North Steens Ecosystem Restoration Project

Draft Environmental Impact Statement

BLM

Burns District Office

December 2005

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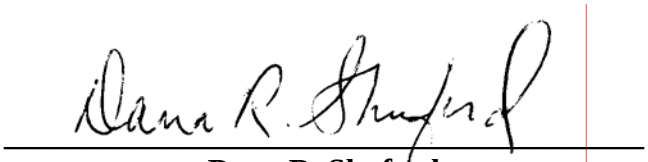
U.S. Department of the Interior
Bureau of Land Management

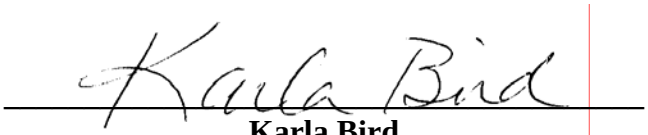
North Steens Ecosystem Restoration Project
Draft Environmental Impact Statement

Prepared by

Burns District Office
Burns District
December 2005



Dana R. Shuford
Burns District Manager



Karla Bird
Andrews Resource Area Field Manager

North Steens Ecosystem Restoration Project
Environmental Impact Statement

1. Responsible Agency: United States Department of the Interior, Bureau of Land Management

2. Cooperating Agencies:

   Burns Paiute Tribe
   United States Fish and Wildlife Service Ecological Services
   Malheur National Wildlife Refuge
   United States Department of Agriculture, Agricultural Research Service
   Oregon Department of Fish and Wildlife
   Department of Environmental Quality
   Harney County Court
   Harney Soil and Water Conservation District

3. Draft (X) Final ( )

4. Administrative Action (X) Legislative Action ( )

5. Abstract: The Bureau of Land Management, cooperating agencies, and private landowners propose to utilize a combination of prescribed and wildfire, western juniper treatments, fencing, seeding, planting, and other methods to reduce juniper-related fuel loading and restore a healthy and natural ecosystem on Steens Mountain. The result would provide ecological and economic benefits to intermingled public and private property totaling 336,000 acres. The alternatives detailed in this Environmental Impact Statement (EIS) propose landscape level juniper management of public land including wilderness, Wilderness Study Areas (WSAs), and Wild and Scenic River (WSR) corridors as well as on adjacent private lands. This would be a multiyear project with the extent and types of treatment varying from year to year. The Steens Mountain Cooperative Management and Protection Act of 2000 requires reintroduction of fire and management of juniper within the Cooperative Management and Protection Area. Alternatives analyzed in the Draft EIS represent a range of potential actions and approaches to juniper management. The No Treatment Alternative includes no treatment in the project area. The Continuation of Current Management Alternative proposes to continue existing limited levels of juniper management within the project area. The Partial Treatment Alternative involves extensive juniper management on private and public lands but no management within wilderness, WSAs, and WSR corridors. The Limited Treatment Alternative proposes extensive juniper management on private and public lands including limited juniper management within wilderness, WSAs, and WSR corridors. The Full Treatment Alternative includes broad scale juniper management on private and public lands and within wilderness, WSAs, and WSR corridors. The BLM has determined the two No Action Alternatives would not meet the objectives of the proposal, but they are being analyzed for purposes of comparison and utilization of current baseline conditions for data analysis. The three action alternatives are considered preferable to no action.

6. Date comments must be received: The close of the 45-day comment period will be announced in news releases, legal notices, and/or individual mailings and will begin upon publication of the Environmental Protection Agency's Notice of Availability in the *Federal Register*.

7. For further information contact:

   North Steens Ecosystem Restoration Project EIS Lead
   Attn: Douglas Linn
   Burns District BLM
   28910 Hwy 20 West
   Hines, Oregon 97738
   (541) 573-4543
   Email: ornseis@or.blm.gov

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Burns District Office
28910 Hwy 20 West, Hines, OR 97738
or020mb@or.blm.gov
www.or.blm.gov/Burns/

IN REPLY REFER TO:

2821 (OR-026/027) P

Dear Interested Party:

You are invited to assist the Bureau of Land Management (BLM) by providing comments for an on-the-ground project that may be important to you and your interests. Enclosed for your review and comment is the North Steens Ecosystem Restoration Project (North Steens Project) *Draft* Environmental Impact Statement (EIS).

The goal of the project is to reduce the hazardous fuels created by an unnatural increase in western juniper and to restore appropriate wildfire regimes, native levels of western juniper trees, and appropriate land uses. Reintroducing the historic fire regime and restoring a more natural ecosystem would implement provisions of the Steens Mountain Cooperative Management and Protection Act of 2000 (Steens Act) and would conform with the recently completed Resource Management Plan for the Steens Mountain Cooperative Management and Protection Area (CMPA). This action would result in restored native habitats in aspen, sagebrush-grassland, old-growth juniper, mountain mahogany and riparian plant communities as well as increased forage for wild and domestic herbivores.

The proposed project area is located within the Andrews Resource Area, primarily within the Steens Mountain CMPA. The area includes 336,000 acres containing both private lands and public lands managed by the BLM. Coordination and cooperation with these private landowners is directed by the Steens Act (Section 121) and is essential for achievement of project objectives.

The BLM initially considered this an Environmental Assessment (EA) level project, but because of input gathered in initial public scoping (January 2005) and the enlarged scope and scale of the project, the BLM determined an EIS should be prepared. As a result, a Notice of Intent (to prepare an EIS) was published in the *Federal Register* (July 2005) providing for an additional 15-day public scoping period on the proposal.

Five management alternatives have been identified, described, and analyzed in this draft plan. Public scoping and internal discussions played an important role in shaping both the issues and the alternatives. Suggestions and comments received (January and July 2005) from private individuals, interest groups, other governmental entities, the Steens Mountain Advisory Council, and from cooperating agencies (including Harney County, Burns Paiute Tribe, Malheur National Wildlife Refuge, U.S. Fish and Wildlife Service Ecological Services, Oregon Department of Fish and Wildlife, Oregon Department of Environmental Quality, Harney County Soil and Water Conservation District, and Eastern Oregon Agricultural Research Station) were thoroughly considered in the development of this draft EIS.

The BLM has determined the two No Action Alternatives would not meet the objectives of the proposal, but they are being analyzed for purposes of comparison and utilization of current baseline conditions for data analysis. The three action alternatives are considered preferable to no action.

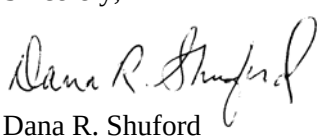
Your review and comments are needed at this time to ensure your concerns are adequately addressed in the EIS process. A 45-day public comment period is provided for your review of the document. Two public meetings will be held in Harney County, Oregon during the comment period. The comment period closing date and specific dates and locations of public meetings will be announced through local media and newsletters.

Written comments should be sent to Douglas Linn, EIS Project Lead, Bureau of Land Management, 28910 Highway 20 West, Hines, Oregon 97738, or e-mail to ornseis@or.blm.gov. All written comments will be fully considered and evaluated in the preparation of the Final EIS. Additional copies of the document and other supporting records may be obtained by contacting Douglas Linn at the above address.

Comments, including the names and addresses of respondents, will be available for public review at the Burns District Office during regular business hours 7:45 a.m. to 4:30 p.m., Monday through Friday, except holidays, and may be published as part of the Final EIS. Individual respondents may request confidentiality. If you wish to withhold your name or street address from public review, or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your written comments. Such requests will be honored to the extent allowed by law. Anonymous comments will not be considered. All submissions from organizations and businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be available for public inspection in their entirety.

Your review of this document and help in this EIS effort are appreciated, as are your continued interest and participation. For additional information or clarification regarding this document or the EIS process, please contact Douglas Linn at (541) 573-4400.

Sincerely,



Dana R. Shuford
Burns District Manager

Enclosure (as stated)

TABLE OF CONTENTS

Chapter 1. Introduction: Purpose of and Need for Action 1

1.1 Summary of the Proposal 1
1.2 Background 2
1.3 Purpose for Action 3
1.4 Need for Action 4
1.5 Planning Area 4
1.6 Conformance with Land Use Plans 4
1.6.1 Compliance with the Steens Mountain Cooperative Management and Protection Act of 2000 5
1.6.2 Compliance with Other Legislation 5
1.7 Initial Screening and Scoping of Issues 6
1.8 Major Relevant Issues 6

Chapter 2. Alternatives including the Proposed Action 9

2.1 Purpose of Chapter 2 9
2.2 Adaptive Management 9
2.2.1 Adaptive Management Objectives 9
2.2.2 Adaptive Management Common to all Action Alternatives 9
2.3 Development of Alternatives 9
2.4 Alternatives Considered by Eliminated from Detailed Analysis 10
2.5 Project Objectives Common to all Action Alternatives 10
2.5.1 Measurable Project Objectives Common to all Action Alternatives 11
2.6 Project Design Elements Common to all Action Alternatives 13
2.7 Treatment Prioritization and Project Units Common to all Action Alternatives 15
2.8 Alternatives Including the No Action Alternatives 16
2.8.1 No Action Alternative A – No Treatment Alternative 16
2.8.2 No Action Alternative B – Continuation of Current Management Alternative 16
2.8.3 Partial Treatment Alternative 17
2.8.4 Limited Treatment Alternative 20
2.8.5 Full Treatment Alternative 23

Chapter 3. Affected Environment 25

3.1 Project Area Profile 25
3.1.1 Physical Characteristics 25
3.1.2 History of the Project Area 25
3.2 Environmental Components 26
3.3 Critical Elements 27
3.3.1 Areas of Critical Environmental Concern 27
3.3.2 Air Quality 27
3.3.3 American Indian Traditional Practices 27
3.3.4 Cultural Heritage 28
3.3.5 Migratory Birds 29
3.3.6 Noxious Weeds 29
3.3.7 Paleontological Resources 30
3.3.8 Special Status Species – Fauna 30
3.3.9 Special Status Species – Flora 33
3.3.10 Wetlands and Riparian Zones and Water Quality 34
3.3.11 Wild and Scenic Rivers 37
3.3.12 Wilderness 38
3.3.13 Wilderness Study Areas 41

3.4 Noncritical Elements 45
3.4.1 Biological Soil Crusts 46
3.4.2 Fire Management 48
3.4.3 Fisheries 52
3.4.4 Forestry/Woodlands 53
3.4.5 Livestock Grazing Management 53
3.4.6 Recreation 55
3.4.7 Off-Highway Vehicles 56
3.4.8 Social and Economic Values 57
3.4.9 Soils 57
3.4.10 Transportation/Roads 60
3.4.11 Vegetation 60
3.4.12 Visual Resources 63
3.4.13 Wild Horses and Burros 64
3.4.14 Wildlife 65

Chapter 4. Environmental Consequences 66

4.1 No Action Alternative A – No Treatment: Critical Elements 66
4.1.1 Areas of Critical Environmental Concern 66
4.1.2 Air Quality 66
4.1.3 American Indian Traditional Practices 67
4.1.4 Cultural Heritage 67
4.1.5 Migratory Birds 67
4.1.6 Noxious Weeds 68
4.1.7 Paleontological Resources 68
4.1.8 Special Status Species – Fauna 68
4.1.9 Special Status Species – Flora 69
4.1.10 Wetlands and Riparian Zones and Water Quality 70
4.1.11 Wild and Scenic Rivers 71
4.1.12 Wilderness 73
4.1.13 Wilderness Study Areas 74
4.2 No Treatment Alternative: Noncritical Elements 75
4.2.1 Biological Soil Crusts 75
4.2.2 Fire Management 76
4.2.3 Fisheries 76
4.2.4 Forestry/Woodlands 77
4.2.5 Livestock Grazing Management 78
4.2.6 Recreation 78
4.2.7 Off-Highway Vehicles 78
4.2.8 Social and Economic Values 78
4.2.9 Soils 78
4.2.10 Transportation/Roads 78
4.2.11 Vegetation 79
4.2.12 Visual Resources 79
4.2.13 Wild Horses and Burros 80
4.2.14 Wildlife 80
4.3 No Action Alternative B – Continuation of Current Management Alternative: Critical Elements 81
4.3.1 Areas of Critical Environmental Concern 81
4.3.2 Air Quality 81
4.3.3 American Indian Traditional Practices 81
4.3.4 Cultural Heritage 81
4.3.5 Migratory Birds 81
4.3.6 Noxious Weeds 82
4.3.7 Paleontological Resources 82
4.3.8 Special Status Species – Fauna 82

4.3.9 Special Status Species –Flora 82
4.3.10 Wetlands and Riparian Zones and Water Quality 82
4.3.11 Wild and Scenic Rivers 82
4.3.12 Wilderness 82
4.3.13 Wilderness Study Areas 82
4.4 No Action Alternative B – Continuation of Current Management Alternative: Noncritical Elements 82
4.4.1 Biological Soil Crusts 82
4.4.2 Fire Management 83
4.4.3 Fisheries 83
4.4.4 Forestry/Woodlands 83
4.4.5 Livestock Grazing Management 83
4.4.6 Recreation 83
4.4.7 Off-Highway Vehicles 83
4.4.8 Social and Economic Values 83
4.4.9 Soils 83
4.4.10 Transportation/Roads 83
4.4.11 Vegetation 83
4.4.12 Visual Resources 83
4.4.13 Wild Horses and Burros 84
4.4.14 Wildlife 84
4.5 Partial Treatment Alternative: Critical Elements 84
4.5.1 Areas of Critical Environmental Concern 84
4.5.2 Air Quality 84
4.5.3 American Indian Traditional Practices 85
4.5.4 Cultural Heritage 85
4.5.5 Migratory Birds 87
4.5.6 Noxious Weeds 88
4.5.7 Paleontological Resources 88
4.5.8 Special Status Species –Fauna 89
4.5.9 Special Status Species – Flora 91
4.5.10 Wetlands and Riparian Zones and Water Quality 91
4.5.11 Wild and Scenic Rivers 92
4.5.12 Wilderness 92
4.5.13 Wilderness Study Areas 92
4.6 Partial Treatment Alternative: Noncritical Elements 93
4.6.1 Biological Soil Crusts 93
4.6.2 Fire Management 94
4.6.3 Fisheries 94
4.6.4 Forestry/Woodlands 95
4.6.5 Livestock Grazing Management 96
4.6.6 Recreation 96
4.6.7 Off-Highway Vehicles 97
4.6.8 Social and Economic Values 97
4.6.9 Soils 97
4.6.10 Transportation/Roads 97
4.6.11 Vegetation 97
4.6.12 Visual Resources 98
4.6.13 Wild Horses and Burros 100
4.6.14 Wildlife 100
4.7 Limited Treatment Alternative: Critical Elements 101
4.7.1 Areas of Critical Environmental Concern 101
4.7.2 Air Quality 101
4.7.3 American Indian Traditional Practices 102
4.7.4 Cultural Heritage 102
4.7.5 Migratory Birds 102
4.7.6 Noxious Weeds 102

4.7.7 Paleontological Resources 102
4.7.8 Special Status Species – Fauna 102
4.7.9 Special Status Species –Flora 103
4.7.10 Wetlands and Riparian Zones and Water Quality 104
4.7.11 Wild and Scenic Rivers 105
4.7.12 Wilderness 107
4.8 Limited Treatment Alternative: Noncritical Elements 110
4.8.1 Biological Soil Crusts 110
4.8.2 Fire Management 111
4.8.3 Fisheries 111
4.8.4 Forestry/Woodlands 111
4.8.5 Livestock Grazing Management 112
4.8.6 Recreation 112
4.8.7 Off-Highway Vehicles 112
4.8.8 Social and Economic Values 112
4.8.9 Soils 113
4.8.10 Transportation/Roads 113
4.8.11 Vegetation 113
4.8.12 Visual Resources 113
4.8.13 Wild Horses and Burros 113
4.8.14 Wildlife 113
4.9 Full Treatment Alternative: Critical Elements 114
4.9.1 Areas of Critical Environmental Concern 114
4.9.2 Air Quality 114
4.9.3 American Indian Traditional Practices 114
4.9.4 Cultural Heritage 114
4.9.5 Migratory Birds 114
4.9.6 Noxious Weeds 114
4.9.7 Paleontological Resources 115
4.9.8 Special Status Species – Fauna 115
4.9.9 Special Status Species – Flora 116
4.9.10 Wetlands and Riparian Zones and Water Quality 116
4.9.11 Wild and Scenic Rivers 116
4.9.12 Wilderness 118
4.9.13 Wilderness Study Areas 120
4.10 Full Treatment Alternative: Noncritical Elements 121
4.10.1 Biological Soil Crusts 121
4.10.2 Fire Management 121
4.10.3 Fisheries 121
4.10.4 Forestry/Woodlands 121
4.10.5 Livestock Grazing Management 121
4.10.6 Recreation 122
4.10.7 Off-Highway Vehicles 122
4.10.8 Social and Economic Values 122
4.10.9 Soils 122
4.10.10 Transportation/Roads 122
4.10.11 Vegetation 122
4.10.12 Visual Resources 123
4.10.13 Wild Horses and Burros 123
4.10.14 Wildlife 123
4.11 Cumulative Effects 123
4.11.1 Past Actions 123
4.11.2 Present Actions 128
4.11.3 Reasonable Foreseeable Future Actions 129
4.12 No Action Alternative A – No Treatment: Critical Elements 130
4.12.1 Areas of Critical Environmental Concern 130

4.12.2 Air Quality 130
4.12.3 American Indian Traditional Practices 130
4.12.4 Cultural Heritage 131
4.12.5 Migratory Birds 131
4.12.6 Noxious Weeds 131
4.12.7 Paleontological Resources 132
4.12.8 Special Status Species – Fauna 132
4.12.9 Special Status Species –Flora 132
4.12.10 Wetlands and Riparian Zones and Water Quality 132
4.12.11 Wild and Scenic Rivers 133
4.12.12 Wilderness 134
4.12.13 Wilderness Study Areas 134
4.13 No Treatment Alternative: Noncritical Elements 135
4.13.1 Biological Soil Crusts 135
4.13.2 Fire Management 135
4.13.3 Fisheries 136
4.13.4 Forestry/Woodlands 136
4.13.5 Livestock Grazing Management 136
4.13.6 Recreation 136
4.13.7 Off-Highway Vehicles 136
4.13.8 Social and Economic Values 136
4.13.9 Soils 137
4.13.10 Transportation/Roads 137
4.13.11 Vegetation 137
4.13.12 Visual Resources 137
4.13.13 Wild Horses and Burros 137
4.13.14 Wildlife 137
4.14 No Action Alternative B –Continue Current Alternative: Critical Elements 138
4.14.1 Areas of Critical Environmental Concern 138
4.14.2 Air Quality 138
4.14.3 American Indian Traditional Practices 138
4.14.4 Cultural Heritage 138
4.14.5 Migratory Birds 138
4.14.6 Noxious Weeds 139
4.14.7 Paleontological Resources 139
4.14.8 Special Status Species – Fauna 139
4.14.9 Special Status Species –Flora 139
4.14.10 Wetlands and Riparian Zones and Water Quality 139
4.14.11 Wild and Scenic Rivers 141
4.14.12 Wilderness 141
4.14.13 Wilderness Study Areas 141
4.15 No Action Alternative B – Continuation of Current Management Alternative: Noncritical Elements 141
4.15.1 Biological Soil Crusts 141
4.15.2 Fire Management 141
4.15.3 Fisheries 141
4.15.4 Forestry/Woodlands 141
4.15.5 Livestock Grazing Management 141
4.15.6 Recreation 142
4.15.7 Off-Highway Vehicles 142
4.15.8 Social and Economic Values 142
4.15.9 Soils 142
4.15.10 Transportation/Roads 142
4.15.11 Vegetation 142
4.15.12 Visual Resources 142
4.15.13 Wild Horses and Burros 142
4.15.14 Wildlife 143

4.16 Partial Treatment Alternative: Critical Elements 143
4.16.1 Areas of Critical Environmental Concern 143
4.16.2 Air Quality 143
4.16.3 American Indian Traditional Practices 143
4.16.4 Cultural Heritage 143
4.16.5 Migratory Birds 144
4.16.6 Noxious Weeds 144
4.16.7 Paleontological Resources 144
4.16.8 Special Status Species – Fauna 145
4.16.9 Special Status Species –Flora 145
4.16.10 Wetlands and Riparian Zones and Water Quality 146
4.16.11 Wild and Scenic Rivers 146
4.16.12 Wilderness 146
4.16.13 Wilderness Study Areas 146
4.17 Partial Treatment Alternative: Noncritical Elements 146
4.17.1 Biological Soil Crusts 146
4.17.2 Fire Management 148
4.17.3 Fisheries 148
4.17.4 Forestry/Woodlands 148
4.17.5 Livestock Grazing Management 148
4.17.6 Recreation 148
4.17.7 Off-Highway Vehicles 148
4.17.8 Social and Economic Values 148
4.17.9 Soils 149
4.17.10 Transportation/Roads 149
4.17.11 Vegetation 149
4.17.12 Visual Resources 149
4.17.13 Wild Horses and Burros 149
4.17.14 Wildlife 150
4.18 Limited Treatment Alternative: Critical Elements 150
4.18.1 Areas of Critical Environmental Concern 150
4.18.2 Air Quality 150
4.18.3 American Indian Traditional Practices 150
4.18.4 Cultural Heritage 150
4.18.5 Migratory Birds 150
4.18.6 Noxious Weeds 151
4.18.7 Paleontological Resources 151
4.18.8 Special Status Species – Fauna 151
4.18.9 Special Status Species –Flora 152
4.18.10 Wetlands and Riparian Zones and Water Quality 152
4.18.11 Wild and Scenic Rivers 152
4.18.12 Wilderness 153
4.18.13 Wilderness Study Areas 154
4.19 Limited Treatment Alternative: Noncritical Elements 154
4.19.1 Biological Soil Crusts 154
4.19.2 Fire Management 154
4.19.3 Fisheries 154
4.19.4 Forestry/Woodlands 154
4.19.5 Livestock Grazing Management 155
4.19.6 Recreation 155
4.19.7 Off-Highway Vehicles 155
4.19.8 Social and Economic Values 155
4.19.9 Soils 155
4.19.10 Transportation/Roads 155
4.19.11 Vegetation 156
4.19.12 Visual Resources 156

4.19.13 Wild Horses and Burros 156
4.19.14 Wildlife 156
4.20 Full Treatment Alternative: Critical Elements 156
4.20.1 Areas of Critical Environmental Concern 156
4.20.2 Air Quality 156
4.20.3 American Indian Traditional Practices 157
4.20.4 Cultural Heritage 157
4.20.5 Migratory Birds 158
4.20.6 Noxious Weeds 158
4.20.7 Paleontological Resources 158
4.20.8 Special Status Species – Fauna 158
4.20.9 Special Status Species –Flora 159
4.20.10 Wetlands and Riparian Zones and Water Quality 160
4.20.11 Wild and Scenic Rivers 160
4.20.12 Wilderness 161
4.20.13 Wilderness Study Areas 162
4.21 Full Treatment Alternative: Noncritical Elements 162
4.21.1 Biological Soil Crusts 162
4.21.2 Fire Management 162
4.21.3 Fisheries 162
4.21.4 Forestry/Woodlands 163
4.21.5 Livestock Grazing Management 163
4.21.6 Recreation 163
4.21.7 Off-Highway Vehicles 163
4.21.8 Social and Economic Values 163
4.21.9 Soils 164
4.21.10 Transportation/Roads 164
4.21.11 Vegetation 164
4.21.12 Visual Resources 164
4.21.13 Wild Horses and Burros 164
4.21.14 Wildlife 164
4.22 Comments on Cumulative Effects 165
4.23 Compliance with the Interim Management Policy for Lands under Wilderness Review 165

Chapter 5. List of Preparers 168

5.1 Introduction 168
5.2 Public Participation 168
5.3 Bureau of Land Management RMP/EIS Team 168
5.4 Cooperating Agencies 169

Chapter 6. Glossary, Bibliography, and Index 170

6.1 Glossary 170
6.2 Bibliography 180
6.3 Index 186

List of Maps:

Map 1: Project Units and Land Administration
Map 2: Past Actions: Juniper Cuts and Wildland Fires (Prescribed and Natural)

Maps and Images available on CD (included):

Image 1.1: Western Juniper Expansion into Riparian and Upland Areas
Image 1.2: Reduced Understory Resulting from Juniper Expansion
Map 1.1: Current Juniper Expansion into Current Sagebrush Distribution
Map 1.2: Projected Juniper Expansion into Current Sagebrush Distribution
Image 2.1: Juniper Induced Understory Reduction
Image 2.2: Lupine Response following a Natural Wildland Fire Event
Image 2.3: Aspen Response following a Wildland Fire Event
Image 2.4: Selective Cutting Resembles Some Visual Results of a Natural Wildland Fire Event
Image 4.1: Juniper Growing on Terrace Upstream of Page Springs
Map 4.1: Projected Sagebrush and Juniper within Example Treatment Units
Map 4.2: Potential Historic Sagebrush Distribution
Map 4.3: Current Sagebrush (over 10 percent cover class) Distribution

Maps from the Andrews Management Unit/Steens Mountain Cooperative Management and Protection Area Resource Management Plan available on CD (included)

Map 1: General Vicinity
Map 2: Administered Lands
Map 3: Visual Resource Management Classes
Map 4: Locatable Minerals Open Areas
Map 5: Mineral Leasing Categories
Map 6: Saleable Minerals Open Areas
Map 7: Herd Areas and Herd Management Areas
Map 8: Grazing Allotment Boundaries
Map 9: Land Tenure Zone Boundaries
Map 10: Right-of-Way Corridors and Realty Use Authorization Avoidance/Exclusion Areas
Map 11: Transportation Plan within the CMPA (Existing Condition)
Map 12: Transportation Plan within the Planning Area (Existing Condition)
Map 13: Transportation Plan within the CMPA - Implementation
Map 14: Off-Highway Vehicle Designations
Map 15: Areas of Critical Environmental Concern/Research Natural Areas and Special Recreation Management Areas

List of Supplemental Maps from the Andrews Management Unit/Steens Mountain Cooperative Management and Protection Area Resource Management Plan available on CD (included)

Map S-1:	Hydrographic Subbasins
Map S-2:	Proper Functioning Condition Assessment
Map S-3:	Soil Survey
Map S-4:	General Vegetation
Map S-5:	Noxious Weed Infestation
Map S-6:	Special Status Species Plants
Map S-7:	Wildlife Habitat
Map S-8:	Completed Cultural Resource Inventory
Map S-9:	Surface and Mineral Estate Ownership
Map S-10:	Locatable and Leasable Mineral Potential
Map S-11:	Available Areas with High Potential for Hot Springs Deposit Type Locatable Minerals
Map S-12:	Saleable Minerals BLM Mineral Materials Sources
Map S-13:	Split-Estate Land - Federal Mineral Estate Outside of the Mineral Withdrawal Area
Map S-14:	Potentially Hazardous Sites
Map S-15:	Range Conditions
Map S-16:	Range Improvements
Map S-17:	Wildland Fires and Prescribed Burns
Map S-18:	Special Areas
Map S-19:	Alvord Desert ACEC, Mickey Hot Springs ACEC and Mickey Basin RNA/ACEC
Map S-20:	Serrano Point RNA/ACEC and Borax Lake ACEC
Map S-21:	East Fork Trout Creek RNA/ACEC
Map S-22:	Fir Groves ACEC, East Kiger Plateau RNA/ACEC, Little Blitzen RNA/ACEC, South Fork Willow Creek RNA/ACEC, Little Wildhorse Lake RNA/ACEC, Rooster Comb RNA/ACEC and Big Alvord Creek RNA/ACEC
Map S-23:	Kiger Mustang ACEC
Map S-24:	Long Draw RNA/ACEC
Map S-25:	Tum Tum Lake RNA/ACEC and Pueblo Foothills RNA/ACEC
Map S-26:	Wilderness Management Plan
Map S-27:	Wild and Scenic Rivers Management Plan

Maps from the Steens Mountain Wilderness and Wild and Scenic Rivers Plan available on CD (included)

W1:	General Vicinity
W2:	Wilderness Management Plan
W3:	Wild and Scenic Rivers Management Plan

ACRONYMS

Reader note: *Please refer to the list below for acronyms that may be used in this document.*

ACRONYM	DEFINITION
ACEC	Area of Critical Environmental Concern
AMP	Allotment Management Plan
AMU	Andrews Management Unit
Andrews/Steens PRMP/FEIS	Andrews Management Unit/Steens Mountain Cooperative Management and Protection Area Proposed Resource Management Plan and Final Environmental Impact Statement
AUM	Animal Unit Month
BIFZ	Burns Interagency Fire Zone
BLM	Bureau of Land Management
BMP	Best Management Practice
BpS	Biophysical Stratum
CD	Compact Disc
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CMPA	Steens Mountain Cooperative Management and Protection Area
DEQ	Oregon Department of Environmental Quality
DEIS	Draft Environmental Impact Statement
DRC	Desired Range of Conditions
EA	Environmental Assessment
EIS	Environmental Impact Statement
EOARC	Eastern Oregon Agricultural Research Center
ESA	Endangered Species Act
FAR	Functional At Risk
FEIS	Final Environmental Impact Statement
FLPMA	Federal Land Policy and Management Act
FMP	Fire Management Plan
FRCC	Fire Regime Condition Class
GIS	Geographic Information System
HUC	Hydrologic Unit Code
ID	Interdisciplinary
Malheur NWR	Malheur National Wildlife Refuge
MFRI	Mean Fire Return Interval
NEPA	National Environmental Policy Act
NF	Nonfunctional
North Steens Project	North Steens Ecosystem Restoration Project
ODA	Oregon Department of Agriculture
ODFW	Oregon Department of Fish and Wildlife
OHV	Off-Highway Vehicle
ONHP	Oregon Natural Heritage Program
ORV	Outstandingly Remarkable Value
OSU	Oregon State University
PDE	Project Design Element
PFC	Proper Functioning Condition
PM	Particulate Matter
PRIA	Public Rangelands Improvement Act of 1978
RA	Resource Area
RH	Relative Humidity
RMP	Resource Management Plan
RNA	Research Natural Area

ROD	Record of Decision
SMAC	Steens Mountain Advisory Council
SMA	Special Management Areas
SRMA	Special Recreation Management Area
Steens Act	Steens Mountain Cooperative Management and Protection Act of 2000
TMDL	Total Maximum Daily Load
TR	Technical Reference
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
USFWS	United States Fish and Wildlife Service
VRM	Visual Resource Management
WJMA	Wildlands Juniper Management Area
WSA IMP	Interim Management Policy for Lands under Wilderness Review
WSA	Wilderness Study Area
WSR	Wild and Scenic River
ybp	years before present

Summary and Reader's Guide

Introduction

The North Steens Ecosystem Restoration Project (North Steens Project) is a landscape-level (see Chapter 6 for definition) project. The goal of this project is to reduce juniper-related fuels, thereby improving the ecological health of the area by restoring and maintaining the integrity of the ecosystem consistent with appropriate fire regimes and land uses.

The proposed project area is a 336,000-acre complex of private land and public land administered by the Bureau of Land Management (BLM) located within the Andrews Resource Area primarily within the Steens Mountain Cooperative Management and Protection Area (CMPA). The CMPA was established by the Steens Mountain Cooperative Management and Protection Act of 2000 (Steens Act) and contains 496,136 acres of combined private and public lands. Coordination with private landowners is directed by the Steens Act (Section 121) and is essential for achievement of project objectives.

Project activities would primarily occur above 4,500 feet and below 8,500 feet, concentrating on the "juniper belt." The techniques used would depend on site-specific plant community objectives and project constraints. Reduction of juniper-related fuels is the foremost objective; however, this is inherently tied to the reintroduction of the role of the historic fire regime. A fire regime within a historic range would promote ecosystem restoration through implementation of provisions of the Steens Act and the Steens CMPA Resource Management Plan/Record of Decision (RMP/ROD) (2005). Restoration of habitat and increased forage for wild and domestic herbivores would result from implementation of the project. Fire and a naturally-functioning historic fire regime would be reintroduced into aspen, remnant aspen, sagebrush-bunchgrass, juniper, and riparian plant communities. Guidance and direction for projects of this type are provided for under Section 113 "LAND USE AUTHORITIES" of the Steens Act. Section 113 (c) of the Steens Act states, "The Secretary shall emphasize the restoration of the historic fire regime in the Cooperative Management and Protection Area and the resulting native vegetation communities through active management of western juniper on a landscape level. Management measures shall include the use of natural and prescribed burning."

Proposed treatment techniques include managed wildfire, prescribed fire, western juniper treatments, fencing, seeding, planting, combinations of techniques, and other methods to reduce fuel loads, restore vegetative communities, improve habitat, and increase forage. Both wildlife and domestic livestock operations would ultimately benefit. The project would include implementation of management actions across the project area that would restore (and maintain) plant communities to a desirable condition through return to the historic fire regime. Actions would center around lessening effects of catastrophic wildfires by reducing fuels and curtailing western juniper expansion in mountain big sagebrush, low sagebrush, quaking aspen, mountain mahogany, old growth juniper (established prior to 1870), riparian plant communities, and limited acres of Wyoming big sagebrush. This is a multiyear project, and each year the extent of implementation would vary depending on budgetary and staff limitations, resource considerations and climatic and operational conditions.

Proposed project treatments, including activities within the Steens Mountain Wilderness, Wild and Scenic River (WSR) corridors, and Wilderness Study Areas (WSAs) are arrayed in a range of alternatives found in Chapter 2 of this document. Descriptions of the Affected Environment (current ecological conditions) and analysis of potential effects from enacting each alternative are found in Chapters 3 and 4, respectively.

This EIS is tiered to the Andrews Management Unit (AMU)/Steens Mountain CMPA Proposed RMP and Final EIS (Andrews/Steens PRMP/FEIS, August 2004) and associated final land use decisions detailed in the AMU and CMPA RMPs and RODs (July 15, 2005.). Information and analysis contained in these documents are herein incorporated by reference.

The following is a brief overview of the document to assist in your review.

Chapter 1

Chapter 1 identifies the purpose and need for action, briefly defines the Planning Area, discusses conformance with Land Use Plans and other legislation, addresses initial screening and scoping of issues, and lists the major relevant issues of the project.

Chapter 2

Chapter 2 presents the alternatives. The Draft Environmental Impact Statement (DEIS) contains five alternatives. The No Treatment No Action Alternative does not propose any fuels reduction through western juniper treatments. This alternative is not consistent with the AMU RMP or Steens CMPA RMP direction. This alternative does not meet the objectives of the North Steens Project but is analyzed for purposes of effect analysis and comparison. Under this alternative encroaching juniper would not be managed in the North Steens Project Area. Wildfires would still occur in the project area and would be managed in a manner consistent with the RMPs and the BLM Burns District's Fire Management Plan.

The Continuation of Current Management No Action Alternative does not propose any increase above current levels of western juniper management or fuels reduction within the North Steens Project Area. Private lands could still be treated according to landowner management objectives. Management of naturally-occurring fires would still occur in the North Steens Project Area under this alternative, but management would be for purposes of restoring wildfire to the CMPA. This alternative also does not meet the objectives of the North Steens Project but is analyzed for purposes of effect analysis and comparison.

The Partial Landscape Alternative proposes active fuels reduction and juniper management on private and public lands outside of wilderness, WSAs, and WSR corridors. Management of naturally-occurring fires would still occur in the aforementioned areas under this alternative.

