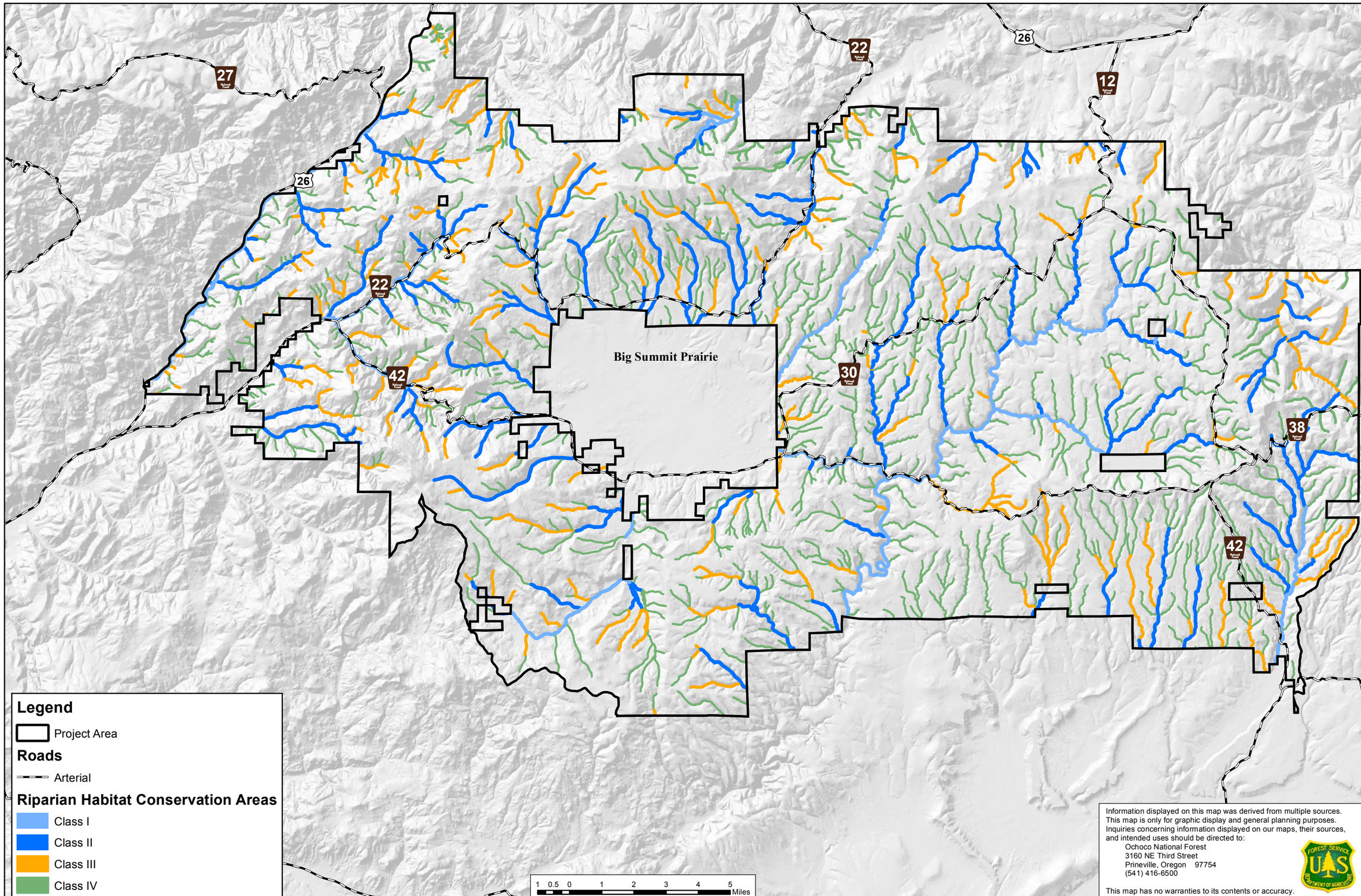

Map 12

Ochoco National Forest Lookout Mountain and Paulina Ranger Districts

Riparian Habitat Conservation Areas (RHCAs)