The Limited Landscape Alternative incorporates many of the description and features of the Partial Landscape Alternative. Management of naturally-occurring fires would occur in wilderness, WSAs, and WSR corridor areas under this alternative and would include the use of prescribed fire for western juniper management and fuels reduction and restoration of wildfire regimes.

The Full Landscape Alternative incorporates many of the description and features of the Partial Landscape Alternative and Limited Landscape Alternatives. The Full Landscape Alternative proposes active, landscape-level, western juniper management and fuels reduction on private and public lands including wilderness, WSAs, and WSR corridors. Management of naturally-occurring fires would occur in the aforementioned areas under this alternative. Management could include the use of prescribed fire, nonmotorized hand tools and nonmechanized transportation for western juniper management and fuels reduction. Additional treatment methods, including the use of other tools following publication of a minimum requirement decision guide, could be considered after a project review occurring on a 3 to 5-year basis.

All of the latter three action alternatives are considered preferable to the two No Action alternatives. At this stage of the analysis process none of the action alternatives is considered the preferred alternative with respect to the other two.

Chapter 3

Chapter 3 provides a description of the existing situation for each of the resource programs. It describes both the living and nonliving components that may be affected. Current management direction is briefly summarized for each program. Statistics such as acres, numbers, resource condition, and designations are presented in a number of tables.

Chapter 4

Chapter 4 analyzes the effects of the management strategies (Chapter 2) on the existing condition (Chapter 3). The environmental consequences and cumulative effects sections in the Andrews/Steens PRMP/FEIS describe potential environmental consequences to the North Steens Project Area and are incorporated into this document by reference in accordance with Council on Environmental Quality regulations § 43 Code of Federal Regulations 1502.2. Additional project-specific descriptions of potential environmental consequences are provided in Chapter 4.

A summary of the potential effects is provided in Table 1 below.

Table 1. Summary of Potential Effects

Measurement*	No Treatment Alternative	Continuation of Current Management Alternative**	Partial Treatment Alternative	Limited Treatment Alternative	Full Treatment Alternative
Percent of all upland landscape expected to actually be treated during the **entire life of the project.**	0%	**Any treatments would require new NEPA documents	25-30%	30-45%	45-65%
Estimated maximum percent of project area potentially treated **each implementation season.**	0%	**Any treatments would require new NEPA documents	3%	4.5%	6.0%
Estimated maximum acres of uplands that could potentially be treated **each year.**	0 acres	**Any treatments would require new NEPA documents	10,000 acres	15,000 acres	20,000 acres
Estimated acres of sagebrush potentially treated **over the life of the project** (Includes all stages of juniper expansion).	0 acres	**Any treatments would require new NEPA documents	86,924 acres	130,387 acres	188,336 acres
Estimated acres of mid to late seral stage juniper encroached sagebrush potentially restored **over the life of the project.**	0 acres	**Any treatments would require new NEPA documents	38,244 acres	77,961 acres	84,749 acres
Estimated acres of juniper dominated sites potentially treated **over the life of the project.**	0 acres	**Any treatments would require new NEPA documents	29,724 acres	73,854 acres	81,396 acres
Could juniper cutting impacts occur in Wilderness, WSAs and WSR corridors?	No	**Any treatments would require new NEPA documents	No	No	Yes
Could prescribed fire impacts occur in Wilderness, WSAs and WSR corridors?	No	**Any treatments would require new NEPA documents	No	Yes	Yes

*Estimates do not include areas affected by wildfire events. Wildfire events could occur under all alternatives and may increase estimates given in this table. Estimates could also be affected by project design constraints which may reduce given estimates. Estimated acres are derived from general vegetation data and predicted treatment rates and scale.

Chapter 5

Chapter 5 lists the cooperating agencies and the specialists who prepared this document.

Chapter 6

Chapter 6 contains the glossary, bibliography, and index to assist the reader in the review process.

1 INTRODUCTION: PURPOSE OF AND NEED FOR ACTION

The Oregon Bureau of Land Management (BLM), Burns District Office manages 3,275,694 acres of public lands located primarily in Harney County, southeastern Oregon. The Burns District BLM is divided into two Resource Areas (RA) – the Andrews and Three Rivers RAs. The Steens Mountain Cooperative Management and Protection Area (CMPA) falls primarily within Andrews RA, but a portion is contained within Three Rivers RA.

1.1 Summary of the Proposal

The North Steens Ecosystem Restoration Project (North Steens Project) is a landscape-level project, the goal of which is to improve the ecological health of the area by restoring and maintaining the integrity of the ecosystem consistent with appropriate fire regimes and land uses. Treatment techniques would include a combination of prescribed fire, western juniper treatments, fencing, seeding, planting, and other methods to reduce fuel loads, restore vegetative communities, improve habitat and increase forage. Both wildlife and domestic livestock operations would ultimately benefit. The project would include implementation of management actions across the project area that would restore (and maintain) plant communities to a desirable condition through return to the historic fire regime. Actions would center around lessening effects of catastrophic wildfires by reducing fuels and curtailing western juniper expansion in mountain big sagebrush, low sagebrush, quaking aspen, mountain mahogany, old growth juniper (prior to 1870), riparian plant communities, and limited acres of Wyoming big sagebrush. This is a multiyear project, and each year the extent of implementation would vary depending on budgetary and staff limitations, resource considerations and climatic and operational conditions.

The proposed project area is located within the Andrews RA primarily within the CMPA. The CMPA was established by the Steens Mountain Cooperative Management and Protection Act of 2000 (Steens Act) and contains 496,136 acres of combined private and public lands. The Steens Act clearly states direction for the BLM to actively manage juniper in Section 113(c) “JUNIPER MANAGEMENT.” Project activities would primarily occur above 4,500 feet and below 8,500 feet, concentrating on the “juniper belt.” The techniques used would depend on site-specific objectives and project constraints.

Proposed project treatments, including activities within the Steens Mountain Wilderness, Wild and Scenic River (WSR) corridors, and Wilderness Study Areas (WSAs) are arrayed in a range of alternatives found in Chapter 2 of this document. Descriptions of the Affected Environment (current ecological conditions) and analysis of potential effects from enacting each alternative are found in Chapters 3 and 4, respectively.

The proposed project area is a 336,000-acre complex of private land and public land administered by the BLM. Coordination with private landowners is directed by the Steens Act (Section 121) and is essential for achievement of project objectives. Sideboards for coordination and cooperation would be established prior to project implementation, and when possible, these efforts would establish treatment units based on geographic and vegetative features rather than ownership lines. Private landowner cooperation is strictly voluntary and all management activities on private land would be conducted in accordance with landowner management objectives.

Eastern Oregon Agricultural Research Center (EOARC) will work cooperatively with the BLM by placing intensive research sites on selected areas within the project area. The EOARC is jointly operated by OSU and the U.S. Department of Agriculture (USDA) Agricultural Research Service (ARS). The Oregon Department of Agriculture (ODA) and Oregon State University (OSU) also expressed interest in monitoring vegetative response to proposed treatments. The BLM proposes to work closely with EOARC, ODA, and OSU to monitor project results. Other monitoring could be established based on available staffing and funding.

Because of the size and complexity of the proposed project the BLM determined there would be a significant (beneficial) effect on the environment. Therefore, analysis of potential effects would require an Environmental Impact Statement (EIS). This EIS is tiered to the Andrews Management Unit (AMU)/Steens Mountain CMPA Proposed Resource Management Plan and Final EIS (Andrews/Steens PRMP/FEIS, August 2004) and associated final land use decisions detailed in the AMU and CMPA Resource Management Plans (RMPs) and Records of Decision (RODs) (July 15, 2005.). Information and analysis contained in these documents are herein incorporated by reference.

1.2 Background

Historic management of Steens Mountain has included fire suppression and past grazing practices, which along with other factors, have contributed to western juniper expansion. This has created an excessive and unnatural buildup of fuels and a reduction of other vegetation communities and habitats. The project area has lost or is losing aspen, mountain big sagebrush, and associated shrubs and is at risk of losing mountain mahogany and old growth juniper stands.

Many plant communities in southeastern Oregon have been altered since human population increased in the area in the latter half of the 1800s. Western juniper density and cover have significantly increased over the past 140 years because of management practices. These trends are readily apparent across Steens Mountain. Prior to 1870, western juniper was primarily limited to rocky ridgetops or shallow soil areas with sparse vegetation (West, 1984). Under the previous practice of suppressing fires, large areas of mountain big sagebrush and quaking aspen have shifted to dominance by western juniper, having dramatic short- and long-term implications on soil stability (and fertility), wildlife habitats, forage resources, and overall ecosystem functionality.

Image 1.1 (see Images and Maps Compact Disc [CD]). Western juniper expansion into riparian and upland areas.

The magnitude and rate of woodland expansion during the last 140 years exceeds anything that has occurred in a similar length of time during the last 5,000 years (Miller and Wigand, 1994).

Image 1.2 (see Images and Maps CD). Reduced understory resulting from juniper expansion.

Lack of fire, due to suppression, is one of the major differences between prehistoric and historic juniper increases. Domestic livestock were introduced during the 1860s and their numbers increased dramatically from the 1870s through the early 1900s (Miller et al., 2005). Domestic grazing may have influenced juniper expansion by reducing fine fuels, which also altered the fire regime (Miller and Rose, 1999). Increases in western juniper have also altered fuel loading and structure of many plant communities.

The rapid increase in western juniper over the past 140 years has not only affected plant communities but has also altered wildlife habitats. Most of the increase in western juniper has been at the expense of big sagebrush plant communities. Sagebrush obligate species have experienced dramatic reductions in sagebrush and associated vegetation. However, early stages of western juniper expansion can also provide diverse wildlife habitat. Approximately 100 animal species at some point in their life cycle utilize open western juniper woodlands for thermal and hiding cover, nesting, and food (Miller, 2001). Wildlife diversity in juniper communities relates strongly to the diversity and abundance of understory plant species. However, this open juniper woodland is only a transitory stage. Stands currently in this condition are moving toward closed woodlands. The rate of this progression is dependent on site-specific productivity.

Figure 1.1 (see Images and Maps CD). Current juniper expansion into current sagebrush distribution. Derived from 1980s Ecological Site Inventory general vegetation data (Burns Geographic Information System [GIS] database).

As juniper cover increases from less than 3.0 percent to 10.0-25.0 percent, much of the understory vegetation is in competition with actively growing juniper for water, soil nutrients and sunlight, and is eventually lost. Continued loss of understory vegetation and the increased rate of loss make treatment of western juniper woodlands a priority in order to shift the dominance of woody vegetation back to sagebrush.

Figure 1.2 (see Images and Maps CD). Projected juniper expansion into current sagebrush distribution. Derived from 1980s Ecological Site Inventory general vegetation data (Burns GIS database). Projection is 80 years from the date of the data.

1.3 Purpose for Action

The objective is foremost to reduce juniper-related fuels and restore various plant communities through implementation of provisions of the Steens Act and the Steens CMPA RMP/ROD. Restoration of habitat and increased forage for wild and domestic herbivores would result from implementation of the project. Fire and other mechanized and nonmechanized treatments would be conducted into aspen, remnant aspen, sagebrush-bunchgrass, juniper, and riparian plant communities to establish fire regimes similar to historical fire regimes. These fire regimes may be similar to historic regimes, but current biologic and social constraints require modifications in some circumstances. Guidance and direction for projects of this type are provided for under Section 113 "LAND USE AUTHORITIES" of the Steens Act. Section 113 (c) of the Steens Act states "The Secretary shall emphasize the restoration of the historic fire regime in the Cooperative Management and Protection Area and the resulting native vegetation communities through active management of western juniper on a landscape level. Management measures shall include the use of natural and prescribed burning."

This EIS links to goals and objectives of the Steens CMPA RMP. In the ***Riparian and Wetlands*** section (Page RMP-24) the goal is "Maintain, restore, or improve riparian vegetation, habitat diversity, and geomorphic stability to achieve healthy, productive riparian areas and wetlands and associated structure, function, process and products that provide public land values such as forage, water, cover, structure and security necessary to meet the life history requirements of fish and wildlife; public recreation and aesthetics; water quality and quantity; and livestock forage and water."

The ***Woodlands*** section (Page RMP-27 ff.) goals include: ***"Maintain or improve ecological integrity of old growth juniper woodlands." Maintain, restore, or improve the ecological integrity of mountain mahogany and quaking aspen stands/groves." "Manage woodland habitat so that the forage, water, cover, structure, and security necessary to meet the life history requirements of woodland-dependent and woodland-associated wildlife species are available on public lands."*** Objectives under this section include: "Maintain or improve late seral stage ecological characteristics in old growth western juniper woodlands," "Reduce the component of western juniper and other associated woody plant species in quaking aspen and mountain mahogany stands,." and "Reduce the influence of western juniper trees less than 120 years old to restore riparian and sagebrush habitats."

Under the ***Fire Management*** section (Page RMP-56 ff.) Goal 2 is to ***"Restore and maintain the integrity of ecosystems consistent with appropriate fire regimes and land uses."*** Objective 1 states: "Implement management actions across the CMPA that maintain or return plant communities to the historic fire regime…the appropriate fire regime will be determined based upon current conditions."

Included in the ***Rangelands*** discussion (Page RMP-30 ff.) is the goal to: ***"Maintain, restore or improve the integrity of desirable vegetation communities including perennial, native, and desirable introduced plant species. Provide for their continued existence and normal function in nutrient, water, and energy cycles."*** Objectives to meet this goal include: "Maintain or restore native vegetation communities through sound landscape management practices. Manage desirable nonnative seedings to meet resource objectives. Rehabilitate plant communities that do not have the potential to meet the DRC through management. Increase species and structural diversity at the plant community and landscape levels in the big sagebrush communities. Provide multiple successional stages within the landscape."

A second goal in the last section is: ***"Manage rangeland habitats so that forage, water, cover, structure, and security necessary to meet the life history requirements of wildlife are available on public lands."*** The objectives to meet this goal include these—"Manage big sagebrush, quaking aspen, and western juniper plant communities to meet habitat requirements for wildlife," and "Manage big sagebrush communities to meet the life history requirements of sagebrush-dependent species." For example, healthy sagebrush communities are high priority for viable greater sage-grouse populations.

Mountain sagebrush, aspen, remnant aspen, and mountain mahogany stands are priority areas for treatment in accordance with the goals/objectives of the RMP. The recovery of aspen and remnant aspen communities is dependent on regular fire events and this regenerated habitat is critical to dependent wildlife species such as neotropical birds and many other nongame species. Aspen communities are also important for elk and deer for browse and cover.

Prescribed fire combined with a variety of juniper treatments would result in a mosaic of multiple vegetation successional stages across the landscape increasing species, structural, and habitat diversity. This optimal resulting condition is titled the Desired Range of Conditions (DRC) (see the Andrews/Steens PRMP/FEIS at 2-3 to 2-4).The DRC described in the Andrews/Steens PRMP/FEIS includes the desirable social and economic quality of life that would be maintained for Steens Mountain landowners, local residents, and visitors in accordance with the Steens Act. Achievement of the DRC would also support the purposes and objectives of the CMPA. For a detailed synthesis of current knowledge and a discussion of ongoing questions concerning western juniper, see the recent publication *Biology, Ecology and Management of Western Juniper* (Miller et al., 2005). This work (Technical Bulletin 152) is a compilation of research on western juniper, much of which was conducted on Steens Mountain by researchers at EOARC.

1.4 Need for Action

As wildfires have been suppressed for decades, and juniper has expanded in reach and density, the balance of vegetation communities has been shifted towards a greater proportion of woody plants. The shrubs, grasses, and tree stands on which wildlife and domestic livestock depend have been altered to a degree which is rendering them useless for overall floral and faunal health, and therefore for wild and domestic animal health. This in turn is negatively affecting the economic and social fabric of the area. If the project is not implemented the downward trend would continue, resulting in further increases in fuel loading and catastrophic wildfires. Ecological conditions on Steens Mountain would continue to deteriorate and the DRC would not be achieved. The criteria for selection of actions to satisfy the objectives of the proposal must support the goals/objectives of the RMP, purposes of the Steens Act and objectives of the CMPA, prevention of further damage to the natural biodiversity and reversion of existing ecological harm.

Through project implementation, fuel loads would decrease, habitat would be restored and a mosaic of seral stages would be established resulting in a more historic representation of sagebrush, aspen and riparian communities and associated flora and fauna. Project implementation would allow for achievement of objectives under Steens Act Section 1 (b) (1) "…maintain the cultural, economic, ecological and social health…," and (11) "…promote viable and sustainable grazing…operations on private and public lands." Findings from the Interior Columbia Basin Ecosystem Management Project (ICBEMP) support the objectives and need for implementing the project. In discussing emphasizing active restoration ICBEMP states "For the most part, ecological integrity improves following restoration activities." The document concludes "Management practices aggressively restore ecosystem health through strategies resembling natural disturbance processes, such as insects, disease, and fire…Healthy ecosystems are better able to meet society's social and economic needs…," and "Restoration activities are economically beneficial whenever possible." (Highlighted Scientific Findings of the Interior Columbia Basin Ecosystem Management Project 1997).

1.5 Planning Area

The proposed project area is located within the Andrews RA primarily within the CMPA and is a 336,000-acre complex of private land and public land administered by the BLM (see Chapter 3 for a more detailed description of the planning area).

1.6 Conformance with Land Use Plans

The proposal is in conformance with objectives and land use allocations in the Andrews and Steens CMPA RMPs and RODs (see references in Section 1.2 above for specific objectives). The proposal is in conformance with objectives of the Standards for Rangeland Health and Guidelines for Livestock Management for Public Land administered by the BLM in the States of Oregon and Washington. These objectives are "to promote healthy sustainable rangeland ecosystems; to accelerate restoration and improvement of public rangelands to properly functioning conditions…and to provide for the sustainability of the western livestock industry and communities that are dependent upon productive, healthy public rangelands." The proposal is also in conformance with all State, local and Tribal land use plans, laws and regulations.

1.6.1 Compliance with the Steens Mountain Cooperative Management and Protection Act of 2000:

This proposal is in compliance with the purpose, objectives and direction contained in the Steens Act. Specifically:

Section 1 (b) "PURPOSES- The purposes of this Act are the following:

(1) To maintain the cultural, economic, ecological, and social health of the Steens Mountain area in Harney County, Oregon"
(5) "To provide for and expand cooperative management activities between public and private landowners in the vicinity of the Wilderness Area and surrounding lands."
(10) "To maintain and enhance cooperative and innovative management practices between the public and private land managers in the Cooperative Management and Protection Area.
(11) To promote viable and sustainable grazing and recreation programs on private and public lands.
(12) To conserve, protect, and manage for healthy watersheds and the long-term ecological integrity of Steens Mountain."

Section 102

"(a) - PURPOSE.- The purpose of the Cooperative Management and Protection Area is to conserve, protect, and manage the long-term ecological integrity of Steens Mountain for future and present generations.
(b) - OBJECTIVES..."
"(1) to maintain and enhance cooperative and innovative management projects, programs and agreements between tribal, public and private interests in the Cooperative Management and Protection Area;"
"(4) to ensure the conservation, protection, and improved management of the ecological, social, and economic environment of the Cooperative Management and Protection Area, including geological, biological, wildlife, riparian, and scenic resources; and
(5) to promote and foster cooperation, communication, and understanding and to reduce conflict between Steens Mountain users and interests."

Section 113 - "LAND USE AUTHORITIES."

(b)(2) "LIMITED EXCEPTION.- The Secretary may authorize the removal of trees from Federal lands in the Cooperative Management and Protection Area only if the Secretary determines that the removal is clearly needed for purposes of ecological restoration and maintenance or for public safety. Except in the Wilderness Area and the wilderness study areas referred to in Section 204(a), the Secretary may authorize the sale of products resulting from the authorized removal of trees under this paragraph."

(c) "JUNIPER MANAGEMENT. - The Secretary shall emphasize the restoration of the historic fire regime in the Cooperative Management and Protection Area and the resulting native vegetation communities through active management of Western Juniper on a landscape level. Management measures shall include the use of natural and prescribed burning."

Section 121 - "COOPERATIVE MANAGEMENT AGREEMENTS.

(a) COOPERATIVE EFFORTS.- To further the purposes and objectives for which the Cooperative Management and Protection Area is designated, the Secretary may work with non-Federal landowners and other parties who voluntarily agree to participate in the cooperative management of Federal and non-Federal lands in the Cooperative Management and Protection Area."

1.6.2 Compliance with Other Legislation

This project also complies with directives in the Federal Land Policy and Management Act of 1976 (FLPMA), the Wilderness Act of 1965, Public Rangelands Improvement Act of 1978 (PRIA), the National Environmental Policy Act of 1969 (NEPA), and other laws.

1.7 Initial Screening and Scoping of Issues

This proposal has been discussed and developed within BLM for several years and many changes to project design have occurred. The Steens Mountain Advisory Council (SMAC) has been provided project updates, site tours, and opportunities for input and recommendation to BLM under their authority as provided in the Steens Act (Section 131). This project was originally called the Bridge Creek Project and was approximately 40,000 acres in size. Over the years project prototypes varied and the project evolved into the current proposal.

Multiple Interdisciplinary (ID) Team meetings were held during development and internal screening of this project. A notice of public scoping was posted on the Burns District internet site on January 5, 2005 and published in the Burns Times-Herald. A mailing with project information and draft alternatives was sent to 238 organizations and individuals nationwide. The public scoping period occurred over 43 days and generated a wide variety of scoping comments.

The BLM initially considered this an Environmental Assessment (EA) level project, but because of input gathered in public scoping and the enlarged scope and scale of the project, the BLM determined an EIS should be prepared. As a result in change of level of analysis the Notice of Intent (to prepare an EIS) published in the *Federal Register* (July 21, 2005) provided for an additional 15-day public scoping period on the proposal. The second scoping period did not generate a large response.

Private landowners have been invited to participate in the project. In addition Harney County, Burns Paiute Tribe, Harney County Soil and Water Conservation District, Oregon Department of Fish and Wildlife (ODFW), U.S. Fish and Wildlife Service (USFWS) Ecological Services and Malheur National Wildlife Refuge (Malheur NWR), Oregon Department of Environmental Quality (DEQ), and USDA EOARC have agreed to participate as cooperating agencies as defined in Council on Environmental Quality (CEQ) regulations.

1.8 Major Relevant Issues

Internal and external scoping generated a number of issues. These issues include, but are not limited to the following:

1. ***Effects of fire on air quality.*** Prescribed fires or wildfires can detrimentally affect local air quality. The remote location of the project area helps to reduce the impacts, but there could be localized impacts to residents and visitors to the area. No Class 1 airshed or non-attainment area is within 100 km (60.00 miles) of the project area. However, particulates produced may have impacts at the regional scale, especially during an active wildfire season.

2. ***Effects of juniper treatments and wildfires and prescribed fire on wildlife habitat.*** Removal of western juniper by cutting and burning would cause shifts in plant community structure and composition. There are tradeoffs in these actions. Species that prefer woodland habits would be discouraged from using treated portions of the project area. However, species that prefer shrublands or grasslands have been forced out of the project area as a result of juniper expansion. Habitat shifts would occur and the balance needs to be considered.

3. ***Effects on Special Status animal populations.*** Prescribed fires or wildfires can modify habitat for Special Status Species such as the greater sage-grouse. Project Design Elements have been created to remove the need for mitigation. Effects that would normally require mitigation are avoided through project design. Conformance with the *Greater Sage-Grouse Conservation Assessment and Strategy for Oregon* would be adhered to during any potential implementation activity.

4. ***Historical and cultural concerns.*** Activities such as those proposed in this EIS have the ability to affect cultural and historic resources. Project Design Elements have been created to remove the need for mitigation. Effects that would normally require mitigation are avoided through project design.

5. ***Riparian vegetation and water quality concerns.*** Treatments within riparian zones can affect vegetation and water quality. Through project design, treatments in riparian areas would be spread over the landscape to maximize positive effects and minimize potential negative ones. Additional Project Design Elements address these concerns as well.

6. ***Concerns for large scale, wild fires if expansion juniper and accumulating juniper-related fuel load is not managed.*** The encroachment of western juniper and the suppression of wildfires has produced a fairly homogonous fuel layer in the project area. Fires that are ignited during the peak of fire season (July –August) have the potential to grow large and affect a significant portion of Steens Mountain. Wildfires could also burn with greater intensity resulting in more severe fire effects.

7. ***Juniper treatments within WSAs.*** Portions of the project area have been designated as WSAs. The ecosystem within these WSAs has been similarly impacted by juniper expansion as areas not designated as WSA. Actions that can be taken to manage these lands are constrained by different management. A balance needs to be established that considers the on and off site implications while following appropriate laws and agency policy.

8. ***Juniper treatments within wilderness.*** Western juniper has encroached into sagebrush, quaking aspen, and riparian plant communities in the Steens Mountain Wilderness. Opinions differ on how to meet the legislative direction to manage western juniper encroachment in the CMPA.

9. ***Juniper treatments within the CMPA.*** Western juniper treatments within the Cooperative Management and Protection Area need to conform to the Steens Act (2000). Opportunities for local landowners to participate in the project would need to be explored.

10. ***Effects on livestock grazing and operations***. Juniper expansion has impacted grazing operations in the project area. Juniper treatments often temporarily displace permittees for several growing seasons. The CMPA has multiple permittees that are within the project boundary. Project Design Elements have been created to avoid potential effects through project design.

11. ***Concerns the project area is either too large or not large enough.*** Depending on individual values and interests, various members of the interested public have expressed concerns about the project area size. The vast majority of comments received during scoping indicated that the interested public wanted to see the project area expanded and analyzed in an EIS.

12. ***Concerns project implementation would take too long to complete.*** This is a multiyear project; alternatives provide a range of proposals that could result in different rates of implementation. Extreme implementation rates are discussed in the Alternatives Considered, but Eliminated from Detailed Analysis section in Chapter 2 of this document.

13. ***Management of:***
   a. ***Naturally-ignited and prescribed fire.*** Wildfires are ignited by lightning every year on Steens Mountain. Many of these fires could be managed to achieve the identified project objectives, but some wildfires could burn outside of desired parameters. Ownership of lands within the project area is a mosaic of public and private lands. Management of any planned or unplanned ignition would be coordinated with cooperating parties.
   b. ***Successional stages of plant communities.*** Currently there is a shortage of early and middle successional stages of plant communities in the project area. The project would produce a mixture of these stages.

14. ***Use of native seeds to encourage restoration.*** There is an insufficient source of native seeds for the restoration native plant communities within the project area. The quantity of seed is lacking, but also the number of species to utilize is small. Other projects are being explored to aid in the effort to produce local native seed sources.

15. ***The potential use of chain saws in WSAs.*** The Full Treatment Alternative is the only alternative that proposes potential use of mechanized equipment in WSAs. Other alternatives propose utilizing only managed wildfires or prescribed fire in these areas. A full range of management options for WSAs are contained within this document.

16. ***Use of the best available science for planning documents.*** Juniper expansion on Steens Mountain has been extensively studied by researchers at EOARC. Some questions remain, but many unsupported claims in past literature are now supported by solid data.

17. ***Project monitoring.*** Minimum monitoring methods are described in the measurable objectives section of Chapter 2 of this document. Data resulting from monitoring would be utilized in project reviews as part of adaptive management.

2 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 Purpose of Chapter 2

Chapter 2 describes all alternatives and provides a framework for analysis and includes a summary of potential effects of enacting the alternatives. This chapter also discusses the concept of adaptive management, a management system that would be utilized during project implementation.

2.2 Adaptive Management

Adaptive management is a system of management practices based on clearly identified outcomes, monitoring to determine if management actions are meeting outcomes, and, if not, facilitating management changes that would best ensure outcomes are met. This learning process builds on current knowledge, observation, and experimentation. A continuous feedback loop allows for mid-course corrections in management to meet planned objectives. In addition, the process provides a model for adjusting objectives as new information and public input arise. As a landscape-level project is implemented, opportunities to fine-tune proposed treatments and approaches increase due to the scale of the project and length of time required until implementation is complete. Experience gained during earlier phases of implementation can result in better management practices. Project implementation flexibility is necessary for addressing and adapting to issues, situations, and new knowledge which can emerge during long-term implementation activities.

The BLM (along with cooperators and private landowners) proposes to study representative habitat types or plant communities (see Measurable Objectives Common to all Action Alternatives).

2.2.1 Adaptive Management Objectives:

1. Where feasible, utilize multiple treatment approaches that can be implemented simultaneously to provide parallel learning opportunities, allowing ready comparison and more rapid adaptation over time.

    a. Utilize minimum monitoring methodologies to provide before-after comparisons of specific resource responses to fire and juniper treatments proposed in this EIS.
    b. Support the overall objectives of the North Steens Project and the AMU/CMPA RMPs.
    c. Implement Section 113 (c) of the Steens Act through the use of adaptive management practices.

2.2.2 Adaptive Management Common to all Action Alternatives

Monitoring is a critical part of adaptive management. The minimum level of monitoring for this proposal would be as stated in the measurable objectives section of this chapter. Additional monitoring could be established as additional questions arise or cooperating researchers establish studies. The data resulting from these studies would be utilized to determine how, when, and where to best apply the range of proposed treatments analyzed in this EIS. The result would be a strong knowledge of the project area responses to treatments.

2.3 Development of Alternatives

Alternatives were developed based on land use plan decisions in the CMPA RMP/ROD and on implementation of Section 113 of the Steens Act that directs management of juniper on a landscape level. Central considerations utilized in developing alternatives included rate and scale of treatment. The ID team determined given different management considerations for wilderness, WSAs, and WSR corridors, juniper management on a landscape scale would be partially driven by possible management constraints within those Special Management Areas (SMAs). The team identified five basic approaches to landscape-scale management:

1. Take no action in the project area;
2. Continue current management and take no additional actions beyond existing small-scale levels of juniper-related fuels management;
3. Manage juniper beyond current levels, but manage wildfire only in SMAs;

4. Manage juniper over the entire project area, but limit treatment methods used in the SMAs; and
5. Manage juniper over the entire project area and use a wider set of treatment methods in the SMAs. The ID team also spent many months considering issues generated internally and externally.

2.4 Alternatives Considered but Eliminated from Detailed Analysis

The alternatives presented in Chapter 2 represent a range of alternatives. A sixth alternative was considered but eliminated from detailed study. This sixth alternative proposed aggressively treating significantly larger portions of the landscape each year, and higher percentages of individual burn units. This alternative was determined to be unachievable for a number of reasons. It is not a practical objective to actually burn high percentages (such as 80.0 to 90.0 percent) of an identified burn unit with prescribed fire. Prescribed fire specialists present at ID team meetings stated clearly that it is not usually possible to burn such a high percent of any given burn unit due to the presence of fire-resistant landscape or vegetation that simply will not burn. Other resource specialists stated the proposal was not possible due to the large-scale, wildlife habitat modification and inadequate recovery intervals. A specific wildlife concern revolved around sage-grouse habitat which must be managed in conformance with the Greater Sage-Grouse Conservation Assessment and Strategy for Oregon (August 2005). Rapid treatment of large acreages of sagebrush habitat would not be in conformance with the aforementioned strategy. Additional concerns revolved around the considerable potential for simultaneous disruption to multiple private operations in the project area. Offsite forage could be difficult to obtain. Seasons of rest in treated areas of public lands would be occurring over large areas involving multiple allotments simultaneously and this could be very disruptive to private operations.

2.5 Project Objectives Common to all Action Alternatives:

Objective - a description of a desired condition for a resource. Objectives can generally be quantified and measured and, where possible, have established timeframes for achievement (see 2.5.1).

1. Reduce juniper-related fuels on a landscape scale within the North Steens Project Area. This can be accomplished through the landscape level management of encroaching juniper (post-1870 trees). By enacting management direction found in the CMPA RMP, RMP goals/objectives (listed above) for landscape level management would be met.
2. Implement Section 113 (c) of the Steens Act which states, “The Secretary shall emphasize the restoration of the historic fire regime in the Cooperative Management and Protection Area and the resulting native vegetation communities through active management of western juniper on a landscape level. Management measures shall include the use of natural and prescribed burning.” This goal is consistent with the purpose of the CMPA as stated in the Steens Act Section 102a which states, “The purpose of the Cooperative Management and Protection Area is to conserve, protect, and manage the long-term ecological integrity of Steens Mountain for future and present generations.”
3. Improve sagebrush/bunchgrass habitats by removal of invasive juniper and to move the North Steens ecosystem toward functionality. The restoration of ecosystem processes improves habitat for not only greater sage-grouse but numerous other wildlife species as well as domestic species.
4. Create a mosaic of plant communities and seral stages with tree, shrub, grassland, and herbaceous components resulting in ecosystem functionality on a landscape scale, thereby increasing structural, biological, and habitat diversity.
5. Manage aspen and remnant aspen stands for multiple age classes where live overstory currently exists and for the reestablishment of these communities to their historical ecosystem function on the landscape.
6. Reestablish mountain big sagebrush-bunchgrass communities through the reintroduction of fire where western juniper is currently in transition to fully-developed juniper woodlands.
7. Improve and protect the integrity of watershed function, improve watershed stability, and decrease accelerating erosion by establishing diverse plant communities. Increase vegetation cover, litter, and reduce the amount of exposed soil over time resulting in greater ecosystem functionality.
8. Improve riparian condition and maintain or improve stream functionality by expanding aquatic herbaceous and deciduous riparian woody species within communities currently encroached upon by western juniper.
9. Improve or maintain aspen, remnant aspen, mountain big sagebrush-bunchgrass, and riparian communities to create diverse habitat for wildlife species. Create and maintain through repeated treatment a dynamic mosaic of seral stages that would meet the forage and cover requirements for elk, mule deer, pronghorn antelope, greater sage-grouse, neotropical birds, other mammals, amphibians, and reptiles.

10. Maintain or improve water quality while striving toward meeting State of Oregon water quality standards.
11. Increase available forage for wild and domestic herbivores in the project area, thereby dispersing and reducing impacts related to wild and domestic grazing.
12. Maintain or improve vegetation condition beneficial to fish habitat resulting in greater ecosystem functionality. Special consideration would be given for Great Basin redband trout and mountain whitefish habitat requirements.
13. Improve the scenic quality of the project area through restoration of natural habitats and the reintroduction of fire and historical fuel loading.

2.5.1 Measurable Project Objectives Common to all Action Alternatives:

Low Sagebrush Communities

There are approximately 102,905 acres in the project area identified as low sagebrush/grassland communities and 47,421 acres of juniper/low sagebrush. The objective in these areas is to reduce expansion juniper by 75.0 to 100.0 percent and protect the integrity of the low sagebrush flats. This objective applies to early, mid and late-successional juniper sites.

Minimum monitoring would include photo points and density transects to determine if project objectives are being met. Monitoring data would be utilized as part of adaptive management. Additional monitoring could be established, but would be subject to budgetary and staffing constraints.

Landscape level objective:

1. Over a 5-year period, treat at least 5,000 acres of low sagebrush communities.

Big Sagebrush Communities

There are approximately 40,684 acres identified as mountain big sagebrush/grassland communities, 51,992 acres as big sagebrush/shrublands, 43,390 acres as juniper/big sagebrush, and 3,352 acres as big sagebrush/annual grassland in the project area. The objective in these areas is to reduce expansion juniper by 75.0 to 85.0 percent which would restore and enhance existing big sagebrush communities. This objective applies to early, mid and late-successional juniper sites.

Burn mosaic percentage objectives are specific to the juniper transition stage of the site.

1. Early-transitional juniper sites in mountain big sagebrush – Under 50.0 percent of burn unit is actually treated.
2. Mid-transitional juniper sites in mountain big sagebrush – Up to 70.0 percent of burn unit is actually treated.
3. Late-transitional juniper sites in mountain big sagebrush – Seventy percent (or greater) of burn unit is actually treated.

Landscape level objective:

1. Over a 10-year period, increase mountain big sagebrush habitat by 15 to 40,000 acres.

Other important plant communities occurring within these sites include mountain mahogany and bitterbrush stands. The objective in these areas is to reduce expansion juniper by 75.0 to 85.0 percent while retaining existing mountain mahogany and dense bitterbrush populations. This objective applies to early, mid and late-successional juniper sites.

Minimum monitoring would include photo points and density transects to determine if project objectives are being met. Monitoring data would be utilized as part of adaptive management. Additional monitoring could be established, but would be subject to budgetary and staffing constraints.

Landscape level objective:

1. Over a 5-year period, treat at least 250 acres of mountain mahogany.

Aspen Communities

Many aspen stands that exist within the project area are being encroached upon by juniper. The objective in these areas is to reduce aspen overstory by at least 50.0 percent to open understory and facilitate suckering. This objective applies to early, mid and late-successional juniper sites within aspen stands.

Minimum monitoring would include photo points and density transects to determine if project objectives are being met. Monitoring data would be utilized as part of adaptive management. Additional monitoring could be established, but would be subject to budgetary and staffing constraints.

Landscape level objective:

1. Over a 5-year period, treat at least 250 acres of aspen stands to facilitate suckering.

Old-Growth Juniper Communities

Many old-growth juniper sites that exist within the project area are being encroached upon by younger juniper.

The objective in these areas is to reduce expansion juniper by 75.0 to 85.0 percent while retaining existing old-growth juniper. This objective applies to early, mid and late-successional juniper sites within old-growth juniper populations.

Minimum monitoring would include photo points and density transects to determine if project objectives are being met. Monitoring data would be utilized as part of adaptive management. Additional monitoring could be established, but would be subject to budgetary and staffing constraints.

Landscape level objective:

1. Over a 5-year period reduce expansion juniper in up to 500 acres of old-growth juniper

Riparian Plant Communities

Riparian habitat has been modified by expansion juniper. The proposal in these treatment areas is to reduce expansion juniper.

Riparian habitat objectives include:

1. Reduce expansion juniper by 75.0 to 85.0 percent. This objective applies to early, mid and late-successional juniper sites within riparian habitat.

   Minimum monitoring would include photo points and density transects to determine if project objectives are being met. Monitoring data would be utilized as part of adaptive management. Additional monitoring could be established, but would be subject to budgetary and staffing constraints.

Landscape level objective:

2. Over a 5-year period, treat at least 2.00 miles of riparian habitat.

2.6 Project Design Elements (PDEs) Common to all Action Alternatives

The PDEs are prescribed to meet the project objectives above. These PDEs are preliminary and are subject to change during the adaptive management process. Any changes, additions or deletions would be made through coordination with the cooperating agencies and by the appropriate BLM specialists and reviewed and approved by the Authorized Officer (BLM Andrews RA Field Manager). Not all PDEs are appropriate and applicable to all treatment units. Applicable PDEs would be applied as appropriate following advice and recommendations from an ID team, based on a review of the prescription.

1. **Safety** - Public and firefighter safety is a number one priority.
2. **Wildlife Habitat Modification** - Wildlife habitat descriptions and considerations in Appendix P of the Andrews/Steens PRMP/FEIS would be utilized during implementation to ensure project implementation properly considers wildlife requirements and moves toward the DRC described in the Andrews/Steens PRMP/FEIS.
3. **Special Status Plant Species** - Protect Special Status plant populations throughout the life of the project, unless these populations are treatment tolerant and require no additional protection. Special Status plant populations would be avoided within mechanically-treated areas. Special Status plant populations may be protected during deployment of prescribed fire by black-lining resources and use of appropriate ignition techniques.
4. **Special Status Animal Species** - Protect Special Status wildlife species habitat throughout the life of the project through the establishment of greater ecosystem functionality. Conformance with the State and National sage-grouse strategies would be adhered to.
5. **Greater Sage-Grouse Leks** - Invasive juniper would be treated aggressively within greater sage-grouse 2.00-mile lek buffers. Treatment methods would be limited to cutting and individually burning juniper within the buffer area. Treatments within the 2.00-mile buffer area would not take place from March 1 to June 15.
6. **Big Game Cover** - Maintain suitable big game hiding and thermal cover within mechanical fuels reduction areas. Ensure the mechanical treatment area continues to function as big game cover following treatment.
7. **Big Game Browse** - Burned acreage within prescribed fire project units supporting big game browse could be limited in some cases. This PDE would not apply toward project units that contain juniper woodlands in a late stage of development.
8. **Old-Growth Juniper** - Retain old-growth juniper stands. Retain 10.0 to 15.0 percent of younger juniper to provide hiding and thermal cover for mule deer and elk.
9. **Old-Growth Juniper Characteristics** - Cutting of juniper with old-growth characteristics or obvious wildlife occupation (cavities or nests) would be avoided. See Chapter 3 for a description of old growth juniper.
10. **Bitterbrush** - Treat juniper mechanically in areas where bitterbrush is healthy and a major component of a site. Individual tree burning could also be used.
11. **Bitterbrush** - Areas currently supporting bitterbrush within the North Steens Project Area treated during project implementation may require planting or seeding with bitterbrush. Burned rangeland (outside of wilderness or WSAs) may be seeded with a rangeland drill, while burn piles or jackpots in the mechanically-treated project units may be seeded without site preparation. Where feasible, bitterbrush would be seeded alone (rather than within a seed mix) in order to reduce competition with other species and increase the likelihood of establishment.
12. **Mountain Mahogany** - Treat juniper mechanically in mountain mahogany stands. Individual tree burning could also be used.
13. **Low Sagebrush** - Cut or burn juniper trees individually in most low sagebrush sites. Complete removal of younger juniper would be prescribed in many of these low sagebrush areas as they are important habitat for greater sage-grouse.
14. **Wyoming Big Sagebrush** - Wyoming big sagebrush sites (lower elevation sites) for the most part are not included in the project area; those with substantial cheatgrass in the understory would not be burned in most cases. Treatment by other means such as juniper cutting or mastication would be undertaken. Wyoming big sagebrush sites with minimal cheatgrass in the understory may be burned and consideration given to reseeding the area with appropriate perennial grass species.

15. **Early Transition to Juniper Woodlands** - Big sagebrush stands with scattered juniper would not be treated by broadcast burning unless the prescription calls for under 50.0 percent blackened acres.
16. **Adjacent Treatments** - Treated mountain big sagebrush communities should attain Class 3 sagebrush cover (as defined in the Greater Sage-Grouse Conservation Assessment and Strategy for Oregon) on average before any additional treatments would be considered within the same individual project unit.
17. **Paleontological Resources** - Prior to treatment implementation, areas determined to be of high probability for the location of paleontological artifacts would be surveyed. Protect paleontological properties throughout the life of the project through the removal of paleontological site area(s) from treatment.
18. **Cultural Resources** - Prior to treatment implementation, a cultural resource site inventory would be completed. In areas where there is no reasonable expectation of cultural resources, site inventories may not be completed. Protect cultural resource properties throughout the life of the project. Heavy equipment using rubber tires could be utilized within site boundaries as needed. Heavy equipment may not be allowed within cultural site boundaries during wet or soil saturated conditions. Sites containing artifacts or features susceptible to fire damage or destruction would be protected during treatment through black-lining adjacent resources and appropriate ignition techniques.
19. **Noxious Weeds** - Prior to implementation of prescribed fire and mechanical treatment within proposed project units, noxious weed populations in the area would be inventoried. Weed populations identified in or adjacent to the project area would be treated.
20. **Noxious Weeds** - Following treatment of prescribed fire and mechanically-treated project units, the areas would be monitored for noxious weed invasions.
21. **Noxious Weeds** - All vehicles and equipment used during implementation would be cleaned before and following treatments to guard against spreading noxious weeds. Vehicles may also be cleaned again prior to re-entry into the project area if they have been utilized for any additional activities following post treatment cleaning.
22. **Seeding** - Sites that lack sufficient understory species, such as fully-developed juniper woodlands, or areas that have burned at a high severity may require seeding following a prescribed fire treatment to attain the desired post-fire response. Mixtures of native grass, forb, and shrub seed may be applied to designated areas with aerial or ground-based methods. Candidate sites for seeding would be determined on a case-by-case basis as pre-treatment prescriptions are developed and/or as monitoring data are gathered.
23. **Riparian Areas** - Prior to the use of prescribed fire, encroached juniper may be left standing in riparian areas to reduce the potential of the maximum heat negatively affecting the deciduous woody components of the riparian communities. Younger western juniper would be cut following prescribed fire.
24. **Riparian Areas** - Project unit treatments would be spread between drainages based on site-specific post-treatment evaluation to reduce the potential of any adverse cumulative effects to riparian areas, water quality, and fish.
25. **Visual Resources** - Protect visual resources throughout the life of the project over the long term. Individual project units would be designed to meet the VRM class objectives for the project unit.
26. **Roads and Trails in the CMPA** - "No new road or trail for motorized or mechanized vehicles may be constructed on Federal lands in the Cooperative Management and Protection Area unless the Secretary determines that the road or trail is necessary for public safety or protection of the environment." (Steens Act Section 112 (d) (1)).
27. **Road Condition and Maintenance** - Maintain safe conditions throughout the duration of the North Steens Project. Several roads would be maintained consistent with assigned maintenance levels. Roads may be graded, graveled, rocks removed, ditches cleaned, and culverts or rock crossings installed to prevent accelerated erosion and easier access for firefighting personnel and administration. Existing roads would be used as fire lines and safety zones. Roads determined to be essential for success of the project, but determined to be closed in the travel plan, would be improved for the duration of the project and reclaimed upon project completion.
28. **Wilderness Study Areas** - Protect the wilderness values of naturalness, opportunities for primitive and unconfined recreation, and solitude found in WSAs. Any proposed project activities within any WSA would comply with BLM's WSA IMP.

29. **Wilderness Study Areas** - "The wilderness study areas referred to in subsection (a) shall continue to be managed under section 603(c) of the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1782(c)) in a manner so as to not impair the suitability of these areas for preservation as wilderness." (Steens Act Section 204 (b)).
30. **Wild and Scenic River Corridors** - No motorized overland transport for fuels-related activities would be utilized in WSR corridors.
31. **Public Notification** - When possible, provide adequate and timely notification to the public of the scope, location, and timing of proposed project activities throughout the life of the project and of any closures that may result. Methods of notification could include, but may not be limited to, press releases, newsletter, BLM Web site if available, and bulletin boards.
32. **Project Progress/Results** - Project progress and results of project implementation would be monitored and results documented. Publication of project progress and results of implementation would optimally occur on a recurring 3 to 5-year basis.
33. **Post-Treatment Resting** - Livestock grazing would not occur for two growing seasons in pastures that have been treated with prescribed fire.
34. **Pre-Treatment Resting** - One season of rest from grazing may be necessary prior to treatment with prescribed fire to allow for the development of a fine fuel ignition source.
35. **Burn Plan Objectives** - Prescribed fire treatments within a specific allotment should achieve burn plan objectives during a single season if possible. Potential negative economic effects on grazing permit holders could be minimized through this approach.
36. **Environment** - Protection of the environment would be considered in all cases.
37. **Project Maintenance and Follow-Up Treatments** - Re-entry into an area may be essential in many cases to achieve project objectives. Follow-up treatments would be the same as those analyzed in this EIS or could be developed as part of the adaptive management process.

2.7 Treatment Prioritization and Project Units Common to all Action Alternatives

The project area contains numerous proposed project units (see Project Units Map 1). The situations within these project units may vary over the course of implementation. The PDEs, budgetary constraints, and operational limitations could influence the timing, acreage objectives, and sequence of treatments. Project unit specific acreage objectives would be determined by a fuels implementation team and would be contained in the burn plan for that specific project unit.

The project area has been divided into specific project units which are primarily defined by pasture fence lines. The wilderness and WSA project units are organized by fence lines where possible. Larger project units are found in WSAs and wilderness in particular due to the lack of fence lines or the different management for these areas. Project Unit names are sometimes utilized in the descriptions of the affected environment. Private lands are found in a mosaic throughout the project area.

Project Units that Include Wilderness:

Ankle Creek Project Unit
Fish Creek Project Unit
Gorges Project Unit
Home Creek Project Unit
Kiger Creek Project Unit
Cold Spring Project Unit
Road #2 Project Unit
South Mud Creek Project Unit
Wildhorse Project Unit

Project Units that Include WSAs:

Bridge Creek #3 Project Unit
Brown Project Unit
Cold Spring Project Unit
Cucamonga Creek Project Unit
Dingle Project Unit
Drake Project Unit
Kiger Creek Project Unit
Krumbo Mountain #2 Project Unit
Krumbo Ridge #1 Project Unit
Kundert Project Unit
Lower Field #1 Project Unit
North Mud Creek Project Unit
P. Hill Project Unit
Road #2 Project Unit
Scharff Project Unit
Solomon Project Unit
South Steens Project Unit
Upper Field #2 Project Unit
West Lower River #6 Project Unit
West Upper River #5 Project Unit

Other Project Units (Public and Private Lands Outside of Wilderness and WSAs):

Bird Reservoir #3 Project Unit
Chimney #3 Project Unit
Doe Camp Project Unit
Elliot Field #9 Project Unit
Hardie Project Unit
Horton Project Unit
McCoy Creek #1 East Project Unit
McCoy Creek #1 West Project Unit
Moon Hill #6 Project Unit
Oliver Springs #4 Project Unit
Ranch Project Unit
Ruby Springs #4 Project Unit
Sagehen Project Unit
West Slope Project Unit

2.8 Alternatives Including the No Action Alternatives

This EIS analyses two No Action Alternatives. The first No Action Alternative is the No Treatment Alternative or No Action Alternative (A). This alternative proposes no fuels reduction through juniper treatments in the project area. This alternative is not consistent with the Andrews Management Unit or Steens CMPA RMP directions. Responses to public scoping indicated some members of the interested public would like to see no fuels reduction through juniper treatments in the project area. Analyzing No Treatment provides a scenario for comparison of future conditions with alternatives that allow treatments.

The second No Action Alternative is the Continuation of Current Management Alternative or No Action Alternative (B). This alternative proposes a continuation of current levels of juniper management which is defined in the description of the alternative.

2.8.1 No Action Alternative A - No Treatment Alternative

This alternative proposes no fuels reduction through juniper treatments in the project area. This alternative is not consistent with the Andrews or Steens RMPs direction. The alternative does not meet the objectives of the proposal but is analyzed for purposes of effect analysis and comparison.

Under this alternative expansion juniper and the related changes to fuels would not be managed in the project area. Wildfires would still occur in the project area and would be managed in a manner consistent with the Fire Management Plan (FMP).

2.8.2 No Action Alternative B - Continuation of Current Management Alternative

Image 2.1 (see Images and Maps CD) Juniper induced understory reduction.

Under this alternative, current management activities would continue and site-specific treatments would require NEPA analysis. The additional proposed management in the three action alternatives would not be implemented.

Expansion juniper in the project area would be treated on a reduced landscape level. Most future treatments would continue to encompass 2,000 to 4,500 acres. The Continuation of Current Management Alternative recognizes juniper treatment in the project area would continue to occur on a smaller scale. The NEPA categorical exclusion authority may be utilized in these types of situations where appropriate under the authority of the Healthy Forest Initiative (2002).

Naturally-ignited fires would still be managed in accordance with the Andrews and Steens RMPs and FMP guidance. Not all fire would be suppressed. Some wildfires would be managed for resource benefits. Factors that need to be considered include, but are not limited to, threats to human life, fire behavior, potential final fire size, concurrent incidents, available equipment and qualified personnel, and proximity to private lands.

Private lands would be subject to fire management (prescribed and natural ignitions) in accordance with private landowner management objectives. Wildfires originating on private lands that threaten or move onto Federally-administered lands will be suppressed based on current policy. Coordination of small-scale prescribed fire management efforts between public land managers and private landowners would still occur. Coordination of larger scale prescribed fire management efforts between public land managers and private landowners would not occur under this alternative and could result in reduced treatment of encroaching juniper across the CMPA.

2.8.3 Partial Treatment Alternative

The Partial Treatment Alternative proposes proactive juniper management through fuels reduction (e.g., prescribed burning and mechanical treatments) on a landscape level on private and public lands outside of wilderness, WSAs, and WSR corridors. Management of naturally-occurring fires to achieve project objectives would occur in all areas under this alternative.

Assumptions:

1. Restore native, shrub-dominated plant communities where fire is capable of operating as an ecosystem process. Due to treatment limitations in wilderness, WSAs, and WSR corridors, approximately 25.0 to 30.0 percent of the identified upland communities over the entire landscape would be effectively burned (black area) to create a mosaic of seral stages. Private land objectives may differ and would reflect landowner management objectives.

2. An approximate range of up to 10,000 acres (~3.0 percent of the total project area) could be targeted for treatment during each season of implementation. This target is subject to operational and budgetary constraints.

Table 2. Summary of Actions in the Partial Treatment Alternative

Habitat Type	Proposed Management	Actions Analyzed
Aspen	Reduce Fuel Loading, Restore Aspen Stands	Prescribed Fire, Temporary Fencing, Fire Use, Juniper Cutting*
Mountain Mahogany	Reduce Fuel Loading, Restore Mountain Mahogany	Temporary Fencing, Fire Use, Juniper Cutting*
Sagebrush	Reduce Fuel Loading, Restore Sagebrush Habitat	Prescribed Fire, Fire Use, Permanent Fencing, Temporary Fencing, Juniper Cutting*, Planting/Seeding,
Riparian	Reduce Fuel Loading, Restore Riparian/Wetlands	Prescribed Fire, Fire Use, Temporary Fencing, Juniper Cutting*, Planting/Seeding
Old-Growth Juniper	Reduce Fuel Loading, Maintain/Improve Old Growth Juniper Woodlands	Juniper Cutting*, Fire Use
All	Commercial Use of Cut Juniper	Removal of cut juniper**, Wildfire Management
All	Reduce Fuel Loading in Wilderness, WSR corridors and WSAs	Fire Use (Natural Ignitions Only)

* All references to "juniper cutting" refer to the reduction of young encroaching juniper.
** Section 113(b) (2) of the Steens Act authorizes the removal of cut juniper for commercial use. This use applies only to nonwilderness and non-WSA portions of the CMPA.

Important Features of the Partial Treatment Alternative:

1. All implementation timelines for project completion are dependent upon funding.
2. Under this alternative encroaching juniper and associated excessive fuel loading in Steens Mountain Wilderness, WSAs or WSR corridors would be managed on a landscape level using wildfire in accordance with the RMPs and Burns Interagency Fire Management Plan.
3. Treatments in the Riddle Brothers Ranch Historic District (Ranch Project Unit) could include other treatments if deemed necessary for historic preservation purposes.

Through implementation of this alternative, some fires ignited by lightning would be managed for project objectives. Prescribed fire (outside of wilderness, WSAs, and WSR corridors) would be introduced into quaking aspen communities, mountain big sagebrush communities, and riparian communities in various stages of transition to fully-developed juniper woodlands.

Quaking aspen plant communities in transition toward western juniper woodlands would be given a high priority for reintroduction of fire. Implementation of prescribed fire alone may not be sufficient due to fuel structure. Cut trees would help to build burnable fuel on the site. Other areas that would be given a priority for prescribed fire would be deep soil areas with a western juniper overstory with dying shrubs. Deep soil sites with a juniper overstory or with a high density of young juniper with a stressed, dying, or dead shrub component and those segments of riparian habitat being encroached by western juniper would be high priorities for juniper cutting and fire reintroduction.

Prescribed fire burn plans would be designed to utilize natural fuel breaks such as talus slopes, rock, and uncut juniper communities with taller trees and limited understory. Project unit design would control fire distribution so the acres of actual burn may vary. The burn plan would encompass buffer areas not targeted for treatment in which fire effects would not be detrimental. The use of these buffers would allow fires to go out naturally without artificial control lines thereby resembling wildfire events.

Prescribed fire on public and private lands would be managed simultaneously when cost sharing and signed cooperative agreements are in effect. Allotments and pastures within the project area would be rested from livestock grazing for a minimum of two growing seasons following burning. During this rest period cattle could be trailed through these pastures to adjoining pastures or other grazing areas agreed to through cooperative agreements.

Additional rest or adjustments to the timing of livestock grazing could be implemented as needed to ensure riparian and upland objectives are being met.

Elk, deer, and other wildlife species are attracted to burned areas because of the succulent herbaceous growth of grasses and forbs and the high palatability of new shrub and aspen sprouts. Experience with burns in similar habitat has shown that larger burns help protect aspen and other palatable species by distributing browsing animals over larger areas. Activities proposed under the Partial Treatment Alternative would require a number of years to complete depending on climatic factors, funding, and the amount of juniper cutting required to accomplish objectives. Post-burn juniper cutting, as well as additional burning, may be required in certain situations to achieve objectives.

Image 2.2 (see Images and Maps CD). Lupine response following a wildfire event.

Image 2.3 (see Images and Maps CD). Aspen response following a fire event (young aspen are visible in the foreground).

Potential Treatment Methods (Outside of Wilderness, WSAs, and WSR Corridors):

Ignition methods for prescribed fire may include drip torches, aerial ignition techniques, and the use of hand held and vehicle mounted (where appropriate) ignition devices.

1. Broadcast burning – Prescribed fire is utilized through an entire area identified in the burn plan using a prescription designed to achieve specific habitat and fuel loading objectives.
2. Jackpot burning – Accumulations of fuels are burned while other vegetation remains unburned. This method would be implemented in the late fall, winter, or early spring when the potential for fire spread is low. Fuels could be piled by hand or machine.
3. Individual tree burning - Prescribed fire that is implemented using an ignition device (flamethrower or terra-torch).
4. Fencing (permanent and temporary) – Areas could be fenced where response of vegetation (following treatment) could be slowed by grazing and browsing. Ideally, all temporary fencing would be removed within one season after vegetative recovery objectives have been met. Permanent fencing may be used to change grazing patterns following treatment as determined necessary.
5. Reseeding (crested wheatgrass) – Maintenance seeding with crested wheatgrass could be utilized in existing crested wheatgrass seedings to provide additional forage or to accomplish other project objectives. There are very few acres of existing crested wheatgrass seedings in the proposed project area.
6. Reseeding (native species) – Selected treated areas could be seeded with native seeds to accomplish project objectives and offset potential temporary loss of plant species such as bitterbrush from sections of project units.
7. Planting – Areas could be planted with native species including riparian woody species.
8. Total juniper reduction (cutting and piling) - The treatment consists of cutting all younger juniper within portions of a project unit. Juniper could be cut and piled prior to follow-up treatments; this could be accomplished by nonmotorized or motorized means.
9. Commercial use of cut juniper - Downed juniper could be collected for firewood, ornamental use, or other uses. Section 113(b) (2) of the Steens Act allows for the removal of legally downed juniper in the CMPA outside of wilderness and WSAs.
10. Selective juniper reduction (cutting and piling) - Treatments could vary from cutting every third tree in juniper pockets to limbing and girdling juniper found in dense stands. Juniper could be cut and piled prior to follow-up treatments; this could be accomplished by nonmotorized or motorized means.
    - Every third tree cutting involves felling trees into juniper pockets to provide ladder fuels for remaining junipers. This method has worked well in areas with moderately dense juniper, steep slopes, and remnant ground fuels to carry fire between juniper pockets. In areas of moderate slopes this technique may be limited as fire needs more ladder fuels and a mechanism such as high or up-slope winds to carry fire through surrounding tree canopies.

- Droop cutting involves cutting the lower limbs of juniper so they droop to the ground. The limbs are not severed from the tree bole; instead they are cut three-fourths way through from the top down. This method results in ladder fuels still attached to the base of standing trees. As fire carries through juniper stands, dead limbs ignite and carry fire into the canopy of the tree. This technique is limited by topography and fuel conditions required to carry fire between juniper pockets. Advantages to this technique include a minimized cutting time to treat stands of juniper and that the majority of fuels are left in a vertical arrangement above ground surface thereby reducing heat effects to soils and other resources (primarily cultural). A further advantage is the post-treatment project area resembles the result of a wildfire event.
- The limb and girdle method involves scoring and cutting limbs around the base of the juniper as well as cutting through the cambium layer. This technique results in dead material at the base of juniper trees providing a receptive fuel bed for fire, while at the same time increasing the chances of killing the trees. The limb and girdle method works well in dense stands of juniper with little to no understory to carry fire. As with droop cutting, the limb and girdle method results in the juniper remaining upright which keeps the majority of the fuels away from fragile soils and mimics the lower intensity of a wildfire event.

11. Combination treatments - Any or all treatment methods.

Image 2.4 (see Images and Maps CD). Selective cutting resembles some visual results of a wildfire event

2.8.4 Limited Treatment Alternative

The Limited Treatment Alternative incorporates by reference applicable descriptions and features of the Partial Treatment Alternative; the text is not repeated to avoid redundancy. Differences between the alternatives are described in the text below and in the Important Features and Assumption sections contained in this alternative.

The Limited Treatment Alternative proposes active juniper management through fuels reduction on a landscape level on private and public lands. Management of naturally-occurring fires would occur in all areas under this alternative. Use of prescribed fire for juniper management may occur in wilderness, WSAs, and WSR corridors. This alternative does not propose any juniper cutting in wilderness, WSAs or WSR corridors.

Assumptions:

1. Restore native, shrub-dominated plant communities where fire is capable of operating as an ecosystem process. Due to treatment limitations in wilderness, WSAs, and WSR corridors, approximately 30.0 to 45.0 percent of selected upland communities could actually be burned (black area) to create a mosaic of seral stages. Private land objectives may differ and would reflect landowner management objectives.
2. An approximate range of up to 15,000 acres (4.5 percent of the total project area) could be targeted for treatment during each season of implementation. This target is subject to operational and budgetary constraints.

Table 3. Summary of Actions in the Limited Treatment Alternative

Habitat Type	Proposed Management	Actions Analyzed
Aspen	Reduce Fuel Loading, Restore Aspen Stands	Prescribed Fire, Temporary Fencing, Fire Use, Juniper Cutting*
Mountain Mahogany	Reduce Fuel Loading, Restore Mountain Mahogany	Temporary Fencing, Fire Use, Juniper Cutting*
Sagebrush	Reduce Fuel Loading, Restore Sagebrush Habitat	Prescribed Fire, Fire Use, Permanent Fencing, Temporary Fencing, Juniper Cutting*, Planting/Seeding
Riparian	Reduce Fuel Loading, Restore Riparian/Wetlands	Prescribed Fire, Fire Use, Temporary Fencing, Juniper Cutting*, Planting/Seeding
Old Growth Juniper	Reduce Fuel Loading, Maintain/Improve Old Growth	Juniper Cutting*, Fire Use

Habitat Type	Proposed Management	Actions Analyzed
	Juniper Woodlands	
All	Preserve Wilderness Values Within WSAs	Fire Use, Prescribed Fire, Temporary Fencing, Seeding
All	Enhance Wilderness and WSR Corridors	Fire Use, Prescribed Fire, Seeding
All	Reduce Fuel Loading, Commercial Use of Cut Juniper	Removal of Cut Juniper**

*All references to "juniper cutting" refer to the reduction of young encroaching juniper outside of wilderness and WSA boundaries.
** Section 113(b) (2) of the Steens Act authorizes the removal of cut juniper for commercial use. This use applies only to nonwilderness and non-WSA portions of the CMPA.

Important Features of the Limited Treatment Alternative:

1. All implementation timelines for project completion are dependent upon funding and operational constraints.
2. Wilderness and WSR corridors would be included in the project.
   - Seeding would not be proposed unless desired to follow high severity wildfire where there is no reasonable expectation of natural healing; only native or naturalized species would be utilized in this case. Seeding would be accomplished using aerial or hand broadcast techniques.
   - Only wildland fire use would be allowed in wilderness and WSR corridors for the first 3 to 5 years to achieve project objectives. During the project review at 3 to 5-year intervals, prescribed fire could be considered if wildfire did not achieve objectives.
   - Lightning-ignited fires would be utilized to restore a more naturally-functioning ecosystem. Clear direction for the use of fire for ecosystem restoration comes from numerous directives. Appendix B of House Report 101-405 on the Arizona Desert Wilderness Act of 1990 gives Congressional guidelines for the use of fires in wilderness in Section 14 where it states under "Management of Fire: The objectives of fire management in wilderness are to: (a) permit lightning-caused fires to play, as nearly as possible, their natural ecological role within wilderness and (b) reduce, to an acceptable level, the risks and consequences of wildfire within wilderness or escaping from wilderness. Fire ignited by lightning would be permitted to burn or would be suppressed as prescribed in an approved plan. Prescribed fires ignited by man may be permitted to reduce unnatural buildup of fuels only if necessary to meet objectives (a) and (b) above. Although additional benefits may result from man-ignited prescribed fire, vegetative manipulation would not be used to justify such fires."
   - The Steens Act also provides specific legal direction regarding treatment of western juniper in the CMPA. It states in Section 113 (c), "JUNIPER MANAGEMENT – the Secretary shall emphasize the restoration of the historic fire regime in the Cooperative Management and Protection Area and the resulting native vegetation communities through active management of Western Juniper on a landscape level. Management measures shall include the use of natural and prescribed burning."
   - The Steens Mountain Wilderness and WSRs Plan under Fire Management Objectives states as an objective: "To restore and maintain the integrity of ecosystems by establishing appropriate fire regimes." It further states under Fire Management Direction that the BLM would "Develop guidance in the Burns District FMP that addresses management of fire in Steens Mountain Wilderness and WSRs. Emphasis is given to restoring appropriate fire regimes and ecosystem integrity, while still protecting human life, private property or other significant resource values. Appropriate rehabilitation guidelines associated with protecting wilderness resources will also be developed as needed."
   - The BLM Manual 8560, "Management of Designated Wilderness Areas" Section .35, Fire Management, provides for the use of fire in subsection 2, Natural Fire, and states; "Natural Fire – Natural fire (i.e., lightning-caused) is normally a part of the ecology of the wilderness, and human efforts to ban this agent may have resulted in significant ecological changes in the flora and fauna of some areas. In order to return some ecosystems to a more natural state, it may be appropriate to allow natural fire to burn, but only in conformity with an approved FMP and the over-riding fire guidance."

- The BLM Manual 8560, Section .35, subsection 3, Prescribed Burning, gives direction for that issue as:

  a. Ignition by Bureau Personnel.

  Where wildfire under prescription does not meet wilderness fire management objectives, prescribed burning ignited by Bureau personnel may be allowed on a case-by-case basis for the following purposes;

  (1) To reintroduce or maintain the natural condition of a fire-dependent ecosystem,
  (2) To restore fire where past strict fire control measures had interfered with natural, ecological processes,
  (3) Where a primary value of a given wilderness will be perpetuated as a result of the burning, or
  (4) Where it will perpetuate a threatened or endangered species.

- Prescribed fires are allowed only in conformity with an approved FMP. As noted in the WSRs Act under Section 10 (a): "Each component of the national wild and scenic rivers system shall be administered in such manner as to protect and enhance the values which caused it to be included in said system without, insofar as is consistent therewith, limiting other uses that do not substantially interfere with public use and enjoyment of these values. In such administration primary emphasis shall be given to protecting its esthetic, scenic, historic, archaeological, and scientific features. Management plans for any such component may establish varying degrees of intensity of its protection and development, based on the special attributes of the area."
- Further direction for the protection of Outstandingly Remarkable Values (ORVs) is provided in BLM Manual 8351 – "Wild and Scenic Rivers – Policy and Program Direction for Identification, Evaluation, and Management" in Section .5.51 A.1. – "Management for Wild River Areas: Management of wild river areas should give primary emphasis to protecting the values which make it outstandingly remarkable while providing river-related outdoor recreation opportunities in a primitive setting."
- The BLM Manual 8351 also provides for cutting of trees in a wild river corridor for fire control (and other) purposes as provided for in Section .51 A. 2. a. – "Forestry Practices". No overland motorized travel is permitted in a designated "wild" river corridor per direction from BLM Manual 8351, Section .51 A. 2. e.

3. The WSAs would be included in the project.
   - Seeding would not be proposed as part of this project. In the event of catastrophic fire, where there is no reasonable expectation of natural healing, seeding would occur following Andrews and Steens RMPs and WSA IMP direction. Seeding would be accomplished using aerial or hand broadcast techniques.
   - Fire use would be allowed in WSAs.

Specific Project Design Elements:

1. Treatments outside of wilderness, WSAs or WSR corridors:
   - All available treatment methods listed in the Partial Treatment Alternative could be utilized in these areas to achieve resource objectives.
2. Treatments in the Riddle Brothers Ranch Historic District (Ranch Project Unit):
   - Treatments in this project unit would include preventative measures and may include treatment of the WSR corridor. The WSR corridor treatments would be for fuels management, natural habitat restoration, and historical preservation.

2.8.5 Full Treatment Alternative

The Full Treatment Alternative incorporates by reference applicable descriptions and features of the Partial and Limited Treatment Alternatives. The text is not repeated to avoid redundancy. Differences between the alternatives are described in the Important Features, PDEs, and Assumption Sections contained in this alternative.

The Full Treatment Alternative proposes active juniper management through fuels reduction on a landscape level on private and public lands including wilderness, WSAs, and WSR corridors. Management of natural and prescribed fires would occur in all areas under this alternative. Additional treatment methods in wilderness, WSAs, and WSR corridors could be considered after the project review 3 to 5-year interval and could include the use of hand tools, motorized or mechanized equipment, and nonmotorized transportation following the Minimum Decision Requirements Guide evaluation.

Assumptions:

1. Restore native, shrub-dominated plant communities where fire is capable of operating as an ecosystem process. Due to other available treatment methods in wilderness, WSAs, and WSR corridors, approximately 45.0 to 65.0 percent of the identified upland communities could be burned (black area) to create a mosaic of seral stages. Private land objectives may differ and would reflect landowner management objectives.
2. An approximate range of up to 20,000 acres (~6.0 percent of the total project area) could be targeted for treatment during each season of implementation. This target is subject to operational and budgetary constraints.