Ochoco Summit Trail System EIS

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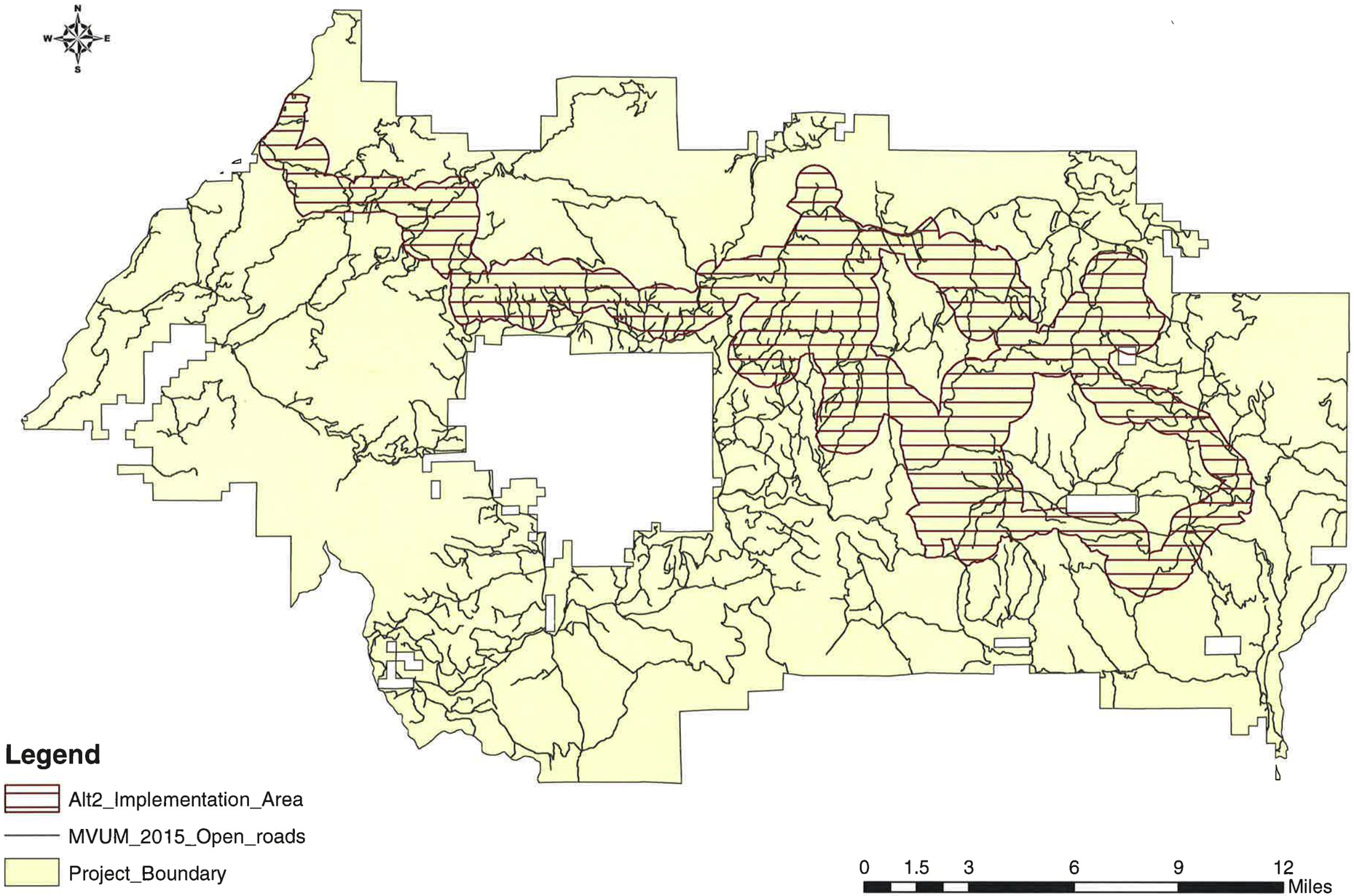
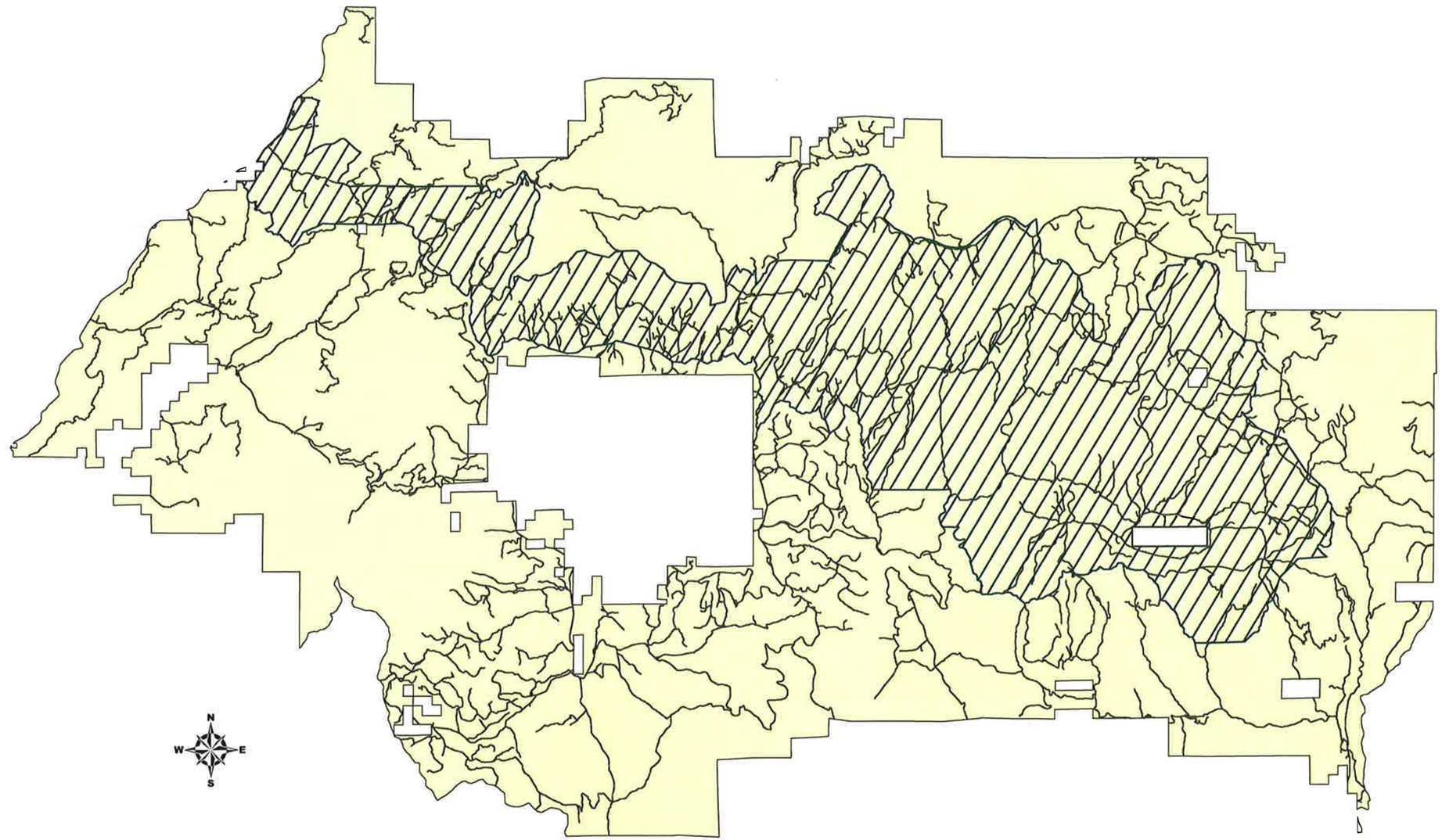
Alternative 2 Implementation Area