Table 4. Summary of Actions in the Full Treatment Alternative

Habitat Type	Proposed Management	Actions Analyzed
Aspen	Reduce Fuel Loading, Restore Aspen Stands	Prescribed Fire, Temporary Fencing, Fire Use, Juniper Cutting*
Mountain Mahogany	Reduce Fuel Loading, Restore Mountain Mahogany	Temporary Fencing, Fire Use, Juniper Cutting*
Sagebrush	Reduce Fuel Loading, Restore Sagebrush Habitat	Prescribed Fire, Fire Use, Permanent Fencing, Temporary Fencing, Juniper Cutting*, Planting/Seeding
Riparian	Reduce Fuel Loading, Restore Riparian/Wetlands	Prescribed Fire, Fire Use, Temporary Fencing, Juniper Cutting*, Planting/Seeding
Old Growth Juniper	Reduce Fuel Loading, Maintain/Improve Old Growth Juniper Woodlands	Juniper Cutting*, Fire Use
All	Reduce Fuel Loading, Preserve Wilderness Values Within WSAs	Juniper Cutting*, Use of Nonmotorized Transport, Use of Nonmechanized Equipment, Use of Mechanized or Motorized Equipment, Fire Use, Prescribed Fire, Temporary Fencing
All	Reduce Fuel Loading, Enhance Wilderness and WSR Corridors	Juniper Cutting*, Use of Nonmotorized Transport, Use of Nonmechanized Equipment, Use of Mechanized or Motorized Equipment, Fire Use, Prescribed Fire, Temporary Fencing
All	Reduce Fuel Loading, Commercial Use of Cut Juniper	Removal of cut juniper**

* All references to “juniper cutting” refer to the reduction of young encroaching juniper.
** Section 113(b) (2) of the Steens Act authorizes the removal of cut juniper for commercial use. This use applies only to nonwilderness and non-WSA portions of the CMPA.

Important Features of the Full Treatment Alternative:

1. All implementation timelines for project completion are dependent upon funding and operational constraint.
2. Wilderness and WSR corridors would be included in the project.
   - Seeding would not be proposed as part of this alternative. In the event of high severity fire, where there is no reasonable expectation of natural healing, seeding would occur following Steens RMP direction. Seeding would be accomplished using aerial or hand broadcast techniques.
3. Treatments in wilderness and WSR corridors would be utilized in the following order:
   - Fire use would be allowed for the first 3 to 5 years to achieve project objectives in lower priority areas (areas outside of aspen stands and mountain mahogany populations). During the project review at 3 to 5-year intervals, additional methods could be considered if fire did not achieve objectives. Volunteer groups or contractors could be utilized to accomplish treatment of some high priority areas. Treatments in high priority areas could include the use of nonmotorized transport and nonmechanical machinery.
   - Treatments that include the use of nonmechanized transport and motorized equipment could be used in all areas in addition to wildfire.
4. The WSAs would be included in the project.
   - Seeding would not be proposed in WSAs as part of this alternative. In the event of a catastrophic fire, where there is no reasonable expectation of natural healing, the area may be seeded following Andrews and Steens RMP and WSA IMP direction. Aerial or hand broadcast techniques would be used.
5. Treatments in WSAs would be considered in the following order:
   - Prescribed fire treatment that does not include the use of motorized vehicles or other forms of mechanical transport off cherrystem roads and existing ways could be used. During the 3 to 5-year interval project review, additional methods could be considered if wildland fire use and prescribed fire treatment did not achieve objectives.
   - Treatments that include the use of nonmotorized transport and mechanical or motorized equipment could be used in all areas in addition to wildfire.

Specific Project Design Elements:

1. Treatments outside of wilderness, WSAs or WSR corridors:
   - All available treatment methods listed in the Partial Treatment Alternative could be utilized in these areas to achieve resource objectives.
2. Treatments in the Riddle Brothers Ranch Historic District (Ranch Project Unit):
   - Treatments in this project unit would include preventative measures and may include treatment of the WSR corridor. The WSR corridor treatments would be for fuels management, natural habitat restoration, and historical preservation.

All of the latter three action alternatives are considered preferable to the two No Action alternatives. At this stage of the analysis process all three of the action alternatives are considered preferred alternatives.

3 AFFECTED ENVIRONMENT

3.1 Project Area Profile

The North Steens Project Area encompasses private and public lands administered by BLM located within the Andrews RA primarily within the CMPA. This chapter describes the current condition, amount, location, use, and demands of each of the resources in the project area that could be affected by the actions described in Chapter 2. Physical characteristics such as geology and climate are incorporated into the description of the physical environment. Although they should not be affected by the alternatives, they are a part of the physical environment where the actions would be taking place.

Health and safety is a required management component that would not change by alternative or be affected by the various actions. Protection of the public would be provided under all alternatives and would include such measures as posting signs and issuing news releases to alert the public to hazardous elements and locations within the project area.

3.1.1 Physical Characteristics

The project area lies in the northwest portion of the Great Basin in the Basin and Range Physiographic Province. Drainage is generally internal with no outlet to the sea.

About ten million years ago, regional uplifts and movement on faults in the Basin and Range Province formed fault-block mountains and intervening broad valleys. Fault movement continues today. Steens Mountain is a fault-block mountain dipping gently westward and is characterized by its steep, east-facing, 5,500-foot high escarpment overlooking Alvord Valley.

The elevation of 9,700 feet on top Steens Mountain allowed the formation of alpine glaciers less than one million years ago. The glaciers took the form of an icecap on top Steens Mountain during an earlier glacial advance (the Fish Lake advance) and were confined to river valleys during a later glacial advance (the Blitzen advance). The valley glaciers carved gorges 2,000 feet deep that expose layers of the Steens Basalt. The Steens Basalt has a total thickness of approximately 3,000 feet.

Weather in the semiarid project area is the result of maritime air moving eastward from the Pacific Ocean over the Coast and Cascade Mountain ranges. As air masses rise to cross these mountains, much of the moisture in the air condenses and falls to the ground, making the air relatively dry by the time it reaches southeastern Oregon. There is an abundance of sunshine and a wide range between maximum and minimum daily temperatures. Average annual precipitation in the region is between 8 and 14 inches, with some isolated areas receiving up to 30 inches or more. Most of the precipitation occurs from November through February with about one-third falling as snow. The amount of precipitation in a particular location depends on topography; the higher the elevation, the greater the precipitation.

Thunderstorms, occasionally accompanied by hail, typically occur each year over virtually every part of the project area. High-intensity thunderstorms occur between April and September; storms during June or July are typically drier than those in August or September. At elevations below 6,000 feet the snow pack usually melts by April; at higher elevations it remains until mid-June. Localized flooding often follows spring snowmelt.

Generally, the last spring frost occurs by May 30 and the first frost of autumn by September 2. The frost-free period (temperatures about 32.0 °F.) varies from 139 days at the lower elevations to 74 days at higher elevations; however, frost may occur during any month of the year.

The prevailing winds are west-southwest with the most intense winds occurring during March and April. December and January are the calmest months.

3.1.2 History of the Project Area

Archaeological evidence indicates the project area has been inhabited by humans for the last 10,000 years.

Prehistoric occupation has been continuous, although population density and patterns of use have varied according to changing climatic cycles. Small, highly mobile family groups of hunters and gatherers were the norm during most of the year though larger groups gathered at winter camps in the valley bottoms.

Archaeological sites, the material remains of this prehistoric presence, are a commonplace yet fragile reminder of prehistoric activity. Prehistoric sites include stone flake scatters, larger more complex campsites, tool stone quarries, rock shelters and caves, rock art and rock structures such as rock rings (wickiup supports), rock cairns, and hunting blinds. Many Paiute tribal members have continued traditional practices such as marmot hunting, root gathering, and fruit harvesting.

Fur trappers were the first Euro-Americans to visit the Steens Mountain Area in a brief foray in 1826. The next visitors came in the 1840s and 1850s. The area was increasingly populated in the 1870s, and the most arable land with water was claimed shortly thereafter. Just after the beginning of the 20th century, a brief dry-land farming boom occurred to the west in Catlow Valley. By 1920, however, most residents were driven away from the Steens area by cold winters, summer frost, and drought. The Riddle Brothers, who ranched on the Little Blitzen River, were an exception. They developed the 1,220-acre ranch in the late 1800s, and it was operated continuously until 1986 when the public acquired the property and designated it a National Register Historic District administered by the BLM.

In the early 20th century, Basque sheepherders moved onto Steens Mountain and surrounding rangeland, leaving their marks in the form of place names, cabins, carved aspen, sheep camps and numerous rock cairns. Many eventually became ranch owners.

Historic sites in the Steens Mountain Area include wagon roads, homesteads, and Basque sheep camps with carved aspen. The Riddle Brothers Ranch National Historic District is a complex of well-preserved historic buildings, willow fences, corrals, and rock walls. The BLM has restored four of the buildings and stabilized the others. In addition to the historic component, the District contains several prehistoric sites.

3.2 Environmental Components

This section describes site-specific affected environmental components. The discussion is divided into critical and noncritical elements of the human environment which are discussed and analyzed in this document.

Critical Elements of the Human Environment:
ACECs, Air Quality, American Indian Traditional Practices, Cultural Resources, Environmental Justice, Farmlands (prime and unique), Flood Plains, Hazardous Materials, Migratory Birds, Noxious Weeds, Paleontology, Special Status Fauna, Special Status Flora, Wetlands and Riparian Zones and Water Quality, WSRs, and Wilderness and WSAs.

Noncritical Elements of the Human Environment:
Biological Soil Crusts, Fire Management, Fisheries, Forestry/Woodlands, Grazing Management, Lands and Realty, Minerals, Recreation, OHVs, Social and Economic Values, Soils, Transportation/Roads, Vegetation, Visual Resources, and Wildlife.

The following elements of the human environment are not known to be present in the project area or affected by implementation of the proposal: Flood Plains, Prime or Unique Farmlands, Minerals, Lands and Realty, and Hazardous Materials. The following element would also be unaffected by this proposal:

> Environmental Justice: Executive Order 12898 requires that Federal agencies adopt strategies to address Environmental Justice concerns within the context of agency operations. After review of the proposal the BLM has determined implementation of the proposal would not result in a disproportionately adverse effect on minority or economically disadvantaged populations as such populations do not occur in or near the project area. Environmental Justice will not be discussed further in this document.

3.3 Critical Elements

3.3.1 Areas of Critical Environmental Concern

(See Andrews/Steens RMP Map 15, Areas of Critical Environmental Concern/Research Natural Areas and Special Recreation Management Areas, on the attached CD.)

Located within the project area are all or portions of four ACECs. The ACECs include the Fir Groves ACEC, Rooster Comb Research Natural Area (RNA)/ACEC, East Kiger Plateau RNA/ACEC, and Little Blitzen RNA/ACEC. The area covered by ACECs within the project area is 1,687 acres.

Fir Groves ACEC - The ACEC covers 477 acres in two separate parcels near the confluence of Big and Little Fir Creeks. The relevant and important value for which the ACEC is designated is a grand fir forest on Steens Mountain. The largest parcel of the ACEC contains about 20 acres of grand fir in a densely packed thicket of mostly 60 to 80-year-old trees. The smaller parcel, located on Fence Creek, is not as large or as dense and contains more trees under 20 years old in the understory. The smaller parcel is interspersed with western juniper and quaking aspen. The elevation of the RNA/ACEC varies from 6,200 to 6,400 feet. Both parcels contain trees that have been damaged or killed by insects. Condition, along with tree density, makes the Fir Groves ACEC susceptible to fire.

Rooster Comb RNA/ACEC - Rooster Comb RNA/ACEC covers 683 acres in the lower part of Little Blitzen River Gorge. The entire Rooster Comb RNA/ACEC is located within the Gorges Project Unit. The relevant and important values associated with this area include a mountain mahogany/bluebunch wheatgrass plant community and a black cottonwood riparian community. The elevation of the RNA/ACEC varies from 5,600 to 7,400 feet.

East Kiger Plateau RNA/ACEC – East Kiger Plateau RNA/ACEC covers 1,216 acres on the ridge between Kiger Gorge and the east face of Steens Mountain. Only 359 acres of the RNA/ACEC is within the Kiger Creek Project Unit of the project area. The relevant and important values associated with this area include an excellent example of a high elevation fescue grassland and Special Status plant species. The elevation of the RNA/ACEC varies from 7,200 to 9,200 feet. There is no juniper associated with this RNA/ACEC and fire is rare at this elevation. Although fuels treatment is not an issue, fire would likely benefit the grassland community.

Little Blitzen RNA/ACEC – Little Blitzen RNA/ACEC totals 2,255 acres on top of Steens Mountain at the head of the Little Blitzen Gorge. Only 168 acres of that total is within the Gorges Project Unit of the project area. Relevant and important values associated with this RNA/ACEC include a mid to high elevation vernal pond; a stream system originating in the subalpine zone; aspen groves; alpine communities on Steens Mountain including snow deflation and moderate snow cover communities; late-lying snowbeds; a high elevation fescue grassland and Special Status plant species. The elevation of this RNA/ACEC varies from 7,000 feet in the bottom of the gorge to 9,500 feet in the subalpine zone. There is no juniper associated with this RNA/ACEC and fire is rare.

3.3.2 Air Quality

Under criteria established under the Clean Air Act as amended in 1990, Steens Mountain Wilderness is designated as a Class II airshed. The air pollutant of most concern on BLM-administered land is Particulate Matter (PM), which may originate from fire, road or windblown dust, and vehicle use. Most of this PM is produced from fire and is PM_{10}.

3.3.3 American Indian Traditional Practices

No specific American Indian traditional practices areas have been identified to BLM staff within the project area; however, staff is aware these areas exist (Coahran, 2001, 2003).

American Indian traditional use of fire as a management tool is well known and has been documented extensively, and numerous uses have been suggested including hunting, crop management, fireproofing areas, insect collection, pest management, warfare and signaling, clearing areas for travel, felling trees, and clearing riparian areas. (Coahran, 2001, 2003; Kay, 1994; Russel, 1983; Simms, 1987; Wheat, 1967; Williams, 2000; Winnamucca-Hopkins, 1883). Historic research has documented the use of fire among local American Indians as a tool to drive rabbits, antelope, and deer (Coahran, 2001, 2003; Kay, 1994; Kelly, 1938; Lewis, 1973; Simms, 1987; Wheat, 1967; Winnamucca-Hopkins, 1883).

3.3.4 Cultural Heritage

(See Andrews/Steens RMP Map S-8, Completed Cultural Resource Inventory, on the attached CD.)

Section 3.1.2 of the Andrews/Steens PRMP/FEIS (Page 3-2) defines a rich and extensive human history within the project area and its surrounds. This history details human occupation beginning at least 11,500 years ago and encompassing the cultures of American Indian Tribes, European and American fur traders, Euro-American pioneers and settlers, and Basque sheepherders. Remnants of these peoples' historic occupations exist as archaeological sites located throughout the project area.

Section 3.9 of the Andrews/Steens PRMP/FEIS (Page 3-36) states both the legal and regulatory compliance issues surrounding the protection of cultural resources properties. These compliance issues are further emphasized within Public Law 106-399 in Section 111(a)(1) whereby, within Steens Mountain Wilderness Area, the BLM would act in a manner that:

> "…ensures the conservation, protection, and improved management of ecological, social and economic environment of the Cooperative Management, and Protection Area, including…North American Indian tribal and cultural and archaeological resource sites, and additional cultural and historic sites…."

Evaluation of the current project area affected environment is problematic based on the current database of located and documented archaeological sites. Of the acres within the project area only approximately 7.0 percent of the total project area has been assessed for the location of archaeological remains.

Despite this paucity of information, realistic generalizations can be made based upon the known data, oral and written histories and extrapolations from data gathered in areas immediately adjacent to the project area. One hundred-sixty (160) cultural resource sites have been located within the planned project area. Of these sites, approximately 90.0 percent are pre-contact era, 10.0 percent are post-contact era, and fewer than 3.0 percent contain both pre- and post-contact era elements. The dates of use attributed to the pre-contact sites ranges from 8,000 years before present (ybp) to modern times, the post-contact sites from 1880 to present. Many of the sites within the planned project area have not been evaluated for eligibility to the National Register of Historic Places. The sites would require evaluation for eligibility before management priorities and management actions can be determined.

Combining this data with environmental features of known site locations, a probability sample for the location of nondocumented sites can be extrapolated. These indicative features include soils types conducive to economic root and berry crops, gently sloping and rolling terrain, and year-round water sources. Based on these environmental features and the known pre-contact and post-contact use of the area, approximately 60.0 to 80.0 percent of the planned project acreage within each pasture is considered "high probability" for the occurrence of cultural resource properties.

Activities planned within this project area include a combination of mechanical treatments, fencing, reseeding, and prescribed fire. While all of these planned activities could create a "potential for adverse affect" to certain types of cultural resource properties, not all of the environmental factors support a "potential for adverse affect" to cultural resource properties. Lithic scatter and items buried at least 1-inch deep in the soil would be minimally affected by burning of the aboveground vegetation. Other resources, such as rock art next to heavy fuel loading, structures, or other organic material, may be damaged by burning.

Riddle Brothers Ranch Historic District

The Riddle Brothers Ranch Historic District is eligible for the National Register of Historic Places under all four evaluation criteria (see Riddle Brothers Ranch Historic District Cultural RMP). The site contains both historic and American Indian archaeological site components.

Historic (wooden) structures and features are extremely susceptible to damage from fire, either planned or unplanned. Planned activities such as mechanical treatments, fencing, reseeding, and prescribed fire could create a potential for adverse affect to site constituents.

The District Archaeologist or designee would assess treatment modification in or around the Riddle Brothers Ranch Historic District during the treatment planning phase and be present as advisor during any treatment.

3.3.5 Migratory Birds

Approximately 70 species of migratory birds are known to inhabit different parts of the project area. Some of these species such as Northern goshawk and Swainson's hawk are considered Special Status Species and will be discussed in that section.

Neotropical migratory birds utilize all habitats in the project area; some are habitat specific while others use a variety of habitats. Grassland species include vesper sparrow and horned lark. These species usually are ground nesters in open areas. Sagebrush species include Brewer's sparrow, white-crowned sparrow, green-tailed towhee, sage thrasher, and sage sparrow. Most of these species nest in the sagebrush canopy but may also nest at the base of a shrub. Woodland species include gray flycatcher, dusky flycatcher, dark-eyed junco, bushtit, Cassin's finch, pine siskin, western wood-peewee, and chipping sparrow. Species that may be found in two or more habitats include American robin, brown-headed cowbird, Lincoln's sparrow, lark sparrow, and western meadowlark. These species nest in many different habitats and nest sites are found from the ground to trees and willows. The current transition of sagebrush into juniper woodlands is favoring the woodland species and reducing habitat for sagebrush-dependent species, some generalist species, and some of the grassland species.

3.3.6 Noxious Weeds

(See Andrews/Steens RMP Map S-5, Noxious Weed Infestation, on the attached CD.)

The Burns District GIS database currently identifies 235 sites of noxious weeds totaling 462 acres in the proposed North Steens Project Area. Please see the following table. The weed database has not been updated since 2003; however, no significant weed sites have been discovered since that time in the project area. The majority of weed sites occurs along roads and reservoirs and has been actively treated on a regular basis. The treatments utilized include chemical, mechanical, and biological control methods.

Table 3.1. Noxious Weed Site Information (Burns District GIS Database)

Noxious Weed Species	Number of Sites	Number of Acres
Bull Thistle	63	27.94
Canada Thistle	69	98.41
Dalmatian Toadflax	5	0.09
Diffuse Knapweed	12	1.95
Field Bindweed	1	0.08
Mediterranean Sage	4	156.51
Medusahead Rye	3	1.32
Perennial Pepperweed	5	0.25
Russian Knapweed	4	0.02
Scotch Thistle	34	168.57
Spotted Knapweed	12	5.26
St. Johns Wort	2	0.01
Tansy Ragwort	2	0.01
Whitetop	16	1.97
Yellow Starthistle	2	0.001
Yellow Toadflax	1	0.001
Total	**235**	**462.39**

3.3.7 Paleontological Resources

Limited numbers of paleontological sites, sites containing fossilized remains of plants and animals, have been reported within the planned project area. However, numerous areas containing the types of surface soil deposits known to contain paleontological resources are located within the project boundaries. Most of these areas have not been inventoried for paleontological sites.

Paleontological artifacts are extremely fragile and easily destroyed by minimal exposure to modern activities, including all of those activities listed as potential treatment alternatives within the planned project area. The paleontological localities, especially the known and potential localities, are important because they are a window to an environment that existed millions of years ago. They are nonrenewable, extremely fragile, and usually small in aerial extent.

Prior to project implementation, areas determined to be of high probability for the location of paleontological artifacts would be surveyed in conjunction with the Class III cultural resource inventory.

3.3.8 Special Status Species – Fauna

(See Andrews/Steens RMP Map S-7, Wildlife Habitat, on the attached CD.)

Special Status Species occurring within this project area include bald eagle, Columbia spotted frog, greater sage-grouse, Northern goshawk, Swainson's hawk, Preble's shrew, wolverine, California bighorn sheep, several species of bats, long-billed curlew, western burrowing owl, and sage sparrow. Sage sparrows are discussed above in the Migratory Bird Section. Other Special Status Species listed on Pages 3-26 to 3-28 of the Andrews/Steens PRMP/FEIS do not occur in this project area or would not be affected by the project.

Bald eagles (Federally listed, Threatened, winter resident only) winter in the project area, but there are no known roost sites. There is a potential for one in the Donner und Blitzen River drainage upstream from Page Springs Campground. Bald eagles have been documented flying out of the Donner und Blitzen River Canyon for years, but winter roosts have never been documented. During March 2005, bald eagles were observed on two of four survey visits.

Columbia spotted frogs (Federal Candidate for listing as Threatened or Endangered) are known to inhabit several stream systems within the project area. They have been documented on public lands in the upper part of McCoy Creek from the private land upstream (south), in Fish Lake, in Little Fish and Grove Creeks, in Page Springs Campground, and in the lower part of Mud Creek near the Malheur NWR boundary. Habitat for Columbia spotted frogs in the project area includes slow moving or still water around springs, ponds behind beaver dams or other ponds, and shallower vegetated areas in lakes. Faster flowing water courses such as McCoy Creek may be used as travel corridors between breeding and wintering habitat. Spotted frogs will bury themselves in soft mud substrates during the late summer through winter months and emerge in late winter-early spring for breeding. Some research suggests that after breeding, the frogs disperse to habitats near their wintering areas, dig into soft substrate and remain there until the next breeding season.

There are 14 known greater sage-grouse leks within the boundary of the North Steens Project Area. Sage-grouse leks usually occur in low sagebrush sites or areas with very little vegetation but with escape cover such as low or big sagebrush nearby. Of these leks, three are known to be inactive, of which one is considered historic (has not been active since disturbance occurred many years ago); one has not been active since a wildfire burned the area in the mid 1980s, and sage-grouse have not been seen for about 15 years at the third lek site, possibly due to the proximity to South Loop Road.

The entire project area has been identified as yearlong sage-grouse habitat with nesting habitat extending from the lower elevations up to about 6,500 feet. Brood rearing, which occurs from May through October, occurs all along the elevational gradient with most sage-grouse being found at the higher elevation of sagebrush, above 6500 feet, until late fall to early winter snows move them into lower country. Movement to higher elevations is due most likely to the drying up of vegetation in the lower elevations and the availability of greener vegetation and water at higher elevations. Some hens and broods will stay at lower elevations if food and water are available such as in areas with springs and areas along the East Canal of Malheur NWR. While nesting may occur anywhere suitable nest sites are found, most hens will nest within 4.00 miles of the leks. Nest site selection seems to be independent of the lek at which the hen was radio collared. Research has also shown that about two-thirds of hens will nest in big sagebrush while one-third nest in low sagebrush or other mixed sagebrush communities. Hens also show affinity to nest sites. While they may not return to the exact nest site each year, they will return within a few meters of the nest site used previously. If a nest site is destroyed because of fire, research has shown that hens returning to that site may move many miles to suitable habitat to nest. Research conducted on sage-grouse in Steens Mountain from 1997-2000 (Crawford, et al.) shows that hens nested an average of 7.00 miles from the lek where they were captured (range = 0.60 to 17.60 miles). Of the 29 nests that were located during the study, 13 were in mountain big sagebrush vegetation type, 12 were in a low sagebrush/big sagebrush mix, and 4 were in Wyoming big sagebrush.

Currently, western juniper expansion is affecting sage-grouse nesting habitat as well as migratory routes between lower elevation nesting to early brood-rearing habitats and upper elevation late brood-rearing habitats. Nesting habitat has been reduced because of juniper expansion that has reduced the amount of sagebrush available for nesting. Juniper has expanded into both big and low sagebrush vegetation types. This has probably reduced overall productivity of sage-grouse. This expansion of juniper into nesting habitat has also affected the productivity of nesting hens by providing more perches for predators such as raptors and ravens. Ravens are effective nest predators and use perch trees to spot nests and predate the eggs. Juniper expansion may also be affecting some lek sites by providing raptor perches close to the strutting males which could disrupt breeding occurrence and also reduce the numbers of sage-grouse through predation.

Wolverine are known to exist on Steens Mountain. One individual was trapped in the 1970s and wolverines have been observed several times in the 1990s and in 2000. Their habitat is mostly unknown as they have not been studied on Steens Mountain, but would include talus slopes on the east side of Steens Mountain, in some of the canyons as well as some upper elevation flat areas adjacent to the canyons. A critical component of their habitat seems to be the absence of human activity or development.

Northern goshawks are known to utilize Steens Mountain, but documented occurrences are few. Reynolds, et al., (1982) describe a goshawk nest in an aspen stand at 5,700 feet on the west slope of Steens Mountain. They are usually a forest species but will use dense, large groves of aspen with considerable canopy closure. Many of the lower elevation aspen stands on Steens Mountain have been invaded by junipers and the amount of nest sites has probably been reduced in the last half century. Some of these stands, such as along Big Fir Creek, have had the junipers cut out in the last 15 to 20 years but the density of mature aspen may not be high enough for nesting goshawks. Any aspen stands that are in an area to be treated would need to be surveyed at least one year prior to treatment for the presence of nest sites.

Swainson's hawk may be found in the project area but documentation of nest trees or sightings have not been obtained. These raptors use the juniper woodlands and are known to nest in small trees such as junipers, willow, and possibly in sagebrush. They have been in decline for many years. Some of the factors affecting Swainson's hawk numbers are caused by offsite issues, but some of the decline is possibly due to the change of shrublands to juniper woodlands. They may forage and nest near open grasslands and wet meadows which would include areas near the seedings and Malheur NWR. Sighting location data would be collected and analyzed to determine if and where hawks occur in relation to proposed cuts and burns.

Bighorn sheep habitat occurs mostly on the periphery of the project area and includes steep slopes on the East Rim of Steens Mountain and along Catlow Rim. Most of the habitat is not differentiated into seasonal use, but the animals move up and down in elevation along these rims depending on weather conditions.

Long-billed curlews are mainly a grassland species that nest in many of the crested wheatgrass seedings and native grassland or meadow vegetation types in the area. They also use flooded native hay meadow areas for feeding. They are quite common in the crested wheatgrass seedings near the project area.

Preble's shrew has been found on Steens Mountain in a variety of habitats and is found mainly near streams, wet meadow, and aspen habitats but also in sagebrush-bunchgrass vegetation types near these wet areas. Verts and Carraway (1998) suggest the rarity of specimens of this species may be an artifact of sampling effort.

Eight species of Special Status Species bats are known to inhabit areas in and around the project area. These include the long-eared myotis, long-legged myotis, pallid bat, silver-haired bat, spotted bat, Townsend's big-eared bat, western small-footed myotis, and the Yuma myotis. These bats use a variety of habitats for roosting and foraging. Roosting habitats include crevices in rock cliffs and rimrock, abandoned mines, abandoned structures, and in trees with loose bark such as older cottonwood and old-growth juniper trees. Foraging habitats include open grasslands, shrub-steppe, and in and around trees. Most species will fly some distance from their day roosts to forage for bugs and drink water then will roost for a couple of hours around midnight. They will return to foraging then return to their day roosts. We have very little site-specific information on bats and their foraging or roosting areas within the project area.

Western burrowing owls are found in grassland and shrub-steppe habitats. Burrowing owls in Oregon tend to use burrows for nesting which were previously excavated by badgers. Badgers are a major predator of burrowing owl eggs and young. No burrowing owls have been observed in the project area recently, but nest sites do exist in some of the crested wheatgrass seedings near the project area.

Great Basin redband trout represent a unique natural history reflecting the Pleistocene connection between the lake basins of eastern Oregon and the Snake and Columbia Rivers. Redband trout are able to survive warmer water than most other salmonids and thus are better adapted to their desert environment. The redband trout is widespread throughout the Donner und Blitzen drainage and there are also populations in the Catlow Valley. Populations are considered to be strong. The Steens Act of 2000 designates the Donner und Blitzen River as a redband trout reserve upstream of the confluence with Fish Creek. The purpose of the reserve is to conserve, protect, and enhance the Donner und Blitzen River population of redband trout and the unique ecosystem of plants, fish, and wildlife of a river ecosystem; and to provide opportunities for scientific research, environmental education, and fish and wildlife oriented recreation and access (Steens Act 2000). Great Basin redband trout is a BLM tracking species and is considered sensitive by the USFWS.

The distribution data indicate that the Malheur mottled sculpin is widespread throughout the Donner und Blitzen watershed, including populations in McCoy, Kiger, and Riddle Creeks. The Malheur mottled sculpin is a BLM sensitive species. The preferred habitat of mottled sculpin is clear, cool mountain streams of rapid to moderate current (Sigler and Sigler, 1987).

3.3.9 Special Status Species - Flora

(See Andrews/Steens RMP Map S-6, Special Status Species Plants, on the attached CD.)

Portions of the project area have been surveyed by BLM for the presence or absence of Special Status plant species. A significant population (~10,000 individual plants) of playa Phacelia was discovered in the project area during 2004 surveys and was documented on an Oregon Natural Heritage Program (ONHP) site form. Playa Phacelia is an ONHP list 1 species, a Bureau Sensitive species and a Federal Species of Concern. The habitat for this species is naturally low in fuels and normally has little or no juniper or sagebrush component. Playa Phacelia had not previously been documented on Steens Mountain.

Large portions of the project area currently require botanical surveys. These surveys would be conducted in the appropriate season prior to any project implementation.

Known Special Status plant populations occur in the project area. These known populations represent 17 species which are shown in the table below. Status definitions are located at the end of this section.

Table 3.2. Known Special Status Plant Species in the Project Area (Burns District GIS Database)

Scientific Name	Common Name	Federal Status	BLM Status	ONHP List
Agastache cusickii	Cusick's hyssop	-	A	2
Botrychium crenulatum	crenulate grapefern	SOC	S	1
Botrychium lunaria	Moonwort	-	A	2
Botrychium minganense	gray moonwort	-	T	4
Botrychium pinnatum	pinnate grapefern	-	T	4
Castilleja pilosa v. steenensis	Steens mountain paintbrush	-	S	-
Castilleja viscidula	sticky paintbrush	-	T	3
Claytonia nevadensis	Sierra spring beauty	-	T	4
Cymopterus nivalis	snowline cymopterus	-	A	2
Eriogonum ochrocephalum	ochre-flowered buckwheat	-	T	4
Gentianella tenella s. tenella	slender gentian	-	A	2
Melica stricta	nodding melic	-	A	2
Penstemon davidsonii v. praeteritus	Davidson's penstemon	-	T	4
Phacelia inundata	Playa Phacelia	SOC	S	1
Potamogeton diversifolius	Rafinesque's pondweed	-	A	2
Saxifraga adscendens s. oregonensis	wedge-leaf saxifrage	-	A	2
Sedum debile	weak-stemmed stonecrop	-	T	4

Federal Status:
SOC – Species of Concern

BLM Status:
S = Sensitive – species that could easily become endangered or extinct in a State, are restricted in range and have natural or human-caused threats to survival.
A = Assessment – species not currently eligible for official Federal or State status, but are still of concern and need protection or mitigation.
T = Tracking – species that may become of concern in the future, but more information is needed to determine status for management purposes.

ONHP Status:
L1 – taxa threatened with extinction or presumed to be extinct throughout their range.
L2 – taxa threatened with extirpation or presumed to be extirpated from the State of Oregon.
L3 – taxa of conservation concern that need more information to determine status.
L4 – taxa which are of concern because they are rare and stable or common and declining.

This list could change depending on what species botanical specialists locate during the remaining botanical surveys. The Andrews/Steens PRMP/FEIS contains an expanded list of Special Status plant species at 3-23 to 3-25; not all species from this list are represented in the CMPA.

3.3.10 Wetlands and Riparian Zones and Water Quality

(See Andrews/Steens RMP Map S-1, Hydrographic Subbasins, and Map S-2, Proper Functioning Condition Assessment, on the attached CD.)

The proposed project includes portions of the Malheur, Alvord, and Guano/Harney subbasins. Riparian condition was analyzed at the 6th-field hydrologic unit (HUC) or 6th level subwatershed. There are 16, 6th-level HUCs within the project area.

Analysis of stream condition was based on an assessment of Proper Functioning Condition (PFC) that was evaluated for 76 stream reaches (137.00 miles of stream) between 1998 and 2003. Overall, stream systems and riparian areas are in good condition (Table 1). Ninety-seven stream miles were rated at PFC and 22.00 miles were rated Functioning At Risk (FAR) with an upward trend. Only 16.50 miles or just over 12 percent were rated as FAR with no apparent trend, a downward trend, or as nonfunctioning (Table 2).

Streams in the project area have been evaluated for water quality impairment as directed by the Oregon Department of Environmental Quality (DEQ). A table of impaired streams can be referenced in the Andrews/Steens PRMP/FEIS on Pages 3-5 and 3-6. The majority of the streams in the project area are listed on the State's 303(d) listed for water quality impairment because they exceed the water temperature standard. However, at the time of listing, the temperature standard used to evaluate water quality impairment required was a 7-day average maximum temperature of 64 ºF. The standard has since been changed to a 7-day average maximum temperature of 68º F, reflecting natural conditions in desert areas. The temperature standard is linked in part to biological requirements of redband trout that occur in these systems. Redband trout have evolved to persist in warmer waters than other trout species. For example, redband trout in the Owyhee system have been observed feeding at water temperatures of 82.9º F (Zoellick, 1999).

No other pollutants were documented in the streams within the project area. Macroinvertebrate data have been collected across the District for 14 years between 1980 and 2001. Streams included in the sampling and within the project area include Donner und Blitzen River at Page Springs, Donner und Blitzen River upstream of confluence with Little Blitzen River, Little Blitzen River, Deep, Fish, Home, Indian, and Threemile Creeks. Most of the macroinvertebrate species that were identified are indicative of slightly enriched water.

Below are brief descriptions of the current conditions of 6th level subwatersheds within the project area.

Alvord Lake 6th Field HUC

The only streams in this subwatershed that are within the project area are Little Wildhorse and Wildhorse Creeks. Over 7.00 miles of stream were surveyed in two reaches. Both reaches were at PFC and most of the drainage is included in the no livestock grazing area. This stream system supports a population of introduced Lahontan cutthroat trout. Because these Lahontan cutthroat trout are introduced and not native, they have no special management status. Both streams do not meet the water quality standard for temperature. Based on the facts that these two streams are managed as wilderness and are permanently excluded from livestock grazing; both streams support an introduced hatchery strain of Lahontan cutthroat trout, and the 2004 Oregon Administrative Rules (OAR 340-341, Table 190B) do not identify these streams under the beneficial use designation for fish, they are a low priority for monitoring and restoration (Alvord Lake WQRP, 2005).

Ankle Creek 6th Field HUC

Most of Ankle Creek flows across BLM-managed lands. Riparian conditions were determined to be FAR with an upward trend in three reaches surveyed and at PFC in the headwater reach. The FAR rating was based on low numbers of woody riparian species, lack of sedges, and small headcuts. Ankle Creek was listed by the State as impaired due to temperature; however, the stream does not exceed the new standard established by DEQ.

Bridge Creek 6th Field HUC

In this subwatershed data were collected from Bridge Creek and Little Bridge Creek. Bridge Creek was surveyed for 2.20 miles and rated at PFC. Little Bridge Creek was surveyed in two areas. One reach was FAR due to juniper encroachment and lack of woody riparian species while the other was at PFC. Bridge Creek is meeting the new temperature standard established by DEQ. There are no temperature data for Little Bridge Creek.

Cucamonga Creek 6th Field HUC

Most of this subwatershed is under private ownership and management. The PFC data were collected for three reaches on Cucamonga Creek. Two reaches were at PFC with the third identified as FAR with a downward trend. This rating is due to juniper encroachment into the riparian area, lack of recruitment of riparian species, and a deeply incised channel.

Deep Creek 6th Field HUC

The headwaters of Deep Creek and the South Fork Donner und Blitzen River are located on private ground. Data were collected from each system on BLM lands. One reach was completed on Deep Creek and determined to be FAR with an upward trend. It was graded as FAR due to effects from beaver dam failures and juniper encroachment into riparian areas. Deep Creek is exceeding the standard for temperature. The 7-day average maximum temperature for Deep Creek was 71.6 ºF.

The South Fork Donner und Blitzen River flows through lands managed by BLM and through private lands. Five reaches were surveyed, of which three were on BLM-managed land. Two reaches were PFC while one was determined to be FAR with an upward trend. Junipers were identified as needing treatment in all three reaches. Temperature data collected by BLM indicate temperatures exceed the DEQ standard.

Conditions on the South Fork are meeting management objectives identified in a water quality management plan completed in 1996 (Lampman, 1996). The plan identified a need for juniper to be reduced to historic fire regime levels by 2010. The North Steens Project will move the South Fork area toward meeting the 1996 water quality management plan.

Dry Creek 6th Field HUC

Four reaches on Cold Springs Creek and two reaches on Squaw Creek were surveyed. Two reaches of the lower Donner und Blitzen River (upstream from Page Springs to the confluence of the Little Blitzen River) and some data from tributaries within the reach are included in the subwatershed description.

Cold Springs Creek is a small stream that has intermittent flows. No temperature data have been collected. Of the four reaches surveyed, only one is at PFC. Two are FAR with an upward trend on one and no apparent trend on the other. The fourth reach is nonfunctional (NF) due to a meadow in extremely poor condition as it is not functioning relative to hydrology, vegetation, and erosion. In addition there is no natural sinuosity and upland vegetation is present.

Squaw Creek is a small stream with little water flow. The area does not have a well-developed composition of riparian species. No temperature data have been collected from this stream. The area needs to be reassessed to determine the current trend. One reach was at PFC and the other was FAR with no apparent trend. The reach was rated at FAR due to grazing effects, excessive erosion, and juniper encroachment.

The first reach of the Donner und Blitzen River above Page Springs was rated at FAR with an upward trend. It received the FAR rating due to high levels of sediment; however, it may be due to a change in stream morphology going from a higher gradient flushing system to a lower gradient depositional system. The other surveyed reach on the Donner und Blitzen was at PFC as were the tributaries that were surveyed. This section of river does not meet the temperature standard.

Fish Creek 6th Field HUC
Data were collected from Fish, Little Fish, and Grove Creeks. The headwaters of Little Fish and Grove Creeks are within the no livestock grazing area of Steens Mountain Wilderness. The Fish Creek survey covered 6.50 miles of stream. This section was at PFC and in great condition. Grove Creek was surveyed in two different areas, and conditions were not good in this system. One reach was FAR with a downward trend and the other was NF. These ratings were given due to heavy cattle use, bank erosion, and channel conditions. Little Fish Creek also had two reaches evaluated. One was determined to be at PFC and the other was NF due to cattle use, bank erosion, and high levels of sediment.

Home Creek 6th Field HUC
Three reaches were surveyed on Home Creek. A great portion of this stream flows through privately owned land. Reach 1 was determined to be at PFC with some juniper encroachment. The BLM portions of Reaches 2 and 3 were rated as FAR with an upward trend due to noticeable vegetation growth. Home Creek exceeds the DEQ standard for temperature.

Indian Creek 6th Field HUC
Data in this subwatershed have been collected from Big Indian, Indian, and Little Indian Creeks. All surveyed riparian areas were in very good condition and all reaches in this system were at PFC. This entire subwatershed is within the no livestock grazing area. Big Indian Creek is identified by DEQ as not meeting the temperature standard; however, it only exceeded the standard by 0.4 ºF based on DEQ data. The BLM has monitored Big Indian Creek for seven years and it never exceeded the standard. Data collected by DEQ show Indian Creek exceeded the temperature standard 1 of 2 years data were collected. Data collected over a 9-year period at the mouth of Indian Creek by BLM indicate the standard for temperature was exceeded during six of the years. Temperatures in Little Indian Creek were well below the DEQ standard.

Kiger Creek 6th Field HUC
The headwaters of Kiger Creek are located at the head of Kiger Gorge within Steens Mountain Wilderness. Once out of wilderness, Kiger Creek flows across a mixture of private and public lands. Results from PFC evaluation completed in Kiger Creek show the riparian area was in good condition. All four sampled reaches were at PFC; however, it was noted in two reaches the vegetative component was in an undesirable trend. There are no temperature data, but this information would be collected during the 2005 and 2006 field seasons.

The East Ridge Prescribed Burns and Juniper Cutting Project has been ongoing for the last 2 years in the Kiger Creek drainage. Fire was allowed to burn through riparian areas. In some project units, juniper growing within riparian areas was cut and burned when conditions were conducive to lower intensity burns less likely to have long-term negative effects. During a field visit on March 16, 2005, several young cottonwood trees, willow, and alder were seen throughout the treated areas. Some juniper were felled into the stream and provide cover and increased habitat complexity for fish.

Krumbo Creek 6th Field HUC
Data within this watershed were collected from four reaches of Krumbo Creek. Two reaches were rated at PFC. Reach 2 was identified as FAR with no apparent trend and the fourth reach was determined to be FAR with a downward trend. Reach 2 was lacking woody species and there was little recruitment seen while Reach 4 had an active headcut, and an undesirable composition of vegetation. No temperature data have been collected in Krumbo Creek.

Little Blitzen River 6th Field HUC
Little Blitzen River is located in Steens Mountain Wilderness. The entire 14.00 miles surveyed were at PFC. Water temperatures in this system do not meet the DEQ standard

McCoy Creek 6th Field HUC
Several reaches worth of data were collected on McCoy Creek. Ratings of PFC and FAR were determined throughout the stream system. Reasons for the FAR rating include high width/depth ratios, sagebrush encroachment, little recruitment of woody species, and grazing effects. No temperature data have been collected in McCoy Creek.

Data have also been collected from Dingle Creek, a tributary to McCoy Creek. Dingle Creek flows through private and BLM-managed lands. Three reaches were surveyed on BLM-administered lands, two are at PFC and one is FAR with a downward trend. The FAR rating is due to raw banks, low density of riparian species, and lack of a flood plain. There are no temperature data for Dingle Creek.

Mud Creek 6th Field HUC
This subwatershed is located upstream of the confluence of Donner und Blitzen River and Indian Creek. This subwatershed contains portions of Ankle Creek and South Fork Donner und Blitzen River, which have already been described in Ankle and Deep Creek subwatersheds discussion. Three reaches of Mud Creek have been surveyed. Two were rated at PFC and one at FAR with an upward trend. It was noted in Reach 1 that juniper were encroaching. Reach 2 rated at FAR because the stream channel was not in balance with the landscape setting. Mud Creek exceeds the DEQ standard for water temperature.

Mud Creek 6th Field HUC
This subwatershed is located downstream of Page Springs Campground. Surveys within this subwatershed were completed on Big Fir, Little Fir, and Mud Creeks. One reach of Big Fir Creek was surveyed and rated as FAR with an upward trend due to bank instability, lack of herbaceous vegetation, and excess sediment. The upward trend was based on good densities of desired woody species. Little Fir Creek was determined to be PFC in the two reaches surveyed. There are no temperature data for Big Fir or Little Fir Creeks. Two reaches were also surveyed on Mud Creek and both were at PFC. Water temperature in Mud Creek exceeds the DEQ standard.

Threemile Creek 6th Field HUC
Much of Threemile Creek flows through private lands before crossing onto BLM-managed lands. Both reaches evaluated on Threemile Creek were at PFC. In Reach 1 the channel was noted to be stable with good coverage of willows. Reach 2 was completed in an area where the stream was intermittent. No signs of excessive erosion were noted. Based on data from 1997 through 2004, this stream meets the temperature standard of a 7-day maximum average temperature of 68 ºF.

Table 3.3. PFC Assessment for Streams within the Project Area. Data Collected During 1998 – 2003

Rating/Trend	Miles	Percent	Number of Reaches Surveyed
PFC[1]	98	72	47
FAR[2]/Upward	22	16	12
FAR[2]/Downward	4	3	6
FAR[2]/Not apparent	11	8	8
Nonfunctioning	2	1	3
Totals	**137**	**100**	**76**

1 – Properly functioning condition
2 – Functioning at risk

3.3.11 Wild and Scenic Rivers

(See Steens Mountain Wilderness and WSRs Plan Map W3, Wild and Scenic Rivers Management Plan, on the attached CD.)

Outstandingly Remarkable Values:

The Donner und Blitzen WSR was designated as "Wild" in 1984. Segments of the WSR include Fish Creek, Little Blitzen River, Big Indian Creek, Little Indian Creek, South Fork Donner und Blitzen, and the Donner und Blitzen. ORVs associated with this WSR are scenic, geologic, recreational, fisheries habitat, wildlife, vegetation, and cultural (historic and pre-historic).

In 2000, Congress added Mud Creek, Ankle Creek, and South Fork Ankle Creek to the Donner und Blitzen WSR through the Steens Act. Kiger Creek WSR and Wildhorse Creek WSR, including Little Wildhorse Creek, were also designated as "Wild" rivers. The ORVs for these systems include scenic, recreational, wildlife, botanical, and fish. The ORVs for all three WSR systems in the project area are described in detail in Steens Mountain Wilderness and WSRs Management Plan under “Outstandingly Remarkable Values.”

3.3.12 Wilderness

(See Steens Mountain Wilderness and WSRs Plan Map W2, Wilderness Management Plan, on the attached CD.)

The following project areas exist in part or in total in Steens Mountain Wilderness or WSR corridors as North Steens Project Units (see the beginning of Chapter 3):

Project Unit	Total Acres	Total BLM Administered Acres	Steens Mountain Wilderness Acres
Ankle Creek	16,336	14,346	14,346
Cold Spring	29,770	29,031	28,835
Fish Creek	6,782	6,768	6,741
Gorges	10,456	10,456	10,353
Home Creek	20,782	20,706	20,705
Kiger Creek	5,037	5,036	5,021
Ranch	1,171	1,171	none
Road #2	3,434	3,434	2,007
South Mud Creek	15,048	14,842	14,756
Wildhorse	2,420	2,420	2,420
Total	**111,236**	**108,210**	**105,184**

Total acres in project area in Steens Mountain Wilderness and WSRs: 105,184

Wilderness Values:

Naturalness - Naturalness refers to an area which "generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable” as stated in BLM Manual 8560 - Management of Designated Wilderness. Steens Mountain Wilderness is generally considered to be in a natural condition except for areas containing certain human-made elements. These features are generally not noticeable except when viewed from higher terrain or in the immediate vicinity.

The portions of the 170,155-acre Steens Mountain Wilderness that would be affected by the proposed project are generally in a natural condition. Of the proposed project area 105,184 acres lie within nine project units in the Wilderness. The affected portion of the Wilderness lies within the Frazier Field (Fish Creek and Road #2 Project Units) and South Steens (Home Creek Project Unit) livestock grazing allotments and the designated No Livestock Grazing Area. The area involved includes certain unnatural features scattered throughout the area. These features include, but are not limited to, fences, troughs, reservoirs, and other facilities associated with livestock grazing. A number of older buildings and structures also exist in the proposed project area which may be of some historic significance.

Native vegetation within the wilderness area has been affected by a significant expansion in the stocking levels of western juniper, due principally to past fire exclusion. Juniper woodlands totaling 45,000 acres presently exist within Steens Mountain Wilderness. Approximately 10 percent of those woodlands include large-dimension, old-growth junipers scattered throughout the area with the remaining 90 percent having increased in area of occupancy since 1870.

Numerous juniper treatments, consisting of cuts and prescribed fires, exist in the proposed project area within Steens Mountain Wilderness. These vegetative treatments occurred in the area from the mid-1990s through 2001. Proposed project units within the Wilderness which were affected include: 1) Cold Spring Project Unit with three large juniper cuts dating from the mid-1990s; 2) South Mud Creek Project Unit with prescribed fires in 1997 and juniper cuts in 1999; 3) Ankle Creek Project Unit with prescribed fires in 1999 and 2001 (this an unanticipated fire effect from a burn initiated in the Skull Creek drainage); and 4) Home Creek Project Unit with prescribed fires in 1997 and 2001 (also an unanticipated fire effect from a burn initiated in the V Lake area).

It is unknown if juniper treatments impaired any of the wilderness values of naturalness, solitude, and primitive and unconfined recreation as the area was not designated as Wilderness at the time. These actions were not monitored for such effects. Congress did not consider itself impaired in its ability to designate the formerly cut and fire treated areas of WSA as Wilderness.

Solitude - Outstanding opportunities for solitude are enhanced by the varied and rugged topography. Vegetative screening in some areas, especially the creek and canyon bottoms, supplements the topographic screening. In wilderness there is an expectation that encounters with other users would be infrequent. Refer to the Steens Mountain Wilderness and WSRs Plan.

Primitive and Unconfined Recreation - Primitive and unconfined recreation is defined in 43 Code of Federal Regulations (CFR) 6301.5 as nonmotorized types of outdoor recreation activities that do not require developed facilities or mechanical transport.

There are outstanding opportunities throughout Steens Mountain Wilderness for primitive and unconfined recreation including hiking, backpacking, camping, horseback riding, hunting, fishing, photography, and sightseeing.

Numerous nonmotorized recreation trails exist in the project area within the Wilderness. These trails include the High Desert National Recreation Trail, the Wildhorse Lake Trail, the Steens Summit Trail, the Nye Trail, the Little Blitzen Trail, the Big Indian Trail, the Mud/Ankle Creek Trail, and the Blitzen River Trail.

Supplemental Values - Supplemental values are listed in the Wilderness Act as "ecological, geological, or other features of scientific, educational, scenic, or historical value." Supplemental values of the Wilderness are geology, scenery, vegetation, and wildlife. Historical values, including the remains of old homesteads, can be found at various locations throughout the Wilderness.

The Debate about Wilderness Fire Management:

"I must confess that it seems to me academic to talk about maintaining the balance of nature. The balance of nature in any strict sense has been upset long ago, and there is no such thing to maintain. The only option we have is to create a new balance objectively determined upon for each area in accordance with the intended use of that area." - Aldo Leopold (1927)

For many years it is been widely determined and accepted that wildland fire use in fire-adapted ecosystems is not only beneficial, but necessary for healthy, functioning natural systems. The debate now focuses on the use and application of fire in designated wilderness areas. The debate centers not on the issue of the benefits of fire but how to allow fire to come back into play in those areas where fire suppression efforts of the 20th century have altered the natural cycle of fire and the associated habitats.

Should fire in wilderness only be allowed through natural (lightning-caused) ignitions to bring the system back to stability? Or in areas where natural systems are seriously out-of-balance due to decades of fire suppression should fire be brought back by management-ignited (agency personnel) prescribed fire. The question also remains as to whether or not some type of physical manipulation, such as creating ladder fuels, would be needed in areas where unnatural fuel systems have also been created.

The 1964 Wilderness Act gives no clear or concise direction on this issue and the subject is open to interpretation. BLM policy allows for the use of both natural and management ignited fires. BLM Manual 8560 allows for the use of prescribed fire for the following purposes: 1.) It is needed to maintain the natural condition of a fire-dependent ecosystem or to reintroduce fire where past strict wildfire control measures have interfered with natural ecological processes; 2) A primary value of a given wilderness would be sustained as a result of the burning; and 3) It would promote the perpetuation of a threatened or endangered species.

Peter Landres, Carol Miller, and David Parsons of the USDA Forest Service Aldo Leopold Wilderness Research Institute deal directly with this issue in their 2003 paper, *Fire Use: The Dilemma of Managing and Restoring Natural Fire and Fuels in United States Wilderness*. Under the paper's section entitled "The Dilemma of Natural Fire in Wilderness" they have spoken to heart of this ongoing debate:

"The management and restoration of natural fire and fuels in wilderness pose a dilemma – a situation requiring a choice between equally undesirable alternatives. The dilemma stems from the need, in some situations, to choose between two different core values of wilderness – wildness and naturalness – where this choice of one value will likely lead to the reduction or loss of the other value. This choice between wildness and naturalness … parallels the well-documented debate about whether forest and fire restoration in national parks should be guided by process- or structure-driven philosophies …. The outcomes will differ depending on the choices made."

"Whether or not, values and philosophical views ultimately drive the choices made in managing or restoring natural fire and fuels in wilderness. The 1964 Wilderness Act protects both ecological and social values in wilderness. Ecological values include the natural conditions native to an area – the mixture of young and old forests, animals, plants, soil microbes and fungi – as well as ecological processes such as fire, disease, wind storms, and landslides; and the evolutionary processes. In short, "naturalness" is a core value of wilderness representing conditions that are relatively unaffected by modern people …. Social values include the aesthetic, recreational, spiritual, and therapeutic benefits of solitude in undeveloped natural areas. One of the most important and enduring social values of wilderness is its being "untrammeled" and unmanipulated by people and their desires – its 'wildness'."

"Although wilderness is managed for the twin values of naturalness and wildness, in some cases managing for one may compromise the other …. When the Wilderness Act was written, these core values were undoubtedly meant to reinforce on another. Recent recognition of the large-scale effects of acid deposition, exotic species, and fire suppression has lead to a call for restoring native ecological conditions in wilderness…. In some cases restoration plans include intensive actions, such as the mechanical reduction of fuels accumulated over the decades of fire suppression …. This manipulation, even for the purpose of restoring native ecological conditions, is viewed by some as a control of wilderness that abrogates the untrammeled and wild legislative intent of the Wilderness Act (Nickas, 1998). The decision of whether wilderness ecosystems should be manipulated toward naturalness or left wild may be one of the major wilderness management dilemmas of the 21st century…."

"How we weigh the values of naturalness and wildness strongly impacts how we manage fire and fuels in wilderness. For example, if we choose to emphasize the maintenance or restoration of naturalness we would likely favor active management of fire and fuels through prescribed burning and mechanical fuel reduction to maintain species compositions, spatial and temporal patterns of fuels and forest structure and ecological processes native to the area. Although the sheer magnitude of the effort to overcome the effects of fire suppression makes if difficult to attain the goal of natural conditions in many areas, naturalness, to the extent it can be satisfactorily quantified, can provide a useful target for management."

"If we choose favor wildness as the primary wilderness value we would strive to allow all natural ignitions to burn without human intervention, control, or manipulation; prescribed fire and other manipulative tools to create desirable conditions would not be used. The goal of wilderness is rarely attained in today's world because risks to non-wilderness values, such as the threat of fire crossing into non-wilderness lands, result in the suppression of many, if not most, natural fires. Although wildness remains an important social value and management goal in wilderness, managing for wildness may compromise naturalness by allowing un-naturally large and intense fires to burn following decades of fuel accumulation from active fire suppression. The goal of wilderness management should be to optimize both naturalness and wildness. This two-fold goal may be most easily accomplished in those areas where fire suppression has had minimal effect. For example, at higher elevations, natural ignitions may often be allowed to burn because the current fire return interval and fuel conditions are within the historic range of variability. Examples of where such programs have experienced some success include the Selway-Bitterroot Wilderness in Montana, and Yosemite and Sequoia-Kings Canyon wildernesses in California…."

"In other places, where fire return intervals and fuels are clearly well beyond the historic range of historic variability, we must often confront the dilemma of whether to manage primarily for naturalness or wildness. In these situations there are several challenges to crafting an effective FMP that explicitly acknowledges and optimizes both the naturalness and wildness values of wilderness."

In *Natural Resources 3495*, an internet-based wilderness management class offered by the University of Montana, under the "Prescribed Fire in Wilderness" segment, author Laurie Yung also addresses the issue of trammeling with regards to prescribed fire use in wilderness as follows:

"While restoration of *naturalness or natural conditions* is often the stated goal of manager-ignited fires, the Wilderness Act also requires that wilderness be *untrammeled*. According to Worf [President and Founder of Wilderness Watch] *untrammeled* means that 'you don't control it, you don't net it. You let nature's processes go wherever you can.' There is clear agreement that past fire suppression represents trammeling of the wilderness. According to Arno [Research Forester, Intermountain Fire Sciences Lab, Missoula, MT] a mixed-severity fire region is 'absolutely incredible for biodiversity,' and taking it away is trammeling, 'a much greater trammeling than most other things you can do in wilderness.' Morton [Wilderness Coordinator, Northern Region, US Forest Service] also agrees that suppression of fire has been a form of trammeling."

"Nickas [George, Executive Director, Wilderness Watch] and Morton agree that manager-ignited fire also constitutes a trammeling. Morton claims that they are trammeling to restore naturalness. Eckert [District Ranger, Spotted Bear Ranger District, Flathead National Forest] calls this the 'double trammel' and considers it the crux of the issue. Do we trammel wilderness again to reduce the effects of previous trammeling? For Morton 'natural and untrammeled are 180 degrees apart,' meaning they are in conflict with one another regarding the issue of fire. Another trammel is required, in Morton's view, to make wilderness natural again."

A final word on the issue of prescribed fire use in wilderness from Carol Eckert, "the issue is more philosophical than scientific because we are dealing with a wilderness area. No amount of data is going to change how people feel about wilderness and whether they think that more aggressive management is right (Yung, L.)"

3.3.13 Wilderness Study Areas

(See Andrews/Steens RMP Map S-18, Special Areas, on the attached CD.)

All or portions of Bridge Creek, Blitzen River, South Fork Donner und Blitzen River, Home Creek, High Steens, and Lower Stonehouse WSAs, totaling 79,607 acres, are within the project area. The following table details the WSA acreages for those project units with WSAs.

Table 3.4. Wilderness Study Area Acres within Proposed Project Units (Burns District GIS Database)

Unit	Bridge Creek	Blitzen River	S. Fork D&B*	Home Creek	High Steens	Lower Stonehouse
Bridge Creek #3	23					
Brown					1,113	
Cold Spring		33				
Cucamonga Creek					614	
Dingle					2,342	
Drake					107	139
Kiger Creek					10	
Krumbo Mountain #2	1,980					
Krumbo Ridge #1	1,271					
Kundert		3,122				
Lower Field #1	2,857					
North Mud Creek	1,117					
P. Hill		2,986				
Road #2	1,352					
Scharff					1,565	
Solomon		3,325				
South Steens		17,351	27,969	1,165		
Upper Field #2	4,152					
West Lower River #6		1,996				
West Upper River #5		3,019				
WSA Total	**12,752**	**31,832**	**27,969**	**1,165**	**5,751**	**139**

*D&B = Donner und Blitzen

Wilderness characteristics include naturalness, outstanding opportunities for solitude or primitive and unconfined recreation, and the presence of special features. They are further described in Section 2(c) of The Wilderness Act of 1964 and BLM Manual Handbook H-8550-1 – Interim Management Policy for Lands Under Wilderness Review (1995).

Wilderness characteristics of Bridge Creek WSA (14,325 acres) are summarized from the Oregon BLM Wilderness Study Report, Volume I (1991).

Naturalness: Bridge Creek WSA is in a relatively natural condition. The topography creates magnificent areas of naturalness. The steep canyons, rolling hills, and vegetative screening enhance the sense of naturalness. The WSA provides habitats for wildlife species, including mule deer, pronghorn antelope, elk, a variety of raptors and songbirds, and small mammals. Riparian habitat along 12.80 miles of Mud and Bridge Creeks varies in condition from good to fair to poor. The WSA contains 32 unnatural features: 21 reservoirs, 4 fences totaling 6.00 miles, 6 ways totaling 7.00 miles, and one crested wheatgrass seeding of about 1,200 acres. The reservoirs are scattered, generally small, located in drainages, or are surrounded by vegetation. The visual influence of the ways is slight because they are located in sagebrush-covered, relatively flat areas or are screened by juniper trees. Most of these fences are screened by junipers and are not a visual influence on any portion of the WSA. The Steens Mountain Loop Road is the primary outside influence on the WSA. The road receives heavy motor vehicle use during the summer and its size and level of improvement make it visible from a large portion of the WSA.

Solitude: Opportunities for solitude in Bridge Creek WSA are outstanding. Topographic and vegetative screening, as well as the size of the study area, provide areas where visitors can find a secluded spot. Bridge Creek and Mud Creek canyons and their tributaries provide topographic screening both within the canyons and from the remainder of the WSA. Moderate to dense juniper stands in the eastern half of the WSA enhance solitude. Riparian vegetation along the major drainages further enhances solitude. The western portion of the WSA, with only occasional junipers, offers little screening.

Primitive and Unconfined Recreation: Bridge Creek WSA provides outstanding opportunities for primitive recreation, including day hiking, camping, backpacking, horseback riding, hunting, and fishing. Opportunities for day hiking, fishing, backpacking, camping, and horseback riding are mainly associated with Bridge Creek and Mud Creek. Opportunities for big game and upland game bird hunting are good where there is adequate habitat and cover. Fishing opportunities are good in the creeks.

Special Features: Special features of Bridge Creek WSA include wildlife, cultural resources, and scenic features. The WSA contains crucial mule deer winter range, high-quality raptor nesting habitat, redband trout (a native fish with limited range), and a greater sage-grouse strutting ground. Greater sage-grouse is a BLM Special Status Species. The scenery is good because of the deep, winding, and narrow canyons, a variety of colors (reds, brown, tans, and greens), rugged rock outcroppings, and clear streams in the canyon bottoms accented by green riparian vegetation. Significant cultural resources have been also found in the WSA.

Blitzen River WSA was reduced to 31,902 acres from 55,880 acres with designation of Steens Mountain Wilderness. Wilderness characteristics of Blitzen River WSA are summarized from the Oregon BLM Wilderness Study Report, Volume I (1991).

Naturalness: Blitzen River WSA is in a relatively natural condition. The WSA contains a variety of wildlife habitats with a diversity of animals. There are currently 48 unnatural features: 16 reservoirs, 1 developed spring, 14 fences totaling 24.50 miles, and 17 ways totaling 27.00 miles. (The number of unnatural features has been adjusted to reflect new structures in the WSA and changes resulting from designation of wilderness.) Many of the developments and ways are visible from the higher elevations around them. These fences are generally screened by topography or vegetation. Outside influences include several small reservoirs along the west boundary, Page Springs Campground, and a power line along the northwest boundary.

Solitude: Blitzen River WSA has outstanding opportunities for solitude. The area contains a substantial amount of topographic and vegetative screening. There are small portions of the WSA, mostly near the western border, where finding seclusion would be difficult because of the area’s lack of topographic or vegetative screening.

Primitive and Unconfined Recreation: Blitzen River WSA provides outstanding opportunities for primitive recreation. Recreation activities include day hiking, backpacking, camping, horseback riding, hunting, wildlife viewing, sightseeing, and photography. Game species include mule deer, pronghorn antelope, elk, and chukar.

Special Features: Special features of Blitzen River WSA are scenic quality and wildlife. The topography of the WSA offers spectacular scenery of ridges covered by juniper and sagebrush, intermixed with outcroppings of dark basalt rock. Special wildlife features include a greater sage-grouse strutting ground and mule deer winter range. Greater sage-grouse is a BLM Special Status Species.

South Fork Donner und Blitzen River WSA was reduced to 27,969 acres from 37,555 acres with designation of Steens Mountain Wilderness. Wilderness characteristics of South Fork Donner und Blitzen River WSA are summarized from Volume I of the Oregon BLM Wilderness Study Report (1991).

Naturalness: South Fork Donner und Blitzen River WSA is in a relatively natural condition. Juniper and low sagebrush are the dominant vegetation. The WSA provides habitat for a variety of big game, upland game birds, and other wildlife species. The WSA contains 33 unnatural features: 17 reservoirs, 11 ways totaling 28.00 miles, 4 fences totaling approximately 9.00 miles, and an old abandoned habitation. (The number of unnatural features has been adjusted to reflect new structures in the WSA and changes resulting from the designation of wilderness.)

Solitude: Opportunities for solitude in South Fork Donner und Blitzen River WSA are outstanding. The WSA's size, numerous shallow drainages, deeper river tributaries, and juniper trees enhance the opportunities for a visitor to find seclusion.

Primitive and Unconfined Recreation: South Fork Donner und Blitzen River WSA has outstanding opportunities for primitive recreation. Day hiking, backpacking, camping, and horseback riding opportunities are available. Water and camping spots are available throughout the WSA. Game species in the WSA include mule deer, pronghorn antelope, elk, and upland game birds.

Special Features: A greater sage-grouse strutting area is located in South Fork Donner und Blitzen River WSA. Greater sage-grouse is a BLM Special Status Species.

Home Creek WSA was reduced to 1,165 acres from 26,590 acres with designation of Steens Mountain Wilderness. Wilderness characteristics of Home Creek WSA are summarized from Volume I of the Oregon BLM Wilderness Study Report (1991).

Naturalness: Home Creek WSA is in a natural condition. The WSA has good populations of pronghorn antelope and provides habitat for a variety of nongame species. There are five reservoirs and one, 1.00-mile long segment of creek in the 1,165-acre WSA.

Solitude: Opportunities for solitude in Home Creek WSA are outstanding. These opportunities are enhanced by vegetative screening and the remoteness of the Home Creek WSA.

Primitive and Unconfined Recreation: Home Creek WSA offers outstanding opportunities for hunting, wildlife viewing, camping, and horseback riding. Game species include mule deer, pronghorn antelope, and chukar.

Special Features: The identified special features of wildlife, geology, and scenery for Home Creek WSA are now in Steens Mountain Wilderness.

High Steens WSA was reduced to 13,965 acres from 69,740 acres with designation of Steens Mountain Wilderness. Segments of the WSA are located north of the Steens Loop Road and along the lower east face of Steens Mountain. Wilderness characteristics of High Steens WSA are summarized from Volume I of the Oregon BLM Wilderness Study Report (1991).

Naturalness: High Steens WSA appears to be in outstanding natural condition. This WSA contains a variety of physical features which are the result of volcanism, faulting, and erosional processes. High Steens WSA has as good variety of wildlife habitat and diverse fauna. Talus slopes, ponds, and trees and high elevation fescue grasslands are special wildlife habitats. The WSA contains summer and crucial mule deer habitat, summer and yearlong pronghorn antelope range, and elk summer habitat. Riparian areas support beaver, a variety of songbirds, reptiles, and amphibians. The WSA supports habitat for upland game birds, summering raptors, and small mammals. None of the unnatural features are very noticeable. There are 3 ways totaling 5.30 miles, 8 fences totaling 6.90 miles, 2 fire rehabilitation seedings totaling 177 acres, and several locations of mining activity which include three cabins. (The number of unnatural features has been adjusted to reflect new features in the WSA and changes resulting from designation of wilderness.) Rough topography reduces the influence of these developments on the area's naturalness. Outside sights and sounds are not imposing and emanate from the boundary roads and the light traffic on them.

Solitude: High Steens WSA offers outstanding opportunities for solitude. These opportunities are enhanced by the varied and rugged topography. The extreme difference in elevations is the major screening factor. The drainages provide excellent opportunities for isolation. The eastern portions are completely screened from the northern segments. Vegetative screening also provides some opportunities for solitude. Aspens, willows, and other riparian species in the drainages provide screening. However, the WSA as a whole does not contain enough vegetation to significantly enhance opportunities for solitude.

Primitive and Unconfined Recreation: Opportunities for primitive and unconfined recreation in High Steens WSA are outstanding. The primitive recreation activities include day hiking, backpacking, camping, horseback riding, hunting, fishing, sightseeing, and photography. Game species which can be hunted in the WSA include mule deer, pronghorn antelope, bighorn sheep, elk, and upland game birds.

Fishing opportunities are outstanding, especially in McCoy Creek and its tributaries. Sightseeing and photographic opportunities abound with vistas of Beaty Butte and Hart Mountain to the west, the Pueblo Mountains to the south, and the Alvord Basin, Sheepshead Mountains, and Trout Creek Mountains to the east. The rugged and sheer rock escarpments create fascinating views.

Special Features: The special features of High Steens WSA substantially enhance the area's wilderness values. Geology, vegetation, wildlife, and scenic qualities are special features. The geology of Steens Mountain is the dominant special feature. Steens Mountain is a fault-block mountain that dips gently westward and reaches a maximum elevation of 9,773 feet, with a 5,500 fault scarp on the east. Scenic quality is a special feature of the WSA. Most of High Steens WSA contains outstanding scenery. Five plant species of special interest are known to occur in High Steens WSA. Bighorn sheep, greater sage-grouse, Whitehorse cutthroat trout, redband trout, pika, and northern water shrew contribute to making wildlife a special feature. Additionally, Steens Mountain is an important raptor foraging area.

Wilderness characteristics of Lower Stonehouse WSA (7,449 acres) are summarized from Volume I of the Oregon BLM Wilderness Study Report (1991).

Naturalness: Lower Stonehouse WSA is in a relatively natural condition. The eastern escarpment and the high plateau on the western side of the WSA provide an area with a high degree of naturalness. This east-facing escarpment is highly scenic and combines a variety of landforms, color, and vegetation. Habitat for a variety of big game, upland game birds, and other wildlife species occurs in the WSA. The WSA contains 7 unnatural features: 3 reservoirs, a fence 1.25 miles long, 2 ways totaling 1.75 miles and an old 780-acre crested wheatgrass seeding.

Solitude: Opportunities for solitude in Lower Stonehouse WSA are outstanding. Both topography and vegetation provide screening, but the area would support only a limited number of users. Areas with the greatest potential for solitude are in the drainages of the east-facing escarpment and a few places on the ridgetop where shallow drainages and small hills provide some screening. Other portions of the WSA provide insufficient topographic screening to enhance solitude. Juniper stands and a few aspen groves offer some vegetative screening. This screening enhances solitude in the WSA.

Primitive and Unconfined Recreation: Lower Stonehouse WSA has outstanding opportunities for primitive recreation, but they are somewhat limited by the size and topography of the WSA. Hunting, day hiking, backpacking, camping, and sightseeing opportunities are available. Day hiking, backpacking, and camping are limited. Game species in the WSA include mule deer, antelope, elk, and chukar. The east rim of Steens Mountain provides spectacular views of the surrounding area including the Alvord Basin and Sheepshead Mountains. The most attractive feature within the WSA is the impressive east-facing escarpment.

Special Features: Scenic quality and botanical and wildlife values add to Lower Stonehouse WSA's wilderness values. The east-facing escarpment is highly scenic and combines a variety of landforms, colors, and vegetation. Biddle’s lupine, a BLM Special Status Species, occurs at the lower elevations. Greater sage-grouse are found at the upper elevations. Crucial mule deer winter range is found on the lower east-side slopes.

3.4 Noncritical Elements

The following three elements of the human environment are not known to be present in the project area or affected in any way by implementation of the proposal. Descriptions of these elements can be found in the Andrews/Steens PRMP/FEIS and are incorporated by reference in this document. These elements will not be discussed further in this document. The elements are Lands and Realty, Minerals, and Reclamation.