Alternative 2 OHV Management Area



Legend

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- MVUM_2015_Open_roads
- Project_Boundary

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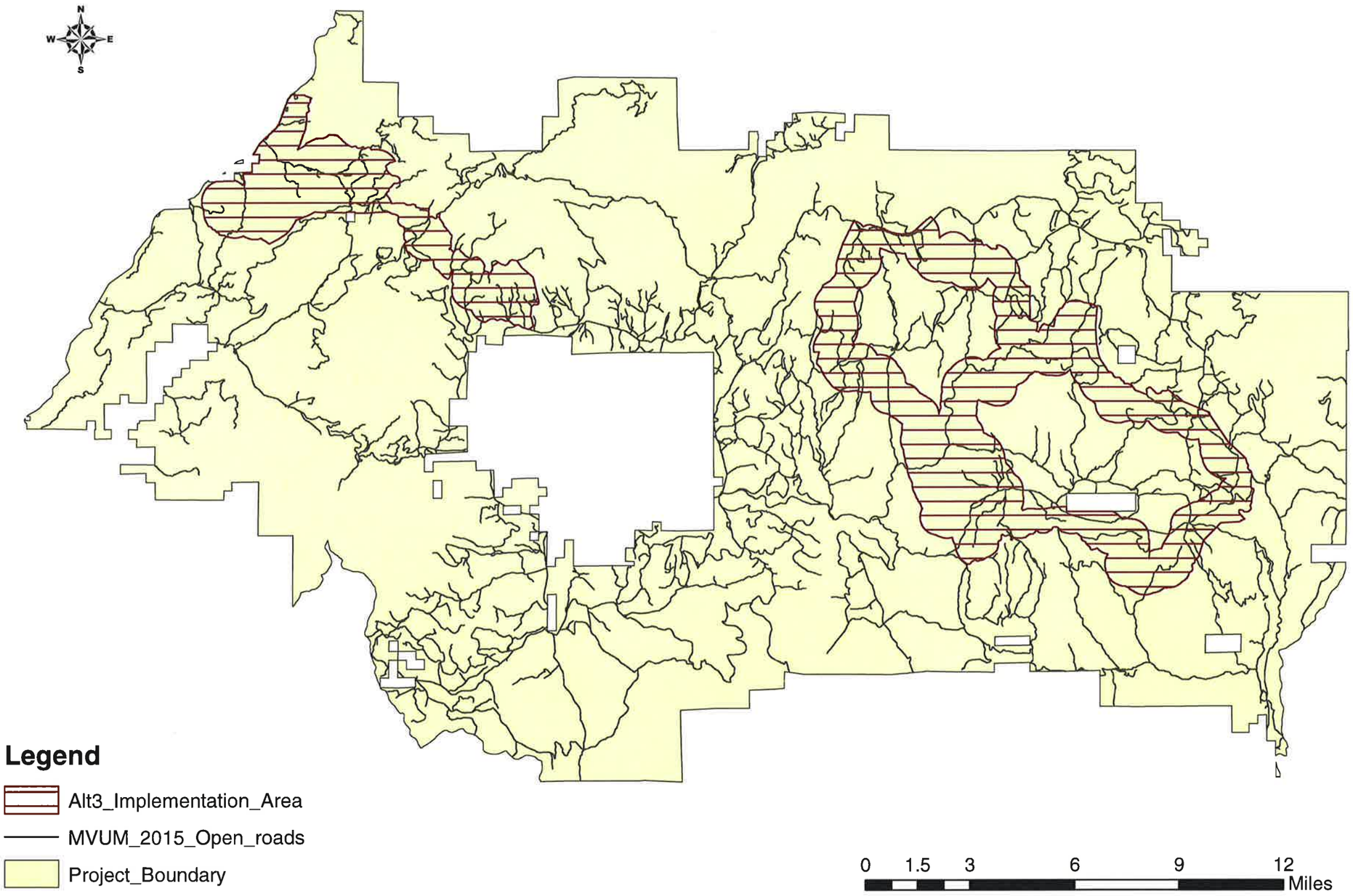
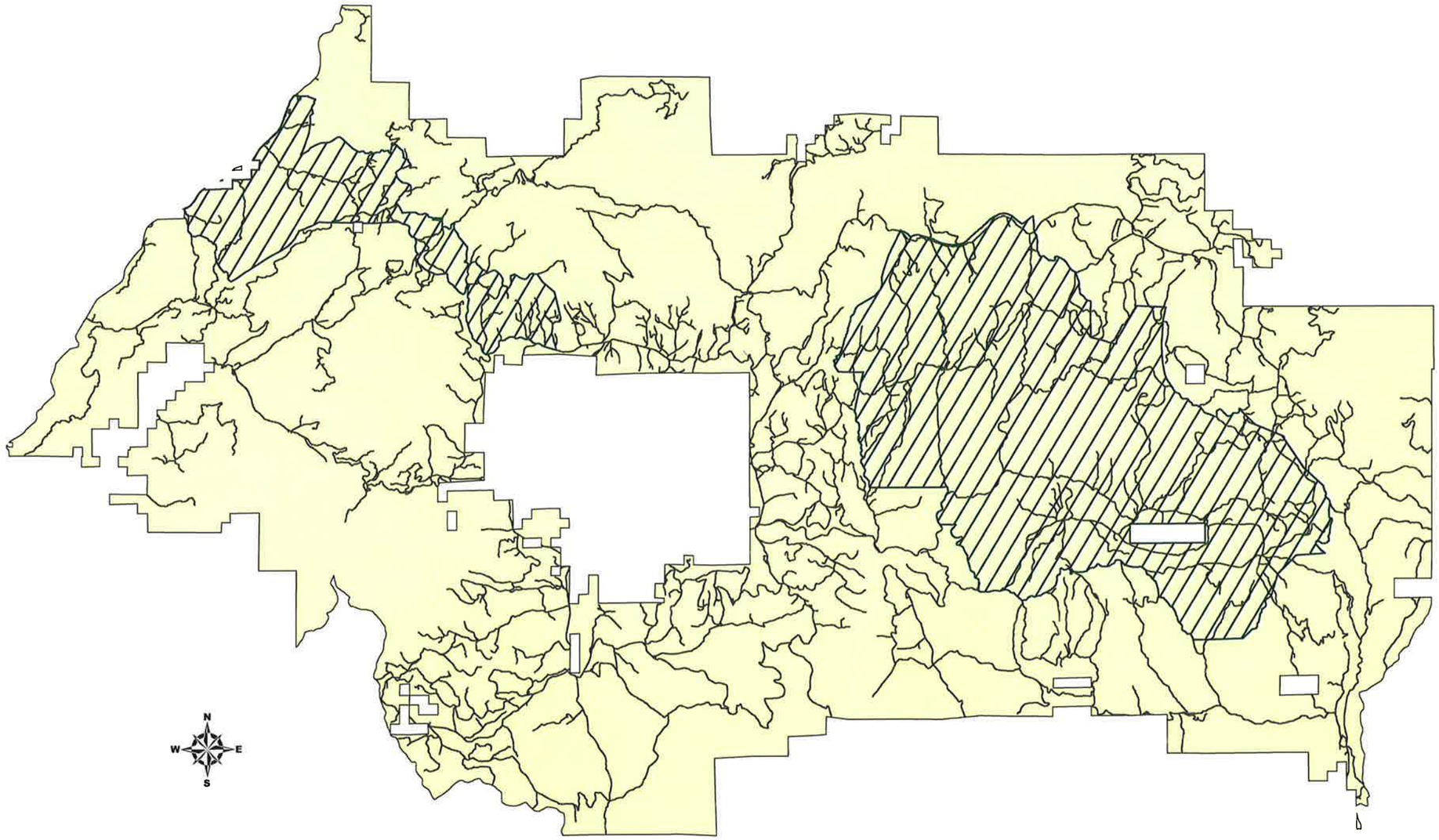
Alternative 3 Implementation Areas