Descriptions and effects discussions of the following noncritical elements of the human environment are contained in the Andrews/Steens PRMP/FEIS and are herein incorporated into this document by reference. Project specific descriptions are contained in the following text.

3.4.1 Biological Soil Crusts

Biological soil crust data specific to the northern Great Basin has been lacking in the past. Research conducted by Ponzetti and McCune in 2001 provides insight concerning biological soil crust communities in the Andrews RA. New monitoring studies are currently in their first year of baseline data collection. Information from these studies could be utilized to inform future management actions.

Factors influencing distribution of biological soil crusts (Technical Reference [TR] -1730-2) include, but are not limited to the following:

Elevation - Biological soil crust cover is usually greatest at inland elevations under 3,100 feet. Lichen and moss components generally increase with elevation until vascular plant cover dominates the site. The project area is generally in the range of 4,500 to 6,500 feet in elevation. Soil crust cover is not expected to be high due to elevation, but may have higher potential where slope and soil chemistry promote biological soil crust community formation.

Soils and Topography - Shallow soils support greater total biological soil crust cover than deep more productive soils. As coarse soil texture increases, total biological soil crust cover decreases. In more unstable soil types the representation of morphological groups such as short and tall moss may be exclusively under vascular plant cover (TR-1730-2).

Percent rock cover influences total biological soil crust cover as well; embedded rocks provide armor for the microbiota contained within the soil interspaces. Preliminary field observations in 2002 and 2003 indicate that some of the most developed biological soil crust communities in the RA occur in these highly rocky unproductive systems. North and east slopes generally favor crust development due to the moisture and temperature requirements for optimal physiological activity. Calcareous and gypsiferous soils can support higher species richness. The soil chemistry gradient has been shown to be the "…strongest explanatory factor for the compositional difference among research sites."(Page 223. Ponzetti and McCune, 2001).

Calcareous and gypsiferous soils occur in the project area and site-specific soil chemistry varies throughout. Potential for biological soil crusts is site-specific.

Disturbance - The intensity of disturbance and the time since disturbance can influence the community composition and total cover of biological soil crust communities. The type of disturbance is a fundamental consideration as well; compressional stress from vehicles, wild horses, livestock, and human footprints can modify biological soil crust communities. As stated by Ponzetti and McCune on Page 223 of their 2001 publication, "...the compositional effects of grazing were overwhelmed by the stronger soil chemistry and climate gradients. However, grazing-related differences were clearly discernable with statistical methods that accounted for the blocked design of the study." Biological soil crusts may serve as an early warning system as they appear to be more sensitive to livestock-related effects than are vascular plants.

Grazing as well as other disturbances such as wild horses, recreationists, short return interval fires, and juniper expansion have occurred in the project area. Their specific contribution to current biological soil crust condition and cover is not discernable from other historic disturbance. The paper cited in the prior paragraph is likely the most relevant.

Timing of precipitation - Moisture regimes can play a large role in crust community composition. The presence or absence of fog in a desert system can influence the abundance of mosses and other microbiota under shrubs due to the collection of moisture by the shrub. Fog seems to play some role in the planning area, the extent to which is not known, but field observations correlate with the expected occurrence of well-developed crust communities under shrubs receiving some increase in moisture interception.

Juniper expansion has increased the interception of moisture and light over large portions of the project area. Biological soil crust communities still may occur in the understory under these conditions. As stated before, site specific soil chemistry is the strongest factor in determining presence or absence of biological soil crusts.

Biological soil crusts play a role in a functioning ecosystem. On Page 29 of TR-1730-2 it states that in "... a given ecoregion, ecological roles of biological soil crusts can vary widely in their importance and will depend on crust composition and biomass, as well as characteristics of the specific ecosystem being considered."

Carbon fixation, nitrogen fixation, and increased soil oxygen content (during active photosynthesis) are beneficial contributions to the ecosystem resulting from biological soil crusts. The effect of crust communities on soil water relations is highly site dependent (TR-1730-2). Soil surface microtopography and aggregate stability are important contributions from biological soil crusts as they increase the residence time of moisture and reduce erosional processes. The influence of biological soil crusts on infiltration rates and hydraulic conductivity varies greatly; generally speaking infiltration rates increase in pinnacled crusts and decrease in flat crust microtopographies. The northern Great Basin has rolling biological soil crust microtopography and infiltration rates are probably intermediate compared to flat or pinnacled crust systems.

Information specific to the Andrews RA is currently being gathered via new monitoring efforts. Best Management Practices (BMPs) would be developed and implemented as determined necessary by the Field Manager.

Common biological soil crusts found in the project area are included in the following list of genera. This is not an all inclusive list of potential genera.

Bryum
Cladonia
Collema
Didymodon
Lecanora
Megaspora
Peltigera
Psora
Tortula

Identification of biological soil crusts at the species level is often not practical for fieldwork. The use of some basic morphological groups simplifies the situation. Morphological groups are also useful because they are representative of the ecological function of the organisms (Page 6, TR-1730-2).

Using a classification scheme proposed in 1994 microbiota such as biological soil crusts can be divided into three groups based on their physical location in relation to the soil: hypermorphic (aboveground), perimorphic (at ground) and cryptomorphic (below ground). Preliminary field observations in 2004 indicate the CMPA contains primarily perimorphic and secondarily hypermorphic biological soil crusts. Hypermorphic biological soil crusts may have better representation in the CMPA as compared to lower elevations in the Burns District.

The morphological groups are:

1. Cyanobacteria - Perimorphic/cryptomorphic.
2. Algae - Perimorphic/cryptomorphic.
3. Micro-fungi - Cryptomorphic/perimorphic.
4. Short moss (under 10mm) - Hypermorphic.
5. Tall moss (over 10mm) - Hypermorphic.
6. Liverwort - Hypermorphic
7. Crustose lichen - Perimorphic.
8. Gelatinous lichen - Perimorphic.
9. Squamulose lichen – Perimorphic.
10. Foliose lichen - Perimorphic.
11. Fruticose lichen - Perimorphic.

Morphological groups 1, 4, 5, 7, 8, and 9 would likely be the dominant groups represented in the project area. Groups 10 and 11 may also be represented in the CMPA as the site-specific conditions required for their growth may exist in sufficient quantity.

For a continued discussion of biological soil crusts, see the Andrews/Steens PRMP/FEIS.

3.4.2 Fire Management

Fire Regime Condition Class

The role that fire would play across the landscape in the absence of modern human intervention is defined as the Fire Regime (Agee, 1993). Fires ignited by lightning and aboriginal peoples are included in the classification. Fire regimes are also a reflection of the past and current vegetation. Five historical fire regimes have been identified based on the average number of years between fire events (fire frequency) and the fire severity (Hann and Bunnell, 2001; Schmidt et al., 2002) (Table 3.5)

Table 3.5. General Fire Regime Classification and Description

Fire Regime	Frequency (years)	Description
I	0-35	Frequent, low to mixed severity fires. Less than 75.0 percent of the dominant overstory vegetation replaced by burning. Surface fires are common.
II*	0-35	Frequent, high severity fires. Greater than 75.0 percent of the dominant overstory replaced by burning. Stand replacing fires common.
III*	35-100+	Fire return is frequent to long term and has mixed severity. Less than 75.0 percent of the dominant overstory is replaced by burning.
IV*	35-100+	Fire return is frequent to long term and has mixed severity. Less than 75.0 percent of the dominant overstory is replaced by burning.
V*	>200	Fires are infrequent and high severity; these can be stand replacing fires.

*Fire regimes present in the project area.

Fire regimes are based on estimated historical conditions. Recent wildfires have indicated that many of the areas are not operating within their historical fire regimes. Many of the current fires are burning less frequently with greater severity. To quantify this situation a secondary classification was also developed. Condition class indicates the departure from historical conditions (Table 3.6). Many conditions can cause a shift in condition class; vegetation characteristics, fuel composition, fire frequency, fire severity, fire pattern.

Table 3.6. Condition Class Description and Potential Risks based on Fire Behavior, Post-fire Vegetation Conditions, Suppression Efforts, and Risks of Losing Native Species Following Burning

Condition Class	Description	Potential Risks
1	Plant communities exist under historical conditions and fire is playing its historical role	Fire behavior, effects, and other associated disturbances are same as those that occurred prior to fire exclusion (suppression) and other types of management that do not mimic the wildfire regime and associated vegetation and fuel characteristics. Composition and structure of vegetation and fuels are same as the historical regime. Risks of losing key ecosystem components are low.
2	Moderate departure from historical conditions.	Fire behavior, effects, and other associated disturbances are moderately different from historical conditions. Frequency and severity are either greater or less than historical conditions. Composition and structure of vegetation and fuels are moderately altered. Uncharacteristic conditions range from low to moderate. Risk of losing key ecosystem components is moderate.
3	High departure form historical conditions	Fire behavior, effects and associated disturbances are highly altered. Frequency and severity are either greater or less than historical conditions. Composition and structure of vegetation and fuels are highly altered. Uncharacteristic conditions range from moderate to high. Risks of losing of key ecosystem components are high.

Fire Regime Condition Class (FRCC) is an interagency, standardized tool for determining the degree of departure from reference condition vegetation, fuels and disturbance regimes. Assessing FRCC can help guide management objectives and set priorities for treatments. The assessment is done at the coarse scale and is used to help develop priorities for land management activities.

An assessment was done for the North Steens Project Area. The assessment identified 5 Biophysical Stratum (BpS) for the project area. Biophysical stratums were selected from the national database. The national database gives historical conditions that were developed through the modeling efforts of LANDFIRE. Geographical information system data was used to determine the percentage composition of the project area. Table 3.7. lists the BpSs for the project area, percent composition, fire regime, condition class, and departure from historical conditions. The project area is dominated by the Mountain Big Sagebrush and Low Sagebrush BpSs. Dry Wyoming Big Sagebrush and Western Juniper BpSs were common and the Riparian BpS was rare. The Riparian BpS includes the quaking aspen plant communities in the uplands of the project area. Analysis indicates that all BpSs were outside of historical fire regimes. The Mountain Big Sagebrush and Western Juniper (pre-settlement stands) BpSs were assigned CC 3. The other BpSs were assigned CC 2. This indicates that the Mountain Big Sagebrush and Western Juniper BpSs were significantly different from historical conditions.

The FRCC analysis also combines all BpSs to develop a landscape assessment. The project area was classified as condition class 2. Conditions across the whole project area are moderately altered from historical conditions. The analysis also indicates that restoration of the vegetation composition, vegetation and fuels structure would be required to move toward the historical conditions.

Table 3.7. FRCC Analysis of the North Steens Project Area

Biophysical Setting	Fire Regime	Strata Comp.	Departure	Condition Class
Mountain Big Sagebrush	II	35.0%	70.0%	3
Low Sagebrush	V	23.0%	40.0%	2
Dry Wyo. Big Sagebrush	IV	18.0%	55.0%	2
Western Juniper	V	16.0%	83.0%	3
Riparian (including Quaking Aspen)	III	8.0%	61.0%	2
Project Area	III	100.0%	62.0%	2

Fire has played an important role in the development of most plant communities in the project area. The wildfire regime can be defined as the role fire would play across a landscape in the absence of human mechanical intervention, but under the influence of aboriginal burning (Agee, 1993). Fire regimes vary across the project area with the change in vegetation. Fire ignited by lightning, or early inhabitants, occurred at varying intervals and intensities across the project area. Fires functioned to reduce the accumulation of old plant material, reduce the dominance of a single or small number of plant species, release nutrients back into the system, provide seedbed for some plant species and reinvigorate some plant species. Fires also exposed mineral soil to the forces of wind and water, allowing movement of soil across the landscape. However, the role of fire in ecosystem structure, function, and processes has changed since 1870.

Mountain big sagebrush plant communities had the shortest historic fire return interval (average number of years between fire events) at 15 to 25 years. Fire burned through these plant communities and consumed a majority of the aboveground plant material. Fires generally burned during the summer and early fall, but fires did occur outside of that time period. A majority of the plant species found in mountain big sagebrush plant communities are adapted to fire. Shrubs, with the exception of mountain big sagebrush, have the ability to sprout from buds on the root collar or along the roots. Mountain big sagebrush must establish from seed. Most grasses and deep-rooted forbs also have buds below the soil surface protected from burning and these will sprout following top removal. Other species may avoid the fire by completing their growth cycle prior to the peak of the fire season. Biscuitroot, buttercups, wild onions, and some native annual forbs are examples of plants that will complete their annual lifecycle prior to the peak of the fire season. Unless soil heating is extreme, these types of plants will be minimally affected by fire. Most of the mountain big sagebrush plant communities across the project area would be classified as Fire Regime II, 0-35 year return interval with high severity (stand replacing) fire effects (greater than 75 percent of the dominant overstory replaced). (Refer to Table 3.5 below for a description of Fire Regimes.)

Low sagebrush plant communities often form a complex mosaic with other sagebrush species. Size of the patches varies from less than an acre to over 1,000 acres. Fire was historically, and still is, a relatively rare event in low sagebrush plant communities. Shallow soils and low site productivity reduce the chance for fuels to accumulate. However, fires did burn across these plant communities, but at a very low frequency. Fire return intervals of these plant communities are greater than 150-200 years. Some of the plants found in other big sagebrush plant communities are found in these areas. However, there is a greater occurrence of mat-forming forbs in the low sagebrush compared to big sagebrush plant communities. Growing points of most mat-forming forbs are elevated above the soil surface and vulnerable to damage from fire. Work done on the Sheldon and Hart Mountain National Wildlife Refuges found that the frequency and cover of these forbs were reduced following burning (Miller and Rose, 1999). Low sagebrush, same as other sagebrushes, does not sprout following burning. Plants must establish from seed. Recovery of these plant communities is slow following disturbance. Low sagebrush plant communities are classified as Fire Regime V (Table 3.5), fire return interval greater than 200 years and fires are stand replacing when they occur.

Western juniper historically occupied rocky ridgetops and shallow soil slopes across Steens Mountain. Thin bark and high volatile oil component makes western juniper susceptible to fire. Western juniper does not sprout from basal buds and needs to reestablish from seeds. The rocky and/or shallow soils limit fire spread and have permitted western juniper to establish in these areas. The Fire Regime is similar to low sagebrush plant communities. However, it is difficult to assign a Fire Regime and Condition Class to these communities because they are small and embedded in other plant communities. Western juniper plant communities on rocky ridgetops and shallow soil areas makes up a small percentage of the total project area, and therefore were not mapped during the vegetation surveys in the early 1980s. However, western juniper has encroached into deeper, more productive plant communities. Miller and Rose (1995) estimated that over 90.0 percent of the current western juniper woodlands on Steens Mountain established after 1870. Expansion of western juniper into the sagebrush plant communities has altered the condition class of the sagebrush plant communities. The condition class of low sagebrush and mountain big sagebrush plant communities has shifted to 2 and 3, respectively. (Refer to Table 3.6 for a description of condition classes.)

Quaking aspen plant communities are maintained by fire (Bartos and Campbell, 1998). Quaking aspen vigorously suckers following top removal. Historically fire burned in these communities once every 60 years. Wall and others (2001) found that the average age of quaking aspen stands was 100 to 120 years indicating that at least one fire cycle has been missed in these stands. Quaking aspen stands would be classified as Fire Regime III (35-100 years, mixed severity fires) and the missed fire would place these communities in Condition Class 2. The lengthening of the fire return interval has allowed expansion of western juniper into these stands. In some areas western juniper has totally replaced quaking aspen, and in other areas western juniper is in various stages of replacing quaking aspen. Western juniper changes the fuels structure of the quaking aspen stands. Aerial fuels are more continuous following western juniper expansion into quaking aspen. fires will burn at a greater intensity with more severe fire effects.

Riparian plant communities comprise a small percentage of the total project area, but are ecologically important to the area. Fire history has not been documented in these areas, but it is assumed to be the same as the adjacent plant communities. Fire return intervals were probably the same as quaking aspen plant communities. Because of the proximity to water, these areas are not dry enough in most years to burn, but during dry years the probability of fire increases. Riparian areas would be classified as Fire Regime III (35-100 years, mixed severity). Fires would burn the understory vegetation and smaller woody shrubs. Large cottonwood trees, willows, and alders may not burn in some fires, but periodically a stand-replacing fire would pass through the riparian. High intensity fires in adjacent uplands may have a greater probability of moving into riparian areas. Most woody plants in riparian areas sprout following death of aboveground plant material.

Lower elevation plant communities in the project areas have experienced some invasion by cheatgrass. Past land and fire management practices have created conditions that favor cheatgrass establishment and survival. Once cheatgrass has become established, it provides a continuous fuel bed. Pre-invasion communities had less continuous understory vegetation and thus fuel bed. With the more continuous fuel bed, the potential for fire spread increases. Fire return interval in these areas has decreased to once every 3 to 5 years. Fire adapted plants in these communities cannot tolerate fires at that high frequency. Repeated fires help to eliminate many native perennial plants. The Fire Regime of these plant communities was classified as Fire Regime IV (35-100 years, stand replacing). Condition Class is 3, more than two fire cycles outside of the historic regime. In some areas the native perennial vegetation has been lost from the community. Restoration in these areas would require seeding of perennial vegetation.

Fire management of the project area will follow guidance outlined in the Andrews and Steens RMPs and the Burns Interagency Fire Zone (BIFZ) FMP and subsequent fire management planning. Fire management strategy focuses on fire suppression, prescribed fire, mechanical treatments, and wildfire use for resource benefit. Prescribed fire would be used to meet resource and fire management objectives. Wildfires ignited by lightning would be evaluated for fire use, by the process outlined in the BIFZ FMP and the Fire Use Implementation Procedures Reference Guide (April 2005) and subsequent FMPs.

3.4.3 Fisheries

Fish have been documented in approximately 201.00 miles of streams within the project area. Most of these fish species are native to Steens Mountain. Overall, fisheries are in good condition and habitat is expected to improve as a result of new management direction. Below is a description of fish species documented within the project area, their distribution and current management status.

Bridgelip Sucker
Little is known about distribution of this sucker species, but it appears limited within the project area. It has only been documented in Kiger and Bridge Creeks. Preferred habitat for bridgelip suckers is small, fast-flowing cold water streams with gravelly, rocky bottoms; although it may also inhabit rivers where current is moderate and substrate composed of sand and silt. There is no Special Status for this species.

Brook Trout
At one time, brook trout were stocked by ODFW into Fish Lake and a self-sustaining population still persists. These brook trout have not spread throughout the system and are only found in Fish Lake, probably a result of limited outflow. There is no Special Status for this species.

Great Basin Redband Trout
Great Basin redband trout represent a unique natural history reflecting the Pleistocene connection between the lake basins of eastern Oregon and the Snake and Columbia Rivers. Redband trout are able to survive warmer water than most other salmonids and thus are better adapted to their desert environment. The redband trout is widespread throughout the Donner und Blitzen drainage and there are populations in Catlow Valley. Populations are considered to be strong. The Steens Act designated Donner und Blitzen River as a redband trout reserve upstream of the confluence with Fish Creek. The purpose of the reserve is to conserve, protect, and enhance the population of redband trout and the unique ecosystem of plants, fish, and wildlife of a river ecosystem; and provide opportunities for scientific research, environmental education, and fish and wildlife oriented recreation and access. The Great Basin redband trout is a BLM tracking species and considered sensitive by the USFWS.

Lahontan Cutthroat Trout
This species is found in Wildhorse drainage that drains into the Alvord subbasin. These fish are not native but were hatchery fish introduced into Wildhorse Lake, which is located near the headwaters of Wildhorse Creek. The fish exist throughout Little Wildhorse and Wildhorse Creeks. The population is self-sustaining and the lake is no longer stocked with any species. This population of Lahontan cutthroat trout is not protected under the Endangered Species Act.

Longnose Dace
Longnose dace are distributed through a big proportion of the project area. Data indicate they have been documented in lower reaches of McCoy and Kiger Creeks and throughout Donner und Blitzen River. The species is widespread throughout its range, which extends across the United States. There is no Special Status for this species.

Malheur Mottled Sculpin
Distribution data indicate the Malheur mottled sculpin is widespread throughout the Donner und Blitzen watershed, including populations in McCoy, Kiger, and Riddle Creeks. The Malheur mottled sculpin is a BLM sensitive species. Preferred habitat of mottled sculpin is clear, cool mountain streams of rapid to moderate current.

Mountain Whitefish
The mountain whitefish is a native species documented in Kiger Creek and in the Donner und Blitzen River system above Page Springs. It likely exists throughout the Donner und Blitzen River system. There is no Special Status for this species.

Redside Shiner
The redside shiner has been documented within the project area in South Fork Donner und Blitzen River and Bridge Creek and likely occurs throughout the river system and in tributaries that satisfy habitat requirements. Redside shiners can occupy a wide variety of habitats including lakes, streams, ponds, and irrigation ditches. There is no Special Status for this species.

3.4.4 Forestry/Woodlands

Western juniper is the dominant woodland type across the project area and occurs in a band between 4,500 and 7,000 feet. Below 4,500 feet, available soil moisture limits western juniper growth to wet areas and stream courses. Two types of woodland can be found across the mountain. Over 90.0 percent of the western juniper woodlands across the project area have trees that established after 1870. Western juniper has encroached into more productive mountain big sagebrush, quaking aspen, riparian hardwoods, and low sagebrush plant communities. Miller and Rose (1995) studied the population structure across Steens Mountain and found that 90.0 percent of the western juniper trees established after 1870.

Up to 10.0 percent is comprised of older trees that inhabit rocky ridgetops or shallow soil areas where fires did not burn very often. Tree age may exceed 1,000 years in these stands. Growth form of old trees is often characterized by a generally asymmetrical, rounded, spreading canopy. These canopies may be quite sparse with large areas of dead branches. The trunk is often irregular shaped with a severe taper. The trunk is deeply furrowed and covered by fibrous bark. The lower portions of the tree may contain several heavy branches and a bright yellow/green arboreal fruticose lichen (Waichler et al., 2001). Woodlands with these characteristics occupy less than 1.0 percent of the project area. However, these communities are often embedded within other plant communities and in close proximity to younger woodlands.

Associated understory plant species in younger woodlands are same as species found in mountain big sagebrush, quaking aspen, and riparian plant communities. Understory of old growth woodland is sparse with large amounts of bare ground and rock on the surface. Understory plant composition or the old growth communities is same as low sagebrush plant communities.

Disturbance in post-settlement woodlands has been documented by Bates and others (2002). Understory herbaceous and shrubby vegetation responds rapidly to removal of the tree overstory. In general the response is the same as the pre-juniper expansion plant community. Response of old growth stands to disturbance is much slower. Historically, disturbance was limited in these stands to small pockets or very rare, large-scale events.

3.4.5 Livestock Grazing Management

(See Andrews/Steens RMP Map 8, Grazing Allotment Boundaries; S-15, Range Condition; and S-16, Range Improvements, on the attached CD.)

The project area has a long history of domestic livestock grazing. A series of land disposal legislation in the mid- to late 1800s helped to encourage the development of the western livestock industry. The Homestead Act (1862), Enlarged Homestead Act (1909), and Stock-raising Homestead Act (1916) granted people land theoretically large enough to support a family; the latter act granted a person 640 acres, enough to support 50 head of cattle. However, acre allocations were based on the productivity of Midwestern farms and not the arid and semi-arid western United States. These land disposal acts set the stage for grazing management in the 20th and 21st centuries.

The Steens Mountain Area was traditionally used as spring and summer range for bands of sheep and cattle in the late 19th and early 20th centuries. Domestic livestock grazing occurred unrestricted until the passage of the Taylor Grazing Act in 1934. This act was passed to help reduce the degradation caused by unrestricted livestock grazing. Griffiths (1902) reported evidence of heavy sheep grazing on Steens Mountain in the spring and summer of 1901.

Griffiths reports little to no available forage in areas close to water sources. The Taylor Grazing Act established a system for the allotment of grazing privileges to livestock operators based on grazing capacity and priority of use. The act also established allotment boundaries, standards for rangeland improvement and implementation of grazing fees. Later legislation, FLPMA (1976), PRIA (1978), and the Steens Act, also provides authority for the management of livestock grazing on public lands.

Grazing Authorization

Livestock grazing is administered on nine allotments in the project area. Nine permittees are authorized to graze livestock on 176,423 acres within the project area. Currently, permittees are authorized to graze 17,936 Animal Unit Months (AUMs) permitted use in the project area. The AUMs allocated to large wild herbivores is 1,924 in the nine allotments.

All nine allotments have developed and implemented grazing systems primarily through Allotment Management Plans (AMPs) and agreements with the permittees.

Rangeland Health and Guidelines for Grazing Management

Allotments are evaluated for rangeland health utilizing five standards outlined in the RMP. Field indicators have been developed for each of the five standards. The qualitative thresholds for these indicators vary according to soils, climate, and landform. An ID team with participation from permittees conducts assessments to evaluate the standards according to field indicators.

The Authorizing Official develops appropriate grazing management actions based on the five standards. This action must occur as soon as practicable, or prior to the beginning of the next grazing season.

Grazing Exclusion

The Steens Act included 94,959 acres of Congressionally-designated No Livestock Grazing Area in Steens Mountain Wilderness. An additional 2,270 acres were also excluded adjacent to Steens Mountain Wilderness by the legislation. Land exchanges described in the Steens Act realigned some allotment boundaries creating revisions to some permitted use.

Frazier Field

The Frazier Field Allotment includes 20,506 acres that are divided into six pastures. There are 1,906 permitted AUMs with 326 AUMs allocated to wildlife and 72 AUMs allocated to wild horses. The domestic livestock period of use is spring and summer under a deferred, rest-rotation system. Management objectives are to improve or maintain ecologic condition for upland and riparian vegetation communities. An AMP was implemented in 1991.

South Steens

The South Steens Allotment contains 89,508 public acres and is divided into four pastures. There are 9,577 permitted AUMs with 582 AUMs allocated to wildlife and 3,540 AUMs for wild horses. The domestic livestock period of use is spring, summer, and fall. The grazing system is a rotational system. Management objectives are to improve or maintain ecologic condition for upland and riparian vegetation communities. An AMP was implemented in 1995.

Mud Creek

The Mud Creek Allotment includes 8,245 public acres and is divided into two pastures. There are 590 permitted AUMs with 100 AUMs allocated to wildlife. The domestic livestock period of use is spring and summer. The grazing system is a deferred rotation system. Management objectives are to improve or maintain ecologic condition for upland and riparian vegetation communities.

East Ridge

The East Ridge Allotment contains 5,066 public acres and 5,440 private acres. The East Ridge Allotment is divided into seven pastures. There are 431 permitted AUMs with 161 AUMs allocated to wildlife. The domestic livestock period of use is spring and summer. The grazing system is a modified rotational system. Management objectives are to improve or maintain ecologic condition for upland and riparian vegetation communities.

Hardie Summer

The Hardie Summer Allotment contains 6,008 public acres and 3,775 private acres. The allotment is divided into four pastures. There are 408 permitted AUMs with 383 AUMs allocated to wildlife. The domestic livestock period of use is summer and fall. The grazing system a deferred system. Management objectives are to improve and maintain ecological condition of uplands and riparian vegetation. The AMP was implemented in 1991.

Krumbo Mountain
The Krumbo Mountain Allotment includes 17,353 public acres and 6 private acres. The allotment is divided into two pastures. There are 1,059 permitted AUMs and 77 AUMs allocated to wildlife. The domestic livestock period of use is summer and fall. The grazing system is a deferred rotation system. Management objectives are to improve and maintain ecological condition of uplands and riparian vegetation. The AMP was implemented in 1991.

Chimney
The Chimney Allotment includes 14,769 public acres and 10,125 private acres. The allotment is divided into 11 pastures. There are 2,015 permitted AUMs and 193 AUMs allocated to wildlife. The domestic livestock period of use is spring, summer, and fall. There is a seasonal grazing system implemented. Management objectives are to improve and maintain ecological condition of uplands and riparian vegetation.

Ruby Springs
The Ruby Springs Allotment includes 14,788 public land acres divided into 11 pastures. There are 1,950 active AUMs with 102 AUMs allocated to wildlife. The domestic livestock period of use is April 1 to September 30. Management objectives are to maintain livestock forage and improve the ecological conditions of bitterbrush, upland vegetation, and riparian vegetation. An AMP was implemented in 1991.

LaVoy Tables
The LaVoy Tables Allotment includes 38,257 public acres that are divided into four pastures. There are 1,653 permitted AUMs with 36 AUMs allocated to wild horses. The domestic livestock period of use is April 1 to October 31. Management objectives are to improve or maintain ecological status of the allotment and to maintain wilderness characteristics within the Blitzen River WSA. An AMP was implemented in 1991.

Table 3.8. Allotment Information (Burns District GIS Database)

Allotment Number	Allotment Name	M, I, C	Public Acres	Private acres	Total acres	Livestock AUMs	Wildlife AUMs	Wild horses AUMs
6002	South Steens	I	89,508	1,392	90,900	9,577	582	3540
6005	Mud Creek	I	8,245		8,245	590	100	0
6006	Frazier Field	I	20,506	94	20,600	1,906	326	72
6010	East Ridge	I	5,066	5,440	10,506	431	161	161
6025	Hardie Summer	M	6,008	3,775	9,783	408	383	0
6032	Krumbo Mountain	I	17,533	6	17,539	1,059	77	0
6033	Chimney	I	14,769	10,125	24,894	2,015	193	0
6031	LaVoy Tables	I	38,257	1,708	39,965	1,653	143	36
6007	Ruby Springs	I	14,788	613	15,439	1,950	102	0

M=Maintain, I=Improve, C=Custodial,

3.4.6 Recreation

The project area is primarily located within the CMPA/Steens Mountain Special Recreation Management Area (SRMA). Primary recreation uses of the area include sightseeing, camping, driving for pleasure, wildlife viewing, hunting, fishing, hiking, bird watching, and photography. Other activities include picnicking, bicycling, nature study, rock hounding, snowmobiling, cross-country skiing, and Off-Highway Vehicle (OHV) use. Except for limited winter recreation, the season of use is generally from July to November, with the highest use on holiday weekends and during fall hunting seasons. The Page Springs area receives heavy use during April, May, and June when the higher elevations are not accessible.

The Steens Mountain Back Country Byway (Steens Loop Road) traverses many project units and other project units are visible from it. This is the main route into the CMPA and is traveled by over 25,000 people each year. One of the major attractions of Steens Mountain is the Kiger Overlook. The Steens Loop Road is closed to the public during the winter and spring because of snow and wet, muddy roads. When conditions allow, winter recreationists are issued permits to drive to the snowline on the North Steens Loop Road. The Steens Loop Road was recently designated as a Tour Route in conjunction with the High Desert Discovery State Scenic Byway.

Primitive camping occurs throughout the area, especially during fall hunting seasons. Page Springs Campground is located 4.00 miles east of Frenchglen on the Steens Loop Road, adjacent to the Donner und Blitzen River. Page Springs is a developed campground with water, vault toilets, designated campsites, and volunteer hosts. The campground receives heavy use during spring, summer, and fall. Additional developed campgrounds east along the Steens Loop Road are Fish Lake and Jackman Park. These higher-elevation campgrounds are heavily used during summer and fall. South Steens Campground is located along South Steens Loop Road and includes equestrian facilities. Camping fees are charged at all four campgrounds. These campgrounds are destinations or are used as staging areas for dispersed uses such as hunting, hiking, and nature study.

Mule deer, pronghorn antelope, and elk are hunted with rifle, muzzleloader, and bow in the project units and surrounding area. Upland bird hunting, primarily for chukar and quail, is a popular late fall and winter activity. Fishing is also popular, particularly for redband trout. There are several lakes, reservoirs, streams, and rivers in the general area, which provide fishing as well as sightseeing, camping, hiking, and wildlife viewing opportunities.

The High Desert Trail, a component of the National Recreation Trails System, passes through the West Upper River #6 and West Lower River #5 Project Units. The trail north of North Steens Loop Road skirts the project area to the west. The Blitzen River fishing path begins at Page Springs Campground and follows the river upstream. A short nature trail loops through the rimrocks east of Page Springs Campground.

3.4.7 Off-Highway Vehicles

(See Andrews/Steens RMP Map 14, Off-Highway Vehicle Designations, on the attached CD.)

The Steens RMP designated 171,303 acres in the CMPA as closed to OHV and mechanized vehicle use. This encompasses Steens Mountain Wilderness and the portion of East Kiger Plateau RNA/ACEC outside of Steens Mountain Wilderness. The OHV and mechanized vehicle uses are limited to designated roads and ways in the remainder of the CMPA – 256,853 acres. These designations are consistent with the Steens Act, specifically Section 112(B), which states:

> (1) PROHIBITION. – The use of motorized or mechanized vehicles on Federal lands included in the Cooperative Management and Protection Area –
>
> > (A) is prohibited off road; and
> > (B) is limited to such roads and trails as may be designated for their use as part of the management plan.
>
> (2) EXCEPTIONS. – Paragraph (1) does not prohibit the use of motorized or mechanized vehicles on Federal lands included in the CMPA if the Secretary determines that such use-
>
> > (A) is needed for administrative purposes or to respond to an emergency; or
> > (B) is appropriate for the construction or maintenance of agricultural facilities, fish and wildlife management, or ecological restoration projects, except in areas designated as wilderness or managed under the provisions of section 603(c) of the FLPMA of 1976 (43 U.S.C. 1782).

The Steens RMP also expanded the area closed seasonally to 300,704 acres.

The terms OHV, mechanized vehicle, road, and way are defined in the Glossary.

3.4.8 Social and Economic Values

Social and economic conditions for the project area are discussed in Chapter III of the Andrews/Steens PRMP/FEIS. Current uses in the project area mainly consist of livestock grazing and recreation. More economic information specific to the project can be found in this document primarily under recreation and grazing management sections.

3.4.9 Soils

(See Andrews/Steens RMP Map S-3, Soil Survey, on the attached CD.)

General Soil Types

Eight soil types have been identified within the project area. Table 3.9 contains a description of each type and the number of acres of each type within the project area. Table 3.10 contains the acres of each type by management unit.

Table 3.9. Soil Types found in the Project Area (Burns District GIS Database)

Soil Types	Description	Acres
Spangenburg-Enko-Catlow	Well or moderately well-drained, very deep soils formed in lacustrine sediments and alluvium on middle lake terraces; 0.0 to 20.0 percent slopes.	3,221
Felcher-Skedaddle	Well-drained, shallow or moderately deep soils that formed in colluvium and residuum on mountains; 20.0 to 70.0 percent slopes.	780
Fury-Skunkfarm-Housefield	Somewhat poorly to very poorly drained, very deep soils formed in alluvium and lacustrine sediments on stream terraces and lake terraces; 0 to 2.0 percent slopes.	518
Reallis-Vergas-Lawen	Well-drained, very deep soils that formed in alluvium and eolian material on high lake terraces and fan terraces; 0.0 to 8.0 percent slopes.	2,345
Baconcamp-Clamp-Rock outcrop	Well-drained, shallow or moderately deep soils formed in residuum and colluvium; 5.0 to 80.0 percent slopes.	106,307
Raz-Brace-Anawalt	Well-drained, shallow or moderately deep soils formed in residuum and colluvium on tablelands having 8 to 12 inches of precipitation; 0.0 to 30.0 percent slopes.	23,318
Ninemile-Westbutte-Carryback	Well-drained, shallow and moderately deep soils that formed in residuum and colluvium on tablelands and hills having 12 to 16 inches of precipitation; 0.0 to 70.0 percent slopes.	184,560
Merlin-Observation-Lambring	Well-drained, shallow to very deep soils formed in residuum and colluvium on shrub and grass covered hills; 0.0 to 70.0 percent slopes.	1,571
Total Acres		**322,670**

Table 3.10. Acres of Soil Type by Proposed Project Unit (Burns District GIS Database)

Project Unit Name (See Project Unit Maps)	* Soil Series Name	Acres
Ankle Creek	BCR	12,866
	NWC	3,470
Bird Reservoir #3	NWC	2,271
	RBA	12
	RVL	17
Bridge Creek #3	BCR	2,593
	NWC	468
Brown	BCR	5,018
Chimney #3	MOL	274
	NWC	2,249
Cold Spring	BCR	9,696
	FSH	48
	NWC	19,852
	RBA	174
Cucamonga Creek	BCR	6,820
	FS	70
	FSH	327
	MOL	392
	NWC	6,831
	RBA	482
Dingle	BCR	2,994
Doe Camp	BCR	786
	NWC	1,086
Drake	BCR	15,142
	NWC	6,476
Elliot Field #9	BCR	109
	NWC	994
Fish Creek	BCR	980
	NWC	3,126
	RBA	2,676
Gorges	BCR	9,343
	NWC	1,119
Hardie	BCR	4,561
	NWC	431
Home Creek	FS	282
	NWC	18,734
	RBA	1,657
	SEC	109
Horton	BCR	1,008
	NWC	610
Kiger Creek	BCR	5,037
Krumbo Mountain #2	BCR	2,947
	NWC	5,111
Krumbo Ridge	NWC	9,297
Kundert	NWC	1,645
	RBA	1,364
	SEC	119
Lower Field #1	NWC	2,339
	RBA	1,677
McCoy Creek #1 East	NWC	456

Project Unit Name (See Project Unit Maps)	* Soil Series Name	Acres
McCoy Creek #1 West	BCR	39
	NWC	1,505
Moon Hill	BCR	2,042
	NWC	131
North Mud Creek	BCR	568
	NWC	2,123
	RBA	120
Oliver Springs #4	BCR	125
	NWC	2,103
P Hill	NWC	3,162
	RBA	173
	SEC	12
Road #2	NWC	2,384
	RBA	1,050
Ruby Spring #4	NWC	2,886
	RBA	47
Sagehen	FS	78
	MOL	905
	NWC	1,536
	RBA	413
Scharff	BCR	8,741
	NWC	318
	Unknown	52
Solomon	NWC	2,452
	RBA	808
	SEC	66
South Mud Creek	BCR	5,001
	FSH	99
	NWC	11,113
South Steens	FS	351
	FSH	43
	NWC	57,745
	RBA	11,501
	RVL	2,328
	SEC	2,911
Upper Field #2	NWC	4,147
	RBA	82
West Lower River #6	NWC	1,186
	RBA	811
	SEC	5
West Slope	BCR	6,517
	NWC	141
West Upper River #5	NWC	2,752
	RBA	270
Wildhorse	BCR	984
	NWC	1,436
WJMA	BCR	2,394
	NWC	874
Total		**322,672**

*SEC – Spangenburg-Enko-Catlow
FS - Felcher-Skedaddle
FSH – Fury-Skunkfarm-Housefield
RVL – Reallis-Vergas-Lawen
BCR – Baconcamp-Clamp-Rock outcrop
RBA – Raz-Brace-Anawalt
NWC – Ninemile-Westbutte-Carryback
MOL – Merlin-Observation-Lambring

For a more detailed description of the soils in the project area refer to Part 3.4 of the Andrews/Steens PRMP/FEIS.

3.4.10 Transportation/Roads

Routes within the project vary from the primitive 2-track roads to the higher standard Steens Loop Road. The more heavily used roads in the area include Moon Hill Road and Kiger Ridge Road. These collector roads serve as primary travel routes in the north Steens Mountain Area and are generally maintained at a higher standard than the more primitive "local" routes. Routes in the area are primarily used for recreation, livestock administration, and to access private property. Travel routes in the area are shown on Maps 11 and 13 of the Andrews/Steens RMPs (see CD, included).

3.4.11 Vegetation

(See Andrews/Steens RMP Map S-4, General Vegetation, on the attached CD.)

The North Steens Project Area contains 12 vegetation types as listed in the Burns District GIS database. The vegetation types are characterized by the dominant plant species. Table 3.11 lists the vegetation types and the acreage within the project area.

Table 3.11. Vegetation Types found in the Project Area, Data from Ecological Site Inventories conducted in the mid-1980s (Burns District GIS Database)

General Vegetation	Acres	% Of Total
Big Sagebrush Shrubland	51,993	16.1%
Mountain Big Sagebrush/Grassland	40,685	12.6%
Mountain Shrub/Grassland	4,878	1.5%
Low Sagebrush/Grassland	102,905	31.9%
Native Perennial Grassland	4,944	1.5%
Juniper/Big Sagebrush	43,391	13.4%
Juniper/Low Sagebrush	47,421	14.7%
Quaking Aspen	19,397	6.0%
Big Sagebrush/Annual Grassland	3,353	1.0%
Crested Wheatgrass	1,219	0.4%
Annual Grassland	1,115	0.3%
Rabbitbrush/Grassland	231	0.1%
Silver Sagebrush/Grassland	291	0.1%
Total	**321,823**	

Big Sagebrush Shrubland Communities

Big sagebrush shrubland communities (including areas where western juniper has encroached big sagebrush) are the most common plant community in the project area. These areas are often a mosaic of different shrubby and herbaceous plant species with a dominant or codominant big sagebrush overstory. There are three subspecies of big sagebrush that are commonly found in the project area. Wyoming big sagebrush, mountain big sagebrush, and basin big sagebrush are the sagebrush subspecies found in the big sagebrush shrubland plant communities.

Wyoming big sagebrush occupies shallower soils than basin big sagebrush and the soils may have elevated calcium content. Green rabbitbrush, gray rabbitbrush, and gray horsebrush are other shrubs commonly found in association with Wyoming big sagebrush. Thurber's needlegrass, bluebunch wheatgrass, and Idaho fescue are common grasses found in the understory of these plant communities. Other grasses include Sandberg's bluegrass, junegrass, Indian ricegrass, and western wheatgrass. Numerous forbs can be found in these plant communities. Several species from the genus *Lupinus, Astragalus, Delphinium, Crepis, Lomatium, and Agoseris* occur in these communities. Introduced plants have invaded these plant communities to a greater degree than any other of the plant communities. Cheatgrass is the most commonly listed invader, but there are also many other annual and perennial plants that are actively spreading through these plant communities. Response to disturbance in these plant communities is often slow, but is often positive if there is a good mixture of natives present prior to disturbance. Western juniper occurs naturally at low densities in the upper elevations of these plant communities; current occupancy would reflect these densities. Most plants in this community exhibit some adaptation to fire; large taproot, protected growing points, or early growth form. Fire played a role in the plant communities' development, but at a much longer interval than the more productive basin and mountain big sagebrush plant communities.

Basin big sagebrush occupies deeper soil areas than Wyoming big sagebrush and has many of the same plant species. A few notable exceptions are the large bunchgrass basin wildrye. Seed stalks from this grass may achieve heights greater than 6 feet.

These big sagebrush plant communities occupy areas between 4,200 and 5,500 feet in the project area. At the lower elevations, greasewood increases and mixes with the sagebrush plants. Bare ground also increases as elevation decreases. The line between Wyoming big sagebrush and mountain big sagebrush plant communities is much harder to distinguish. There are some suggestions that Wyoming big sagebrush and mountain big sagebrush hybridize to some degree in the ecotone between the two plant communities (Winward, 1980). Response to disturbance is quicker and much less threatened by invasive plants as elevation increases.

Mountain big sagebrush plant communities occupy areas between 5,000 and 8,000 feet on Steens Mountain. Productivity of these sites is greater than the lower elevation Wyoming big sagebrush and low sagebrush plant communities. Mountain big sagebrush plant communities occur on a variety of soils, but most are deep, well-drained soils. Numerous woody and herbaceous species occur in these communities. Associated shrubs include antelope bitterbrush, wax current, green rabbitbrush, gray rabbitbrush, and snowberry. Large, deep-rooted perennial grasses found include bluebunch wheatgrass, Idaho fescue, bottlebrush squirreltail, western needlegrass, and Thurber's needlegrass.

Mountain big sagebrush plant communities contain a very diverse forb component. Common genera include *Crepis, Agoseris, Lupinus, Astragalus, Phlox, Penstemon, Eriogonum* and *Lomatium.* There are also a number of native annual forbs that are common to mountain big sagebrush plant communities. *Microsteris gracilis, Epilobium paniculatum, Microseris* sp. are the most common and are important forage for sage-grouse, especially early in the life of the chicks. Response of native perennial plants is usually strong following disturbance. A brief phase dominated by annual plants may occur, but the annuals are quickly replaced by perennial plants. Return of the shrub cover is also quicker than in the drier big sagebrush or low sagebrush plant communities.

Low Sagebrush

Low sagebrush plant communities are found intermixed with Wyoming, basin, and mountain big sagebrush plant communities. Low sagebrush is a low growing (< 24 inches tall) sagebrush found on shallow soils or soils with a restrictive layer within 18 inches of the soil surface. Bedrock or a heavy clay layer may restrict rooting on these sites. Many of these sites are flooded or experience very high soil moisture conditions in the spring. Idaho fescue, bluebunch wheatgrass, Thurber's needlegrass, Nevada bluegrass, and Sandberg's bluegrass are common perennial grasses. Cheatgrass can be found, but is usually restricted to disturbed areas, such as rodent mounds or road shoulders. A larger percentage of the forbs on these areas are mat-forming. Genera include numerous species from *Eriogonum* and *Phlox*. Low sagebrush plant communities also contain a strong population of *Lomatium* sp. These plants were an important food plant to early inhabitants of the area. The fleshy taproot or corm provided American Indians with a good source of starch and protein. Areas where rooting is restricted by bedrock will have large percentage of rocks on the soil surface. Response to disturbance is slow for shrubs, but rapid for forbs and grasses. Areas where rooting is restricted by a clay layer may respond quicker than areas where bedrock limits root growth.

Juniper occupancy of these low productivity sites occurs in two main ways. First there is old growth juniper associated with these sites in the project area. There is a high likelihood of rocky outcroppings in many low sagebrush sites; these outcropping provide the type of protection from fire that leads to old growth form and function. Secondly there exists the problem of expansion by juniper since 1870. This post-settlement juniper is less of an issue in low sagebrush sites as a function of the site-specific low productivity. However, juniper expansion into these areas is currently enough to introduce an increased amount of raptor perches to potential strutting grounds for greater sage-grouse.

Mountain Shrub

Mountain shrub plant communities occur primarily on north slopes above 7,000 feet and below the alpine plant communities on Steens Mountain. This plant community covers 1.50 percent of the project area and is a minor component. However, it provides a great deal of diversity to the total landscape. Mountain big sagebrush is a major component in most communities, but is usually only codominant at best to other shrub species. Antelope bitterbrush, snowberry, was current, ocean spray, chokecherry, bitter cherry, and Ceanothus. Understory vegetation is same as the mountain big sagebrush plant communities. Response to disturbance is also same as the mountain big sagebrush plant communities. Most of the woody vegetation, with the exception of mountain big sagebrush, sprouts following removal of aboveground portions of the plant.

Quaking Aspen

Quaking aspen is a conspicuous plant community across the higher elevation of Steens Mountain. This tree species is often found on north slopes or areas where snow accumulates and persists into the spring. Quaking aspen is found on 6.0 percent of the project area, but are very important to the diversity of the area. Maser and others (1984) identified 84 wildlife species that utilize quaking aspen stands for breeding and 117 species that utilize these areas for forage. Productivity of these plant communities is greater than adjacent sagebrush plant communities. Vegetation occurs in multilayered mixtures of shrubs, forbs, and grasses. Over 300 plant species have been identified growing in quaking aspen stands across the Great Basin. Common grass and grass-like genera found include wheatgrass, bromes, wildrye, bluegrass, and sedges. Forb genera include *Thalictrum*, sweet cicely, geranium, aster, peavine, yarrow, and bedstraw. Numerous shrub species may be found in the understory and are same as those found in the mountain shrub plant communities.

Quaking aspen stands between 5,000 and 6,500 feet elevation have been encroached by western juniper across Steens Mountain. The encroachment has occurred on the same timeframe as in the other plant communities. However, the number of western juniper, and aerial cover of the encroaching western juniper is much higher than the adjacent plant communities because of the high site productivity. Some stands have become totally dominated by western juniper and understory vegetation has been reduced to one or two species per acre. Wall (1999) found that three-quarters of the quaking aspen stands below 6,500 feet were being encroached by juniper. This is coupled with a regional decline in all quaking aspen stands (Bartos and Campbell, 1998). Many factors have attributed to the decline, but fire exclusion, large herbivore browsing, and climate shifts have been the major factors identified (Wall, 1999).

Bartos and Campbell (1998) point out that fire historically played an important part in the ecology of quaking aspen stands. Reduction in fine fuels from domestic livestock, wild horses, mule deer, and Rocky Mountain elk coupled with fire suppression has essentially removed fire from these communities. Fires burned in these stands approximately once every 60 years. This would be adequate to keep quaking aspen clones vigorous. However, currently stands are dominated by old trees in various stages of fungal infections and canopy senescence.

Riparian Areas

Riparian areas are water-dependent ecosystems bordering streams, springs, and lakes. They form ecological links between terrestrial and aquatic components of the landscape. Vegetation or other physical structures (woody debris, boulders) help to reduce overland flow and reduce sediment input into streams. Riparian vegetation communities in the project area can be dominated by woody or herbaceous vegetation based on many factors. Commonly observed woody riparian plant communities include cottonwood-willow, alder-willow, mixed willow, willow-chokecherry, and quaking aspen. Understory herbaceous species includes numerous forbs, grasses, and grass-like species. The plant community development is developed by a number of factors including colonization opportunities, localized bank disturbances, canopy opening, and solar radiation.

Large areas of many of the riparian areas within the project area have varying degrees of western juniper expansion. Streams with the greatest degree of western juniper expansion are Krumbo, Bridge, McCoy, Fish, Fir, Little Blitzen, Big and Little Indian and Home Creeks, and Donner und Blitzen River. Western juniper has established and now dominates many portions of these streams at the expense of other woody and herbaceous vegetation. Increase in the western juniper density and cover has increased the amount of bare ground and the risk of soil erosion and sediment input into streams. Riparian plant communities are fairly resilient and respond rapidly because of the ready water supply and high site productivity.

Other Plant Communities

Less than 2.0percent of the project area would be classified as occurring within modified plant communities. Crested wheatgrass plantings constitute 1,219 acres within the project area. Most of this area is at the lower elevations. The seedings were planted primarily in the early to mid 1970s and have varying degrees of big sagebrush. Crested wheatgrass seedings are not targeted for juniper fuels reduction treatments.

Annual grasslands, rabbitbrush/annual grasslands and big sagebrush/annual grasslands constitute 4,700 acres within the project area. These areas are also concentrated at the lower elevations and are not targeted for juniper fuels reduction treatments.

3.4.12 Visual Resources

(See Andrews/Steens RMP Map 3, Visual Resource Management Classes, on the attached CD.)

Bridge Creek, Blitzen River, South Fork Donner und Blitzen, Home Creek, High Steens, and Lower Stonehouse WSAs, Steens Mountain Wilderness, and the Donner und Blitzen Wild River corridor are VRM Class I areas. The VRM Class I objective is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change created by human actions to the characteristic landscape should be very low and must not attract attention.

The VRM Class II areas are generally located north of Steens Loop Road and in the western portion of South Steens Project Unit. The VRM Class II objective is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Existing seedings, the Steens Loop Road corridor through the WJMA, and several small areas along the west central project area boundary are VRM Class III areas. The VRM Class III areas are also found in the western portions of South Steens Project Unit. The VRM Class III objective is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate and management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the landscape.

The only VRM Class IV areas are in the WJMA, outside of the Steens Loop Road corridor. The VRM Class IV objective is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the effect of these activities through careful location, minimal disturbance, and repeating the basic elements.

VRM Classes for each Project Unit are shown in the following table:

Table 3.12. VRM Classification by Proposed Unit

UNIT	VRM CLASS				Private
	I	II	III	IV	
Ankle Creek	X				X
Bird Reservoir #3		X			X
Bridge Creek #3	X	X			X
Brown	X	X			X
Chimney #3		X			X
Cold Spring	X				X
Cucamonga Creek	X	X			X
Dingle	X				X
Doe Camp		X			X
Drake	X	X			X
Elliot Field #9		X			
Fish Creek	X				X
Gorges	X				
Hardie		X			X
Home Creek	X				X
Horton		X			X
Kiger Creek	X				
Krumbo Mountain #2	X	X			X
Krumbo Ridge #1	X	X			
Kundert	X				
Lower Field #1	X	X	X		
McCoy Creek #1 East		X			X
McCoy Creek #1 West		X			X
Moon Hill #6		X			X
North Mud Creek	X	X			X
Oliver Springs #4		X			X
P. Hill	X	X			
Ranch	X	X			
Road #2	X				
Ruby Spring #4		X			X
Sagehen		X	X		X
Scharff	X	X			X
Solomon	X				
South Mud Creek	X				X
South Steens	X	X	X		X
Upper Field #2	X		X		
West Lower River #6	X				
West Slope		X			X
West Upper River #5	X				
Wildhorse	X				
WJMA			X	X	

3.4.13 Wild Horses and Burros

(See Andrews/Steens RMP Map 7, Herd Areas and Herd Management Areas, on the attached CD.)

The Affected Environment for wild horses as described in the Andrews/Steens PRMP/FEIS applies to this document and is incorporated by reference.

There are two Herd Management Areas (HMAs) within the project area. The Kiger HMA is 38,359 acres, 6,531 acres of which are located in northeast part of the CMPA. The South Steens HMA is 127,838 acres and is located in the southwest part of the project area.

Each HMA is managed according to a Herd Management Plan which identifies the population of horses to be managed for and the objectives for managing the herd including the physical characteristics of the horses. The horse population is controlled by periodic gathers and adoptions conducted by the BLM.

3.4.14 Wildlife

Wildlife other than migratory birds and Special Status Species include mule deer, elk pronghorn antelope, badger, black-tailed jackrabbit, cottontails, magpies, ground squirrels, pocket gophers, deer mouse, cougar, bobcat, coyote, ducks, geese, swans, chukar, California quail, yellow-bellied marmot, wood rats, voles, reptiles, and amphibians. Only the big game species will be covered as to some of their habitat requirements and use areas in the project area. More information on big game species can be found in Chapter 3 of the Andrews/Steens PRMP/FEIS.

Pronghorn can be found at all elevations of the project area at different times of the year. They prefer more open habitats such as grasslands, low sagebrush, and generally open rolling terrain but will use other habitats such as big sagebrush occasionally.

Mule deer use the project area yearlong. The lower elevations below about 5,600 feet are considered winter range but this varies with the snowpack each year. Deer are dependent on sagebrush for the main part of their winter diet. Sagebrush and juniper are also used for thermal cover during the winter months to help reduce heat loss during the cold winter nights. As the snow melts, deer will move to higher elevations. Fawning habitat was described by Sheehy in the 1970s as mountain big sagebrush areas near aspen stands. The majority of the documented fawning occurred within 100 yards of these stands. Bitterbrush is an important browse species for deer in the fall and early winter months.

Elk use the project area yearlong with use patterns moving elevationally throughout the year. Winter range is usually the lower elevations such as along the Donner und Blitzen River corridor and lower juniper areas to the north. Kiger Gorge, Riddle Creek, Coyote Creek, upper elevations of the Donner und Blitzen drainage, and other higher areas on private land make up elk summer range. Approximately 400 head of elk occupy parts of the project area.

4 ENVIRONMENTAL CONSEQUENCES

This section describes potential effects on resources from enacting the proposed alternatives. Cumulative effects sections begin at Section 4.11.

This document is tiered to the Andrews/Steens PRMP/FEIS. (Copies of the Andrews/Steens PRMP/FEIS may be obtained from, or inspected at, the Burns District BLM Office in Hines, Oregon.) The environmental consequences and cumulative effects sections in the Andrews/Steens PRMP/FEIS describe potential environmental consequences to the greater environment of the North Steens Project Area and are incorporated into this document by reference in accordance with the CEQ regulation § 43 CFR 1502.2. Additional project-specific descriptions of potential environmental consequences are provided in the text below.

The proposed project area has been divided into specific project units, which are primarily defined by pasture fencelines and natural features; proposed wilderness and WSA project units are also organized by these features where possible. Larger project units are located in the No Livestock Grazing Area in wilderness due to lack of fencelines and different management for this area.

Project unit names are sometimes utilized in the descriptions of potential environmental consequences. Project unit names are found in Section 2.7 of this document.

4.1 No Action Alternative A - No Treatment: Critical Elements

Assumptions common to all resources: The description of the potential effects of selecting the No Treatment Alternative contains two components. The first is absence of landscape level juniper fuels treatment actions resulting in continued expansion of western juniper in native habitats, and associated changes in fuel arrangements (a sagebrush community transitions to a juniper woodland), second, is the potential for high intensity and large extent fires due to more continuous juniper canopy (fuel). The following descriptions of the environmental consequences include both assumptions.

Under the No Treatment Alternative, western juniper could continue to increase density and cover at the expense of understory vegetation. Increasing juniper cover and density could also modify plant community fuel arrangements (e.g., closed juniper woodlands could replace sagebrush) across the project area with a concomitant increase in risk of large natural wildfires in juniper stands. These wildfires could burn with greater intensity and for longer duration due to an increase in continuous woody fuels in the juniper canopy. Intact, unencroached plant communities have an increased ability to recover from fire events. In late-successional juniper woodland sites, the understory generally is greatly reduced or eliminated. Lack of a healthy understory minimizes potential positive responses to fire events, such as a mosaic of seral stages in a healthy sagebrush community, or a regenerated aspen stand, and maximizes the potential negative effects, such as soil loss or sterilization (from intense fires). As plant communities continue to transition to closed juniper woodlands, post-fire event rehabilitation and operational costs would likely increase.

4.1.1 Areas of Critical Environmental Concern

If expansion juniper are not treated in the project area, the potential for fire moving onto an ACEC could increase; as a result, the Fir Groves ACEC and Rooster Comb RNA/ACEC could be vulnerable to increased negative fire effects.

4.1.2 Air Quality

Under the No Treatment Alternative, western juniper could continue to increase density and cover at the expense of understory vegetation. Increasing cover and density would also increase fuel continuity across the project area with concomitant increase in risk of large wildfires. Fires could burn with greater intensity and for longer duration due to increase in larger woody fuels. Over time, increase in fuels and fire intensity would amplify total emissions and duration of emissions of fire events. Smoldering combustion of woody fuels would continue to produce smoke several days after the event, and this is an air quality concern.

Wildfires tend to burn longer than those prescribed. Climatic conditions change during fires and can result in longer burning times. During natural events, climatic changes are mainly unknown. During the summer burning season, lengthy inversions may occur which cause smoldering fires producing the majority of local smoke. During freely burning fires, convection lifts smoke into the atmosphere. Transport winds may carry that smoke some distance dispersing it in the process.

During prescribed fires, conditions can be selected to maximize these dispersal effects. Burn plans should stipulate optimal conditions for effective smoke dispersion. During wildfires, however, conditions may not be conducive to dispersion. Size is an issue with natural and prescribed events. Prescribed project units would be smaller than most wildfire areas. This difference is important for the amount of particulates produced. During prescribed fires, evening temperatures are lower and Relative Humidity (RH) is higher resulting in greater fuel moisture. The overriding difference between natural and prescribed fire events is operational conditions can be selected with the prescribed event, and all tools are available to choose optimum conditions for minimizing smoke effects.

4.1.3 American Indian Traditional Practices

No effects to American Indian Traditional Practices would be expected as a result of selecting the No Treatment Alternative.

4.1.4 Cultural Heritage

With the exception of fire suppression, the No Treatment Alternative poses some of the greatest potential effects to cultural resources (including the Riddle Brothers Ranch Historic District) of all the alternatives. As a result of a lack of managed juniper fuels, provisions would not be made for locating or protecting sites that could sustain damage from fire effects.

Intense fires are known to damage surface archaeological sites and could damage subsurface site components. Under this alternative, increased erosion and ground visibility in unmanaged juniper woodlands could result in increased effects to archaeological sites both from burn over and juniper invasion in these areas.

4.1.5 Migratory Birds

Under this alternative, juniper populations would increase in size and density over the landscape, which would favor some woodland species of birds. As sagebrush habitat is reduced over time, sagebrush-dependent species may decrease in abundance; however, sagebrush species utilizing woodland habitats would still be present. Species that prefer open grasslands could also be reduced in abundance.

Should a wildfire occur, juniper canopy cover could substantially decrease depending on size and intensity of the fire. Wildfires could affect both big and low sagebrush sites. Wildfires tend to occur during a hotter and drier time of year (late July-early August); the resultant increase in burn intensity could affect the recovery of sagebrush habitats. Due to current, heavy fuel loading, wildfires often leave fewer islands of remnant vegetation such as sagebrush; loss of islands may retard natural recovery of the overall site.

A lack of a mosaic burn pattern (due to the scale and intensity of the fire event) could result in a grassland community that persists for longer periods of time than would be anticipated with a prescribed fire. This would benefit grassland species and probably some habitat generalists.

Continued expansion of juniper down slope, and subsequent reduction of habitat, could affect riparian obligate species. Depending on size and extent of wildfires, juniper canopy in riparian areas could be reduced which could improve habitat for riparian species as long as fire intensity does not also remove native riparian woody species and associated seed sources.

4.1.6 Noxious Weeds

Noxious weed populations could expand as a result of niche creation resulting from juniper expansion. Survey and treatment for noxious weed sites could be more expensive and labor intensive.

4.1.7 Paleontological Resources

With the exception of fire suppression, the No Treatment Alternative poses some of the greatest potential effects to paleontological resources of all the alternatives. Because of lack of treatment, provisions would not be made for locating or protecting localities that could be affected by fire. Fuels reduction could depend on natural forces, resulting in more intense fires of longer duration. This type of fire could damage paleontological resources through increased soil exposure and erosion, increased exposure of paleontological materials to intense heat, and increased potential for illegal collecting.

4.1.8 Special Status Species – Fauna

Project area Special Status Species include bald eagle, Columbia spotted frog, greater sage-grouse, Northern goshawk, Swainson's hawk, Preble's shrew, wolverine, California bighorn sheep, several species of bats, long-billed curlew, western burrowing owl, and sage sparrow.

The bald eagle would not be directly affected by continued juniper expansion. An increase in juniper numbers and age could result in additional roost trees in the long term; however, a catastrophic fire could destroy roost trees. The Burns District Bald Eagle Winter Roost Habitat Management Plan (1986) directs BLM to conduct vegetation management around roosts to prevent loss.

With selection of this alternative, juniper expansion could affect lower elevation Columbia spotted frog habitat. Loss of willows and other deciduous riparian shrubs could continue and restrict beaver use of riparian areas. Beaver ponds, which provide habitat for Columbia spotted frogs, could be eliminated. Upper elevation sites would not be affected unless juniper expands upslope.

Greater sage-grouse habitat could be affected in the long term from loss of winter, breeding, nesting, early to late brood rearing, and migratory habitat. The only habitat not affected would be higher elevation late brood-rearing areas near Fish Lake and above. Future juniper expansion would continue to degrade lower elevation sagebrush habitats. It is expected that within 50 to 80 years, areas where juniper are presently at a low density would approach woodland stand characteristics. At woodland density, most leks would be surrounded by juniper, which would reduce the area available for males to strut and would increase raptor perches close to the leks. This would also reduce escape cover near the leks and increase the susceptibility of displaying males to ground predators. Nesting and early brood-rearing habitat would also be reduced in most sagebrush vegetation types. The increase of raptor and raven perches could increase the susceptibility of nests to depredation by raven, and hens and young chicks to predation by raptors. The amount of forbs available for hens in the prebreeding time, a critical factor in the successful nesting and production of viable eggs, would be affected. Loss of sagebrush and grass cover could affect nesting. The increase in juniper may also continue to affect migratory routes between lower elevation nesting and early brood-rearing habitat and upper elevation late brood-rearing habitat. As juniper increases in density, sagebrush cover, which is important for concealing movements, would be reduced with a proportional increase in raptor perches. This could reduce the recruitment of young into the population as well as reduce the number of breeding adults.

Wildfire could affect greater sage-grouse habitat differently depending on the size and intensity of the fire. Smaller (fewer than 5,000 acres) wildfires that reduce the juniper canopy and leave islands of shrubs may help in restoring vegetation to a grassland/shrub type. The recovery time may be longer depending on the intensity and elevation at which the fire occurs and the type of sagebrush burned. Larger wildfires intense enough to produce a canopy fire, may additionally reduce the juniper canopy, but would also burn more sagebrush habitat potentially resulting in sustained grassland. The lack of mature sagebrush would reduce seed production required to revegetate the burned area. Sagebrush seed is very small and seed dispersal distance from sagebrush is quite short.

Northern goshawk habitat could continue to be affected. Many lower elevation aspen stands have been encroached by juniper, which has reduced the viability of these stands and would eventually reduce their capacity to reproduce clones and reducing nesting habitat. Should a wildfire occur and burn juniper/aspen stands, the fire could rejuvenate the aspen stand, but the intensity of the wildfire may reduce clone production by destroying roots.

The reduction in clone potential could affect the long-term availability of nest trees. Unless these aspen stands are fenced from both browsing wildlife and livestock, recovery of the stand could be slowed and possibly stopped. Higher elevation aspen stands above the juniper belt would not be affected and would still provide nesting and foraging habitat for goshawks.

As juniper continues to expand down slope into Swainson's hawk habitat, there could be more trees available for nesting, but foraging areas decreased, affecting hawk reproductive capabilities. Small wildfires would reduce some nesting habitat, but restore some foraging habitat. One large wildfire could reduce potential nesting habitat, but open a larger area for foraging, increasing long-term productivity.

Juniper expansion could affect Preble's shrew habitat. Small wildfires could improve shrew habitat in the long term by reducing the juniper canopy and allowing native forbs, grasses, and shrubs to return. A large catastrophic wildfire would reduce cover for shrews over a vast area, which may decimate shrew populations in the burn area until vegetation recovers.

Wolverine and wolverine habitat should not be affected by this alternative.

This alternative could affect California bighorn sheep by the increase of juniper, which reduces shrubs, grasses, and forbs on which the sheep depend. While some juniper is a part of the bighorn sheep habitat in some areas on Steens Mountain, sheep may avoid areas with dense juniper stands. Small or large wildfires that occur in bighorn habitat could reduce the canopy cover of juniper and eventually increase foraging habitat for bighorn sheep.

Roosting habitat for bats in cliffs, rock crevices, abandoned mines, and old growth juniper trees would not be affected by this alternative. To the extent that a small or large wildfire would kill older form juniper, some roosting habitat could be affected.

Long-billed curlew habitat would probably not be affected. Larger wildfires could increase habitat for long-billed curlew by increasing grassland. The newly-created grasslands would be used by the birds relative to the distance from other required (such as meadow habitat needed for foraging).

The western burrowing owl may not be affected by this alternative since the only known location for this species is in the crested wheatgrass seedings near the project area. There could be other locations since this species uses abandoned badger burrows.

4.1.9 Special Status Species – Flora

The No Treatment Alternative may not aid in the restoration and protection of historic plant communities including many Special Status plant species. Affected Special Status plant species listed in Chapter 3 of this document and in the Andrews/Steens PRMP/FEIS could be affected by transitioning plant communities and remain susceptible to large-scale, high-intensity wildfires. Under the No Treatment Alternative restoration of plant communities would not occur. Reestablishment of historic fire regimes, which could maintain or create habitat for Special Status plants would also not occur. In fire-adapted ecosystems, many plant species have co-evolved with, and adapted to, fire.

Some plant species are endemic to Steens Mountain, the vast majority of which occur at an elevation where fire disturbance and juniper expansion are not a factor for concern. Other species occur in areas where fuels are naturally low and fire disturbance is not part of their normal disturbance cycle. For these, a continued change in the amount of fuels and the influence of fire are a potential threat.

General Effects Discussion

In general, plants in fire-adapted ecosystems have some ability to respond to the various stimuli generated by fire events, both natural and prescribed. Plant species respond differently to stimuli of this type and not all response is positive for a given species or population.

Fire intensity and duration are important considerations with regard to plant response. Other considerations are specific to the type of growth habit and this may be species specific or general with regard to a group of plants that have similar characteristics.

One of the most important differences between the action alternatives and the No Treatment Alternative is the potential for increased burn severity in the project area due to a lack of juniper fuels reduction. Burn severity is a measure of the amount of fuel consumption and associated heating at and below the ground surface. It is a function of the duration of the fire, and relates closely to the amount of surface fuel, litter and duff consumption, and their moisture content. Belowground effects would only become apparent in areas of high fuel accumulations.

A low severity fire would have little to no effect on most buried plant parts and often stimulates significant amounts of sprouting.

A moderate severity fire may reduce sprouting from some buds. Sprouting can still occur because some buds in deeper duff or soil layers are still undamaged.

A high severity fire can eliminate species and may lethally heat some plant parts in upper soil layers, particularly where concentrations of heavy fuels or thick duff layers are consumed. Any resprouting that does occur on heavily burned microsites can only occur from adjacent areas or from deeply buried plant parts. Abundant vegetative regeneration can still develop from species with deep roots such as aspen.

The reduced understory cover and thickness of organic layers following fire can increase light near the surface, this can increase post-fire plant response. Warmer soil temperatures following fires can enhance the amount of response as well. Some of the biggest effects may come from changes in soil chemistry and soil organisms following burning. However, most of these responses are poorly understood.

Whether herbaceous plants recover after fire depends largely on whether they are exposed to lethal temperatures. Survival generally depends on depth below the surface, whether or not they are located in combustible material, fire intensity and duration, and the subsurface moisture of the site.

4.1.10 Wetlands and Riparian Zones and Water Quality

Under this alternative, juniper would increase and become better established in riparian areas. Continued encroachment could decrease riparian vegetation diversity, and the productivity and function of riparian areas. The loss of desired riparian species (e.g., willow, sedges, and cottonwood) to juniper could lead to deterioration of stream channel integrity, bank stability, and water quality. High water events could to lead to further degradation of channel integrity and water quality. Riparian areas dominated by juniper are at greater risk of stand-replacing fire, and the potential effects of such events including hydrophobic and sterile soils, loss of shade, bank instability, and increased sediment levels.

Data collected from streams within the project area indicate that management is maintaining or improving riparian/wetlands, water quality, and fish habitat throughout much of the project area. However, juniper encroachment was noted among the conditions recorded during PFC assessment. Juniper invades riparian areas by shading out or out competing desired riparian species. Juniper encroachment into riparian areas and stream corridors would not likely lead to immediate degradation of stream channels, water quality, and fish habitat; rather it would likely be a slow process that would compound over time.

Riparian vegetation such as sedges, rushes, grasses, and woody species such as willow, alder, aspen, red osier dogwood, and cottonwood are important for maintaining stream channel integrity, water quality, and fish habitat.