Alternative 3 OHV Management Area



Legend

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- MVUM_2015_Open_roads
- Project_Boundary

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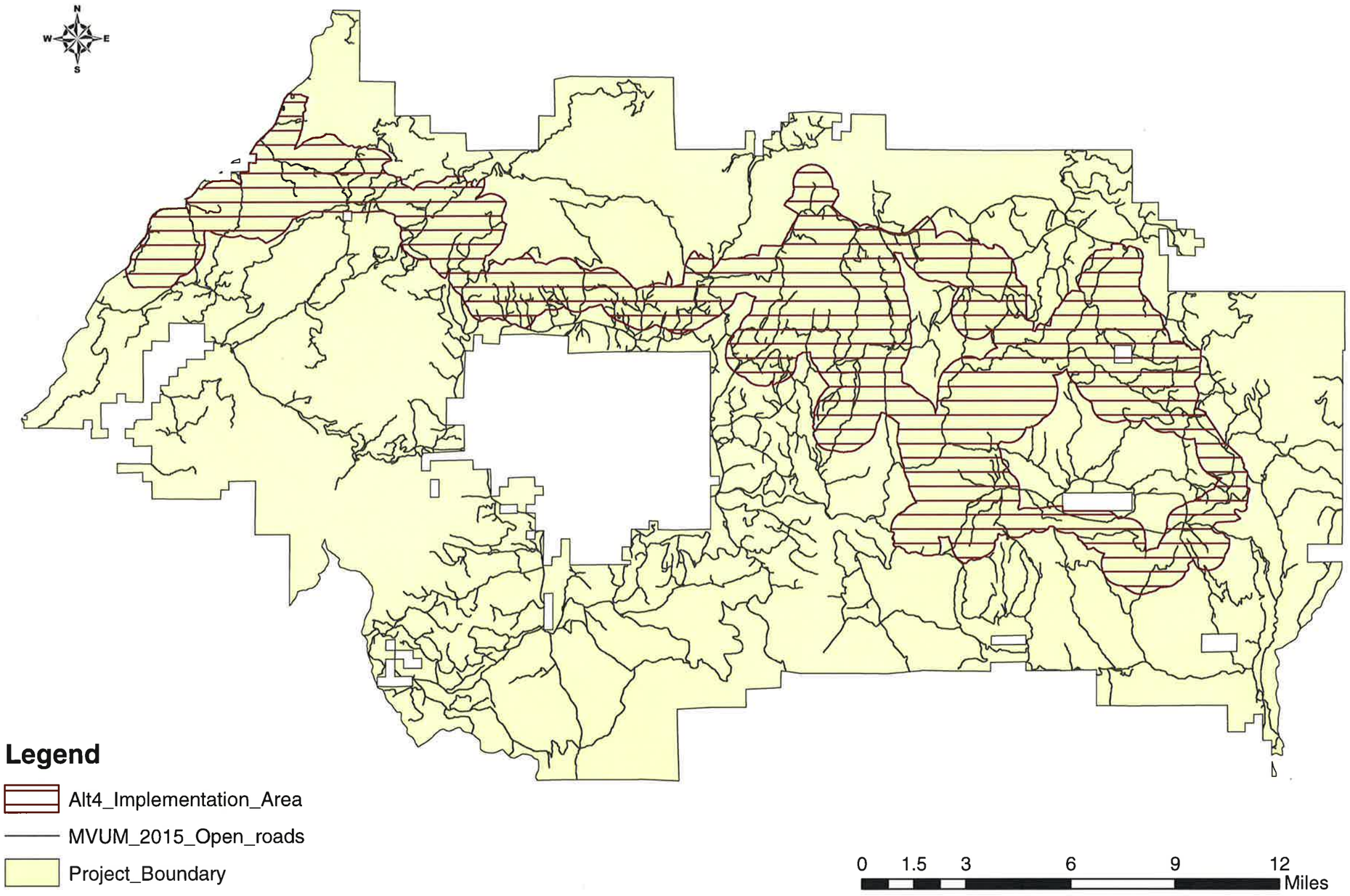
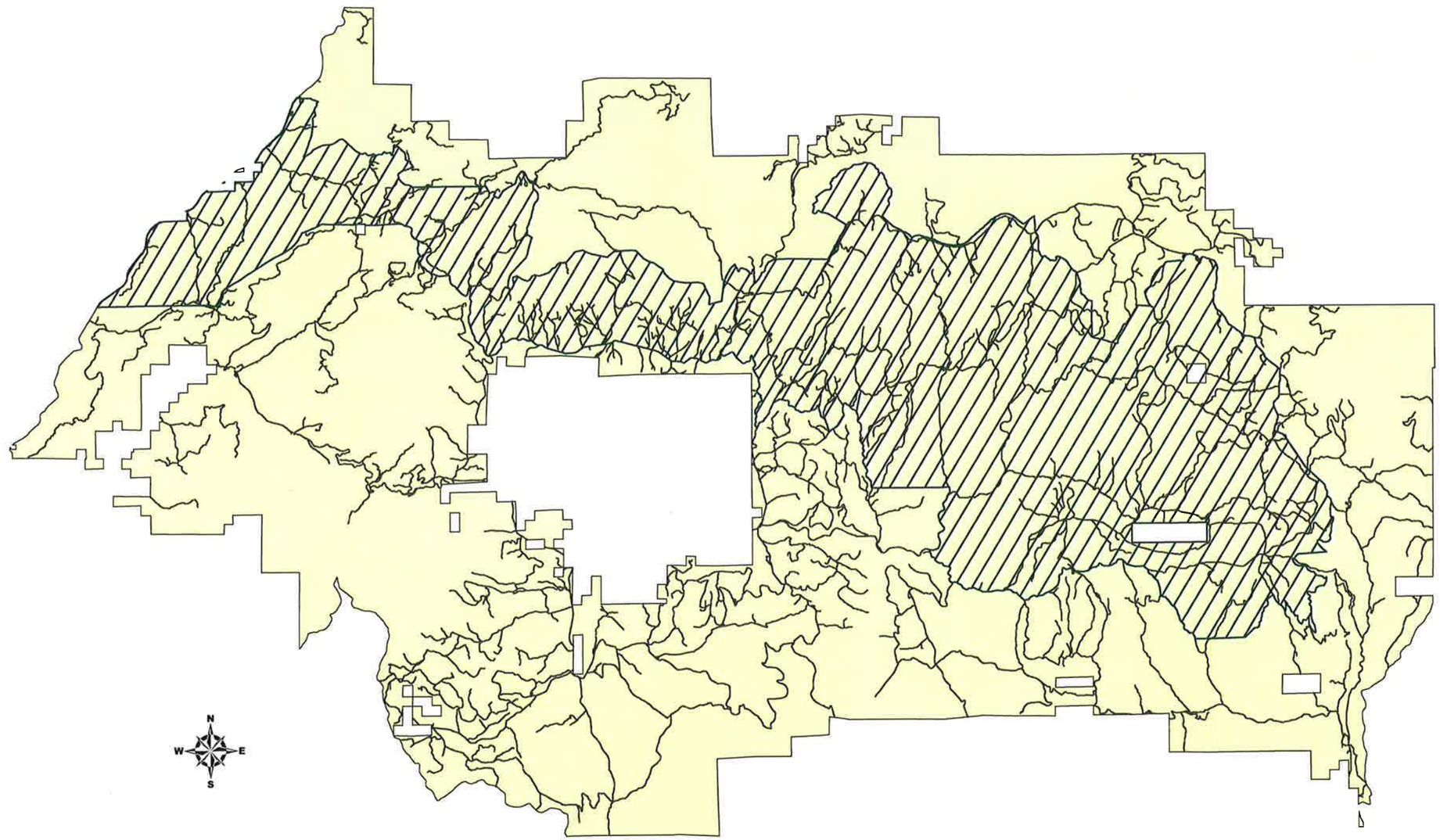


Alternative 4 OHV Management Area



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- Project_Boundary

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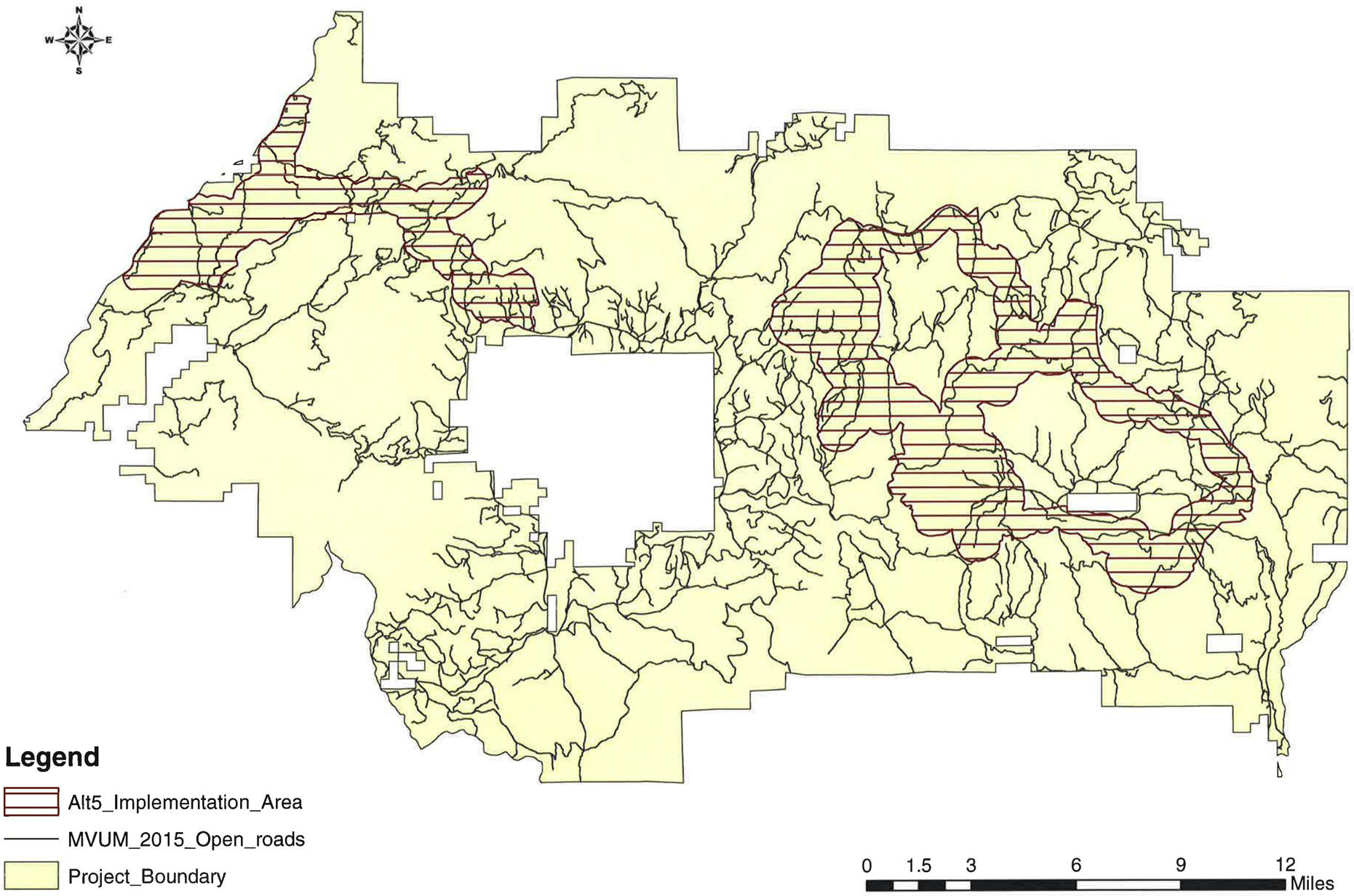
Alternative 5 Implementation Areas



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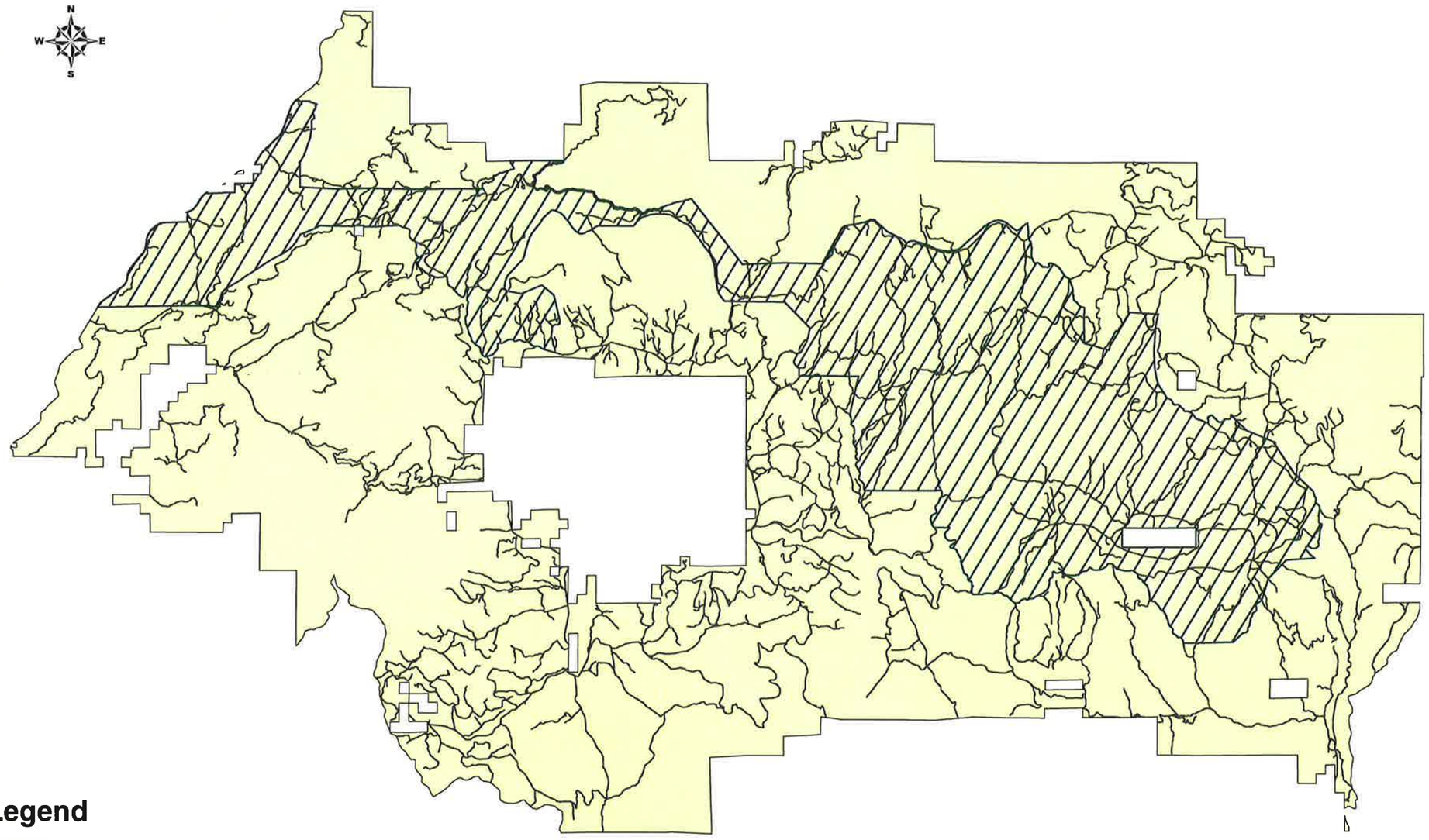

Legend

- Alt5_OHV_Management_Areas
- MVUM_2015_Open_roads
- Project_Boundary

0 1.5 3 6 9 12 Miles