The root systems of these plant species and desired riparian vegetative communities stabilize and protect stream banks from eroding during high water events. Stream banks that are covered with herbaceous vegetation and stands of willow and alder catch sediment during high water events and help maintain and restore flood plain function. Stream banks also dissipate the energy associated with high water, thus reducing the erosive potential of high water.

Juniper stands tend to have less complex vegetative communities, less understory cover, and more bare soil and the bare intercanopy areas exhibit high rates of erosion (Reid, et al., 1999). When riparian areas are dominated by juniper, high flow events have greater potential for erosion leading to bank instability and subsequent channel degradation.

Riparian vegetation plays an important role in maintaining water quality. Water quality can be degraded by changes in chemical/ nutrient content, temperature, turbidity, and levels of sedimentation. Juniper encroachment into riparian areas can lead to degraded water quality from stream bank instability, degraded channel morphology, loss of storage capacity, and reduced potential for groundwater recharge. The resulting impact can lead to increased sedimentation and changes to nutrient cycles associated with deciduous and herbaceous vegetation. Groundwater recharge affects low or late season flows and thus water temperature. The No Treatment Alternative could lead to water quality degradation over time.

Riparian vegetation effects infiltration, runoff, and erosion. Increased infiltration and decreased runoff are important for maintaining the integrity of aquatic systems. Water that infiltrates and percolates into and through the soil profile is available to sustain vegetation and recharge underground storage. Stored water is subsequently released as a cool water source that augments late season flows, buffers stream temperature, and provides habitat for aquatic species (Andrews/Steens PRMP/FEIS).

The long-term impacts of juniper-dominated riparian areas include decreased water quality and aquatic habitat condition. High sediment input that results from erosion and runoff can reduce habitat availability for fish by filling pool habitat and available hiding cover for fish. High levels of sediment also reduce spawning success by smothering eggs or trapping newly-hatched fish in the gravels below the streambed surface. High levels of sediment also reduce habitat for many macroinvertebrates, which are an important food source for fish.

Loss of desired riparian vegetation would affect the nutrient cycle. The riparian and stream nutrient cycle is likely being altered from one dominated by deciduous and herbaceous species to one dominated by juniper leaf input. While total nutrient input may not change, the nutrient input from juniper may not be as readily available for macroinvertebrates and may cause a shift in diversity and density of macroinvertebrates. Aquatic macroinvertebrates are a major food source for fish. In addition, terrestrial invertebrates such as worms, beetles, and grasshoppers would likely be less prevalent in juniper forest due to dryer soils and less succulent vegetation. These invertebrates can be an important food source for fish during certain times of the year.

This alternative would maintain current condition and trend of riparian areas, unless or until an event such as high severity wildfire or flood occurs. Over time, riparian condition would trend downward with consequent negative effects on water quality and fish habitat.

4.1.11 Wild and Scenic Rivers

The following discussions analyze potential effects on the ORVs.

Scenic:
As noted in the proposed Steens Mountain Wilderness and WSRs Management Plan this ORV is considered to be one of the qualities of these river systems. Scenic values could be compromised as junipers both expand into areas having open vistas, such as grasslands and shrublands, and as they grow and mature, thereby causing a reduction in scenic vistas in and along the WSR corridors.

Burning of areas by wildfires would also have an effect on the scenic values of the designated "wild" rivers in the Steens Mountain Area. Some visitors to these areas would consider the effects of wildfire on the visual qualities of the landscape in a negative manner while others would view these events as part of the natural processes of a healthy ecosystem. An increase in juniper density would possibly cause larger, widespread fires due to the increase in available fuels. Class I VRM objectives would be met.

Geologic:
Expansion of juniper woodlands in the WSRs should have no affect on this ORV. Nor should there be any effects to geologic values by wildfire.

Recreational:
The current and projected situation concerning juniper expansion will have little or no effect on WSR visitor issues such as solitude in a primitive environment. A possibility does exist of an adverse effect to this value if areas within the WSR corridors are overgrown by junipers, thereby causing a loss of access and travel due to overly dense stands and possible reduction of campsite areas.

Wildfires could have an effect on recreational values within the Wilderness. Campsites and trails could be damaged by fires as well as other recreational opportunities. Recreationists could also be displaced by wildfires; however, this would usually be restricted to the year of the fire.

Fish:
An expansion of juniper canopy coverage will cause an increase in the loss of riparian vegetation and thus create more barren ground on stream banks and slopes causing an increase in soil erosion. This will have an overall effect on this ORV by increasing water turbidity and adversely affecting the fisheries habitat.

Wildfires burning in areas of heavy concentration of junipers could also cause the same effects. Vegetation could be lost in such quantities as to result in soil loss by erosion into the rivers, which would result in negative effects on fish populations.

Wildlife:
Similar to the effects on fish is the effect on the wildlife ORV. Loss of riparian vegetation, which is in short supply in Great Basin ecosystems, due to juniper expansion will have affects to most wildlife species dependent upon riparian habitats. This situation is the result of the replacement of native habitat plant species with invasive junipers.

Again, dense stands of junipers would have the potential of burning large areas and at high temperatures. This could result in the displacement of wildlife populations and the loss of forage and cover needed for adequate habitat needs for those populations.

Vegetation:
Vegetation in the riparian WSR corridors which should be dominated by willow, alders, cottonwoods, aspens, and sedges, as well as other associated species will be adversely affected by the increased intrusion of western junipers into these habitats.

Fires could initiate situations where native plant species might be replaced by exotic species by allowing a change in species composition to take place. Wildfires could also affect native plant species such as mountain mahogany or sagebrush.

Botanic:
Effects to this ORV would be the same as those described in the Vegetation section above.

Cultural:
Further increases in juniper expansion in WSR corridors could have an adverse effect on this ORV, especially if there is an increase in the probability of wildfire. Intense or extreme fire events could have an effect on pre-historic cultural sites, which are prolific along the area's WSR corridors.

Historic:
Further increases in juniper expansion in WSR corridors could have a dramatic effect on this ORV, especially if there is an increase in the probability of wildfire due to un-naturally high concentrations of invasive junipers and the associated increase in fuel loading in those areas. Fire events of any scale could have an effect on the Riddle Brothers Ranch Historic District site in the Donner und Blitzen WSR corridor, especially to the numerous structures in the area.

4.1.12 Wilderness

The following discussion analyzes potential effects on wilderness characteristics.

Naturalness:
Western juniper expansion throughout large portions of Steens Mountain Wilderness would continue in a pattern same as that which exists at the present time. To the casual observer this would appear to be healthy juniper woodlands in a natural condition. However, the increase in the percent of closed canopy cover will cause a reduction in ground vegetation and an increase in the percent of barren ground in affected areas. On such sites an increase in soil erosion is likely to occur. In addition, there would be a loss of native vegetative species diversity and an increase in noxious weed invasion from opportunistic noxious weed plant species. None of these conditions are typical of open scattered stands of western juniper, which usually host large amounts of vegetative groundcover including a variety of associated grass, shrub, and forb species. As conditions deteriorate, well-informed visitors to the Wilderness may notice a change in the makeup of the system from one that is naturally vigorous to one that has been reduced to an unhealthy condition. This would be especially true to some observers where plant communities such as aspen, mountain mahogany, sagebrush, and riparian habitats deteriorate as they are overtaken by invasive juniper.

Naturalness would be further degraded in the event of a catastrophic wildfire. Under these alternatives naturally-occurring fires would be managed for “fire use” (allowing naturally-ignited lightning fires to burn as long as they stay within “prescription”). The unnaturally-occurring dense canopy cover and associated buildup of fuels due to increase in juniper density could lead to a stand-replacing wildfire. This would also be an unnatural occurrence for a stand of western juniper under normal conditions where wildfire typically spreads through the ground vegetation and includes mortality in those young junipers, which have not yet breached the sagebrush canopy. These less intense fires will only occasionally burn larger on mature junipers.

The potential for management of lesser intensity wildfires creates an opportunity for natural management of juniper expansion.

Wildness:
While “wildness” is not a wilderness value described either in the 1964 Wilderness Act or in BLM policy it is a factor, which receives attention from both the public and the agency. Webster’s Revised Unabridged Dictionary defines “wildness” as “The quality or state of being wild; an uncultivated or untamed state; disposition to rove or go unrestrained.” Wildness, or rather the loss of it, by human manipulation could be considered to being “trammeling” or “placing limits upon” or “restricting” the naturally-functioning wilderness environment.

The perception of wildness should not be affected by the ongoing expansion of invasive juniper, if left untreated. Similar to naturalness, most wilderness visitors would not perceive the current and continued irruption of juniper to be anything other than natural (see above).

Naturally-occurring wildfire, which would be utilized for “fire use” and not suppressed, would also have no effect on wildness. Wilderness visitors would also consider these as natural events. The actions of fighting any wildfire, which needed to be suppressed in order to protect human life or property, would have a negative effect on wildness within Steens Mountain Wilderness.

Solitude:
A wilderness visitor’s perception of solitude should not be affected by continuation of current conditions. Expansion of western juniper in the wilderness should not have a bearing on numbers of visitors to the area or their contact with each other. The issue of solitude is a function of social interaction and not a condition of the natural environment.

Similarly, wildfires not managed or suppressed should not have any effects on visitor solitude. Effects to solitude could result from suppression actions on wildfires, which may pose a threat to human safety and property. Effects on solitude would be the result of the presence of fire fighting personnel and the use of motorized or mechanized firefighting equipment within the wilderness area.

Primitive and Unconfined Recreation:
Effects to wilderness recreation values should not be too great in areas showing early stages of juniper expansion. Day use activities such as hiking, horseback riding, fishing, hunting, sightseeing, and nature study should be able to continue. Over time, though, many of these activities could become restricted as junipers spread and close in recreational use areas. Overnight use in wilderness campsites could be affected if juniper overruns some sites, though normal campsite activity should prevent this on most sites. There may be some loss of scenic vistas as junipers grow and mature, reducing viewing opportunities in some areas, or causing a reduction in openings and constricting cross-country travel.

Fire has potential to disrupt or destroy many types of primitive and unconfined recreation within wilderness. An unnatural buildup of fuels due to an increase in juniper density and canopy cover could create a large wildfire, which could affect all, or most of the recreational activities listed above.

Additionally, fire fighting efforts, if needed, may also have an effect on recreational activities in the Wilderness.

Supplemental Values:
Some supplemental wilderness values described in the Wilderness Act would be affected by the present and continued expansion of western juniper in Steens Mountain Wilderness. The three values in this category most affected would be scenery, vegetation, and wildlife.

Scenery could be affected by the change in vegetation type from areas such as open sagebrush flats or slopes covered in aspen to that of scattered or dense juniper cover, thereby altering the scenic values of those areas. The form, color, and texture of the scenery would change over time. Scenic values would also change because of any wildfire burning in wilderness.

Vegetation values could also be affected by the same processes of either increase in juniper cover or burning by wildfires. Plant species composition and density could be changed by either of these events. Sites could change from that of grasslands, shrublands, or aspen and mountain mahogany stands to those of dense canopy cover juniper stands, or to noxious weeds if the area burned.

Changes in plant communities and plant species composition could have effects on native wildlife populations in the wilderness by changing habitat cover. In addition, the abundance and variety of diet could be changed through loss or change of habitat as the conversion to stands of juniper or burning take place.

4.1.13 Wilderness Study Areas

The wilderness values associated with Lower Stonehouse WSA would be little affected because less than 2.0 percent of this WSA is located within the project area and potentially affected.

The wilderness values associated with the Blitzen River, Bridge Creek, Home Creek, High Steens, Lower Stonehouse, and South Fork Donner und Blitzen WSAs would be potentially affected as follows:

Naturalness:
The WSAs would continue to appear natural, without the imprints of human's activities. Wildfire use could help maintain plant diversity and health of fire-dependent ecosystems in WSAs. This could improve or enhance the WSAs' ecological naturalness through the restoration of native plant communities. However, naturalness could be reduced if stand-replacing wildfires remove all or portions of the juniper forests in the WSAs and attempts are made to suppress with heavy equipment. The opportunity to actively improve or enhance the ecological naturalness in the WSAs would be foregone.

Solitude:
Denser juniper stands and greater expanses of juniper would increase vegetative screening, thereby enhancing opportunities for solitude. However, solitude would be reduced if extensive wildfires were to remove large areas of vegetative screening.

Primitive and Unconfined Recreation:
Denser juniper stands could reduce opportunities for primitive and unconfined recreation by limiting those areas that could easily be traversed by hikers, hunters, backpackers, and horseback riders. Greater juniper density could reduce some opportunities for primitive and unconfined recreation, especially if previously used sites or areas become dominated by junipers. Should stand-replacing wildfires occur some recreation opportunities may be lost for an indefinite period of time, while others could be enhanced.

Special Features:
Greater sage-grouse habitat in Bridge Creek, Blitzen River, South Fork Donner und Blitzen, and High Steens WSAs could be reduced through the expansion of western junipers. Available crucial mule deer winter range in Bridge Creek and Blitzen River WSAs could also be reduced. Redband trout habitat in Bridge Creek and High Steens WSAs could be affected by juniper expansion into riparian areas and reduction of riparian vegetation.

4.2 No Treatment Alternative: Noncritical Elements

4.2.1 Biological Soil Crusts

The description of the factors influencing distribution of biological soil crusts (TR-1730-2) found in Chapter 3 of this document are utilized below as categories for the discussion of potential effects on biological soil crusts from selection of the No Treatment Alternative. For a description of how these factors may influence biological soil crust distribution, see the Biological Soil Crust section of Chapter 3 of this document.

Elevation - The No Treatment Alternative would allow the continued modification of vegetative communities by juniper expansion. The focus of this modification would be in the juniper belt, which occurs primarily from 4,500 to 6,500 feet in elevation in the project area. Biological soil crusts occur in old growth and expansive juniper populations, but are not as readily evident in the modified understory of the recent (post-1870 trees) juniper population expansion, this may be a function of light reduction, moisture interception or simply site-specific soil chemistry.

Soils and Topography - Both shallow less productive and deeper more productive soils support biological soil crusts. The juniper expansion issue affects these two generic soil categories differently. Juniper expansion is more rapid in deeper soils and the populations that occur are more dense in productive soils; whereas the shallow less productive soils are generally where juniper expansion is limited, but is also where old growth juniper tends to occur.

The risk of catastrophic wildfire as an affect of selecting the No Treatment Alternative could threaten remnant biological soil crusts in dense juniper stands in deep soils. The risk of wildfire is much less of an issue where the soils are poor and shallow and this is a function of the natural lack of fuels. Since biological soil crusts are generally more common in less productive soils with large interspaces between vascular plants, the larger percentage of biological soil crusts in the juniper belt should not be affected by large-scale fires.

Over the short term, there should be very little effect to biological soil crusts in poor soil areas as a result of selecting the No Treatment Alternative. Over the long term, juniper populations could increase in poor soil areas to the point where fire could scorch the soil and biological soil crusts.

Disturbance - As a fire burns through an area, some vegetation and biological soil crusts are left unaffected. The mosaic pattern in the vascular vegetation may be mirrored by the biological soil crust communities. Biological soil crusts also occur in areas without vascular vegetation, so the total remaining biological soil crust cover in a burned area should be sum of the remnant cover in the vascular vegetation mosaic and the unburned interspaces or areas of naturally low fuels. The selection of the No Treatment Alternative could produce situations where large-scale high intensity wildfire events burn entire areas without leaving a mosaic of unburned vegetation, if this occurs, natural recovery of biological soil crusts could be slowed considerably due to the reliance on recolonization from fewer unburned biological soil crust populations.

Timing of precipitation - Moisture regimes can play a large role in biological soil crust community composition. Increased juniper cover reduces the available precipitation from each rain event. The amount of precipitation that reaches the ground in a stand of juniper can be very significantly altered compared to sagebrush-dominated systems. Increases in moisture interception could result in a lack of biological soil crusts in expanded juniper populations where foliar cover has increased dramatically.

Biological soil crusts play a varied role in a functioning ecosystem. A given ecoregion, ecological roles of biological soil crusts can vary widely in their importance and will depend on crust composition and biomass, as well as characteristics of the specific ecosystem being considered (TR-1730-2).

Information specific to the Andrews RA is currently being gathered via new monitoring efforts. The BMPs would be developed and implemented as determined necessary by the Field Manager.

4.2.2 Fire Management

The increase in western juniper would continue to increase fuels continuity across the project area. The condition class would remain in a three, indicating a large departure from historic conditions. Wildfires would burn with greater intensity due to the increased fuel loading and could potentially burn over larger areas because of the greater fuel continuity. Wildfires would also become more difficult to suppress because of the greater fuel loading. Firefighter and public safety would be at greater risk once fires are ignited. Fire suppression efforts would be restricted to primarily indirect attack strategies because of fuel loading and potential flame lengths. The use of mechanical equipment would also be increased because of the increase in large woody vegetation.

4.2.3 Fisheries

There would be no direct effects to fisheries with the selection of this alternative, although as riparian areas became dominated with juniper; stream conditions would likely degrade over time. Channels would become simplified meaning less pool habitat, less sinuosity, fewer cut banks, and less hiding cover. Water temperatures would likely increase, and a change in the nutrient cycle would likely affect productivity.

Higher levels of bare ground often associated with western juniper and degraded stream conditions would likely lead to chronic sediment inputs to stream channels. Chronic sediment inputs would reduce spawning habitat and reproductive success of fish. Elevated sediment reduces available habitat for both fish and macroinvertebrates. Fine sediment fills the empty spaces in stream substrate, which is habitat for many species of macroinvertebrates. Increased sediment reduces pool habitat, which are important for cover, over-wintering habitat, and they can provide thermal refuges during temperature extremes.

Healthy riparian areas are essential to the maintenance and recovery of water quality and fish habitat. The importance of healthy riparian areas and their influence on fish habitat are described in the Andrews/Steens PRMP/FEIS.

Fish habitat would likely be affected by juniper invasion and loss of riparian species. While these effects would not occur immediately, there would likely be a slow unraveling or degradation of habitat conditions that would be accelerated during watershed disturbances. Many of the potential effects of degraded habitat have been mentioned above, like loss of habitat complexity, sediment inputs, bank instability, change in groundwater storage and release, increased water temperatures, and likely a change in macroinvertebrate density and diversity. The cumulative effects of these potential effects would lead to lower numbers of fish and reduced population viability.

Selection of this alternative would maintain the current condition and trend, precluding an event such as catastrophic fire or flood. There would be no affects to riparian areas, water quality, or fish habitat, however, riparian areas would be in a downward trend that would have negative effects to water quality and fish habitat. Streams that have been severely degraded take many years to recover. This alternative does little to move conditions toward management and project objectives.

Riparian conditions would be expected to improve wherever fire is introduced and juniper is removed. Stream corridors currently dominated by juniper would be revegetated with desired riparian species and fires within riparian areas would stimulate new growth of decadent and dying vegetation. Riparian plant species possess adaptations to fluvial disturbances that facilitate survival and reestablishment following fires, thus contributing to rapid recovery of streamside habitats (Dwire and Kauffman, 2003). Several grasses and forbs increase reproductive output in the first few post-fire years (Kauffman, 1990). This would improve watershed stability and function by reducing bare soil and sediment inputs, stabilizing banks, increasing infiltration, and maintaining or restoring proper storage and release of groundwater important for late season flows and temperatures.

The differences between action alternatives and no action is that by using prescribed fire there would be less likelihood of a high intensity burn or stand-replacing fire and the action alternatives would put treated watersheds on an upward trend. The differences between alternatives are the amount of riparian area and how the riparian areas would be treated.

4.2.4 Forestry/Woodlands

Under the No Treatment Alternative, western juniper would continue to encroach into mountain big sagebrush, quaking aspen, low sagebrush, and riparian plant communities. Tree density and cover would also continue to increase in existing woodlands. The increase in western juniper would negatively affect the associated woody and herbaceous vegetation. In low sagebrush, and existing old-growth western juniper woodlands, the effects of western juniper increase would be less obvious. In these shallow soil areas western juniper would out compete associated shrubs, herbaceous vegetation, and established pre-settlement trees (prior to 1870). Competition for water and other soil resources would reduce vigor of already low vigor pre-settlement trees.

Associated shrubs and herbaceous plants would be reduced in more productive big sagebrush plant communities. On shallower soil big sagebrush plant communities, the shrubs and herbaceous vegetation would be reduced to very low levels, potentially less than 2.0 percent cover. However, on deeper soils the herbaceous vegetation would persist under higher cover of western juniper. Deeper soil sites would have much more dense western juniper woodlands than the shallower soil areas.

Reduction in vegetation would open the sites to soil erosion from water. Risk of erosion would be greatest in the late transition to fully-developed woodlands. Bare ground is highest of all stages under these conditions. Soil erosion would primarily occur following summer convective events or during the winter months when soils are frozen.

Establishment of western juniper across the project area would effectively homogenize the structure of the vegetation. The conversion of mountain big sagebrush, quaking aspen, low sagebrush, and riparian plant communities to western juniper woodlands simplifies the structure of the vegetation. Plant communities of varying heights, cover, and composition would become more similar as western juniper dominates. The simplification of the vegetation component of the ecosystem also could have the same effect on the wildlife components.

4.2.5 Livestock Grazing Management

Under the No Treatment Alternative, livestock grazing would be negatively affected by the increase in western juniper density and cover and concomitant decrease in herbaceous vegetation. The increase in western juniper and the increased density of existing woodlands would force domestic livestock, and wild herbivores, into smaller more productive areas. The increase in grazing pressure could result in negative effects to rangeland health. Areas that may be over utilized could include riparian areas, quaking aspen stands or meadows. Changes in rangeland health would be monitored by the BLM and the result could be a reduction in the available AUMs for that pasture or allotment.

4.2.6 Recreation

Overall, the types of recreation activities available would not be affected. In the long term, the continuing western juniper expansion would reduce habitat for big game animals, thereby reducing hunting opportunities. Expansion of aspen groves would continue, with an overall reduction of aspen in the landscape. This could reduce the number of fall visitors who come to see the colorful aspens.

The potential for large wildfires, which could affect both dispersed and developed recreation, would continue. Safety concerns would be raised if fires occur in or near developed recreation sites.

4.2.7 Off-Highway Vehicles

The current CMPA designations for the OHVs and mechanized vehicles would not be affected. Temporary closures associated with fires and prescribed burning would displace the OHV and mechanized vehicle users to nearby designated roads and ways, possibly causing crowding and heavy use on those routes.

4.2.8 Social and Economic Values

With continuation of current management rangelands would continue to deteriorate in condition over the project area due primarily to spread of juniper woodlands. As a result there could be a decline in rangeland habitat on which animal species such as deer, elk, and antelope depend. This decline could facilitate a decrease in populations of such animals, in turn resulting in fewer wildlife viewing and hunting opportunities. As these recreational pursuits are closely linked to social values and to the economy local and beyond, there could be an effect on these values. In addition, rangeland deterioration could increase difficulties for livestock operators dependent on healthy rangeland for economically viable and sustainable operations. As the local economy is heavily dependent on livestock grazing operations, a decline in production in the project area could affect the local economic base.

4.2.9 Soils

Bare ground areas would increase with the increasing western juniper cover and density. The risk of soil erosion would increase as the understory vegetation is reduced. The effects would be greatest on the southeastern to western slopes where soils are slightly shallower and the loss of understory vegetation could be greatest. Risk of soil movement would be from water running across the surface as a result of high intensity convective storms or during the winter months when soils are frozen. The frozen conditions limit infiltration and forces water to run across the surface. An effect to soils could happen as a result of future fuels buildup in some areas. High concentrations of fuels could lead to catastrophic fires that would leave large areas devoid of vegetation. Even after rehabilitation efforts, those bare areas would be very susceptible to wind or water erosion.

4.2.10 Transportation/Roads

Left untreated, the project area would remain susceptible to high intensity fires. The exposure of bare soil from these fires would increase overland water flow during rain events and snowmelt, causing route surfaces to erode and possible landslides blocking routes. Impacts to travel routes would be short term pending maintenance by road crews.

4.2.11 Vegetation

Under the No Treatment Alternative, western juniper would continue to increase cover and density on the mountain big sagebrush, quaking aspen, and riparian plant communities. Plant species diversity would be decreased across the project area with increasing western juniper. Similarity of species composition and plant community structure could increase across the project area.

Sagebrush cover and density would be reduced by increasing western juniper. Lateral leader growth of western juniper may be used as an indicator of competition. Suppression of lateral leader growth on western juniper indicates that intraspecific (tree-to-tree) competition is occurring. Sagebrush cover would start to be reduced prior to the point where western juniper begins to compete with itself. The rate of reduction in sagebrush cover would be related to the type of sagebrush present and soil type. Loss of sagebrush would be quickest on the mountain big sagebrush plant communities on southern aspects. Soils are often shallower than the valley bottoms or north aspects. Understory vegetation may also be drastically reduced on these south aspects and shallower soils. Deep-rooted perennial grasses and forbs may persist in the community longer than the shrubs, but eventually competition would also reduce their cover and density. Shallower rooted perennial grasses (Sandberg's bluegrass, bottlebrush squirreltail) and perennial forbs (phlox, buckwheat) may persist longer than the deeper rooted perennial grasses. On deeper soil with north aspects the shrubs would be drastically reduced or eliminated, but the understory grasses and forbs may persist, even under a fairly dense western juniper canopy.

Western juniper density and cover would increase in low sagebrush plant communities, but at a much slower rate than in the more productive mountain big sagebrush plant communities. Low sagebrush would be reduced by the encroaching western juniper, but the understory plants would not be suppressed to the same degree as in mountain big sagebrush plant communities. Early growth and termination of annual life cycle permit these plants to persist in the plant community.

Middle to lower elevation quaking aspen stands and riparian plant communities would be reduced by increasing western juniper under the No Treatment Alternative. The rate of western juniper growth is greatest on these sites. Western juniper has the potential to form closed woodlands with canopy covers in excess of 75.0 percent on these sites. Under these conditions the understory vegetation is all but eliminated. Only a small number of annual plants and very shade tolerant herbaceous plant species would exist under this level of western juniper canopy coverage. The combination of western juniper competition and drastic reductions in light levels would eliminate quaking aspen, willow, alder, and cottonwoods from the plant community, or restrict it to small opening in the stand. The soil surface would accumulate a litter layer composed of senesced western juniper needles, which are more resistant to decomposition than hardwood leaves. The chemistry of western juniper needles would also shift the litter layer and surface soil horizon pH toward a more acidic condition than under quaking aspen woodlands.

Reestablishment of sagebrush plant communities would be slowed under the No Treatment Alternative. Areas dominated by annual plants or crested wheatgrass seedings would be maintained in these conditions. Establishment of sagebrush would be slow because of the limited seed dispersal. Areas dominated by annual grasses and forbs would also remain at a much higher risk for fire than the plant communities dominated by perennials.

Map 4.1 (see Images and Maps CD). Projected Sagebrush and Juniper within the Project Area (data from Burns GIS). Projection is 60 years from present date and 80 years from the date of the data. Cover classes are percentages.

4.2.12 Visual Resources

Visual resources would not be directly affected. The VRM Class I, Class II, Class III, and Class IV objectives would be met. However, continued juniper invasion and the development of more continuous juniper stands, a solid, dark-green band could populate the 4,500 to 7,500-foot elevation belt across the west side of Steens Mountain.

The potential exists for large fires throughout the project area, which could blacken hundreds to thousands of acres. Form, line, color, and texture contrasts with the characteristic landscape could result. Form contrasts would arise from large, irregular forms in a landscape of generally small, irregular patches of vegetation and rock outcrops.

Line contrasts could be created by the juxtaposition of burned and unburned areas or, in time, forests versus grasslands. Color contrasts would result when the patchy black landscape is compared to the patchy to uniform gray-green and dark green vegetation. The alteration of moderately rough vegetation to a smoother, uniform landscape would result in texture contrasts on a large scale.

4.2.13 Wild Horses and Burros

The No Treatment Alternative would increase the likelihood of a decreased amount of forage available to all herbivores in the affected HMAs. Effect to wild horse populations could be pronounced if budgetary or operational restraints delay scheduled gathers. Increased interspecific competition between wild horse populations and other animal populations reliant upon the same limited resources could be exacerbated if the No Treatment Alternative is selected.

4.2.14 Wildlife

Pronghorn antelope, mule deer, and elk would be affected by the continued expansion of juniper into sagebrush, mixed shrub, aspen, and grassland vegetation types. This loss of habitat would eventually reduce the habitat capacity for supporting current populations of these species.

Wildfires, small or large, would reduce the canopy cover of juniper and return burned areas to grasslands. To the extent the fires burned through former low sagebrush areas, these areas would generally not return to a low sagebrush stand for possibly 100 years after the fire. Former mountain big sagebrush areas might return to a sagebrush canopy within 25 to 50 years but this would depend on the availability of sagebrush seed to be reintroduced into the burned areas.

Wyoming big sagebrush areas would probably take longer to return to a sagebrush canopy. Sagebrush seed has low viability and a short timeframe in which it can be seeded. Natural spread of sagebrush seed is only a short distance (<10 meters) from the seed producing plant so revegetation of burned areas through natural processes may require many years to express fully.

The presence of cheatgrass in Wyoming big sagebrush and lower elevation low sagebrush sites may inhibit recovery in the normal period due to the competitiveness.

While the grasslands would provide some forage for pronghorn, the lack of low sagebrush would keep pronghorn from using the area yearlong. This would also apply to mule deer and elk with mule deer requiring both Wyoming and mountain big sagebrush for different parts of their yearlong habitat. The loss of mountain big sagebrush stands would reduce the fawning habitat available for mule deer. Elk would utilize the mountain big sagebrush and low sagebrush for forage and cover as well as the remaining juniper for hiding and thermal cover.

With juniper expansion, aspen stands at lower elevations would be lost. These stands are important foraging areas for mule deer and elk and also important calving areas for elk. Under the scenario where fire occurs in juniper stands with weakened aspen stands, the response of aspen to the removal of the juniper canopy would depend on the viability of the remaining aspen clone and to the extent that scorching of the ground surface from fire intensity does not reduce the aspen clone response further.

Other species of wildlife would be affected differentially depending on the species habitat requirements, such as vegetative seral stage at which certain habitat characteristics occur, reproductive capacity, ability to reoccupy burned areas after treatment and the adaptability of the species.

4.3 No Action Alternative B - Continuation of Current Management Alternative: Critical Elements

Assumptions common to all resources: Under the Continuation of Current Management Alternative, western juniper could continue to increase density and cover at the expense of the understory vegetation. Increasing juniper cover and density could also modify the plant communities fuel arrangement (closed juniper woodlands could replace sagebrush for example) across the project area with a concomitant increase in risk of large wildfires in juniper stands. Wildfires burning in these areas could burn with greater intensity and for longer duration due to the increase in larger woody fuels. Unencroached sagebrush communities have an increased ability to recover from fire events, due to the intact sagebrush plant community. In a late-transitional juniper woodland site, the sagebrush understory has been greatly reduced or eliminated altogether; this lack of a healthy understory minimizes the potential positive responses to fire events (such as a mosaic of seral stages in a healthy sagebrush community) and maximizes the potential negative effects such as soil loss or sterilization (from intense fires). As juniper continued to transition to closed woodlands over much of the landscape, post-fire event rehabilitation and operational costs would likely increase.

In untreated areas, which would be the majority of the landscape, the effects of the Continuation of Current Management Alternative are considered substantially the same as the effects of the No Treatment Alternative. In the small areas that would be treated over time across the landscape (under other NEPA documents), effects of the Continuation of Current Management Alternative would be substantially the same as those described in the Partial Treatment Alternative. The primary difference between the Partial Treatment and Continuation of Current Management Alternatives is the scale and rate at which treatments would occur across the landscape. Under the Continuation of Current Management Alternative, small juniper treatments could still be proposed, analyzed and implemented, but they would require new individual NEPA analysis. The rate at which the landscape could be treated would be substantially slower than any of the Action Alternatives, but would still occur over time assuming project proposals occurred, were analyzed and funded.

4.3.1 Areas of Critical Environmental Concern

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading “Assumptions common to all resources.”

4.3.2 Air Quality

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading “Assumptions common to all resources.”

4.3.3 American Indian Traditional Practices

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading “Assumptions common to all resources.”

4.3.4 Cultural Heritage

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading “Assumptions common to all resources.”

4.3.5 Migratory Birds

In untreated areas, which would be the majority of the landscape, the effects of the Continuation of Current Management Alternative are the same as the effects of the No Treatment Alternative (4.1.5). In the small areas that would be treated over time across the landscape (under other NEPA documents), effects of the Continuation of Current Management Alternative would be substantially the same as those described in the Partial Treatment Alternative (4.5.5). The primary difference between the Partial Treatment and Continuation of Current Management Alternatives is the scale and rate at which treatments would occur across the landscape. This would be substantially slower than any of the Action Alternatives, but would still occur over time assuming project proposals occurred, were analyzed and funded.

4.3.6 Noxious Weeds

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading "Assumptions common to all resources."

4.3.7 Paleontological Resources

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading "Assumptions common to all resources."

4.3.8 Special Status Species – Fauna

In untreated areas, which would be the majority of the landscape, the effects of the Continuation of Current Management Alternative are the same as the effects of the No Treatment Alternative (4.1.8). In the small areas that would be treated over time across the landscape (under other NEPA documents), effects of the Continuation of Current Management Alternative would be substantially the same as those described in the Partial Treatment Alternative (4.5.8). The primary difference between the Partial Treatment and Continuation of Current Management Alternatives is the scale and rate at which treatments would occur across the landscape. This would be substantially slower than any of the Action Alternatives, but would still occur over time assuming project proposals occurred, were analyzed and funded.

4.3.9 Special Status Species – Flora

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading "Assumptions common to all resources."

4.3.10 Wetlands and Riparian Zones and Water Quality

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading "Assumptions common to all resources."

4.3.11 Wild and Scenic Rivers

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading "Assumptions common to all resources."

4.3.12 Wilderness

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading "Assumptions common to all resources."

4.3.13 Wilderness Study Areas

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading "Assumptions common to all resources."

4.4 No Action Alternative B - Continuation of Current Management Alternative: Noncritical Elements

4.4.1 Biological Soil Crusts

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading "Assumptions common to all resources."

4.4.2 Fire Management

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading “Assumptions common to all resources.”

4.4.3 Fisheries

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading “Assumptions common to all resources.”

4.4.4 Forestry/Woodlands

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading “Assumptions common to all resources.”

4.4.5 Livestock Grazing Management

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading “Assumptions common to all resources.”

4.4.6 Recreation

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading “Assumptions common to all resources.”

4.4.7 Off-Highway Vehicles

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading “Assumptions common to all resources.”

4.4.8 Social and Economic Values

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading “Assumptions common to all resources.”

4.4.9 Soils

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading “Assumptions common to all resources.”

4.4.10 Transportation/Roads

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading “Assumptions common to all resources.”

4.4.11 Vegetation

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading “Assumptions common to all resources.”

4.4.12 Visual Resources

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading “Assumptions common to all resources.”

4.4.13 Wild Horses and Burros

Effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment alternatives as described in Section 4.3 of this document under the heading "Assumptions common to all resources."

4.4.14 Wildlife

In untreated areas, which would be the majority of the landscape, the effects of the Continuation of Current Management Alternative are the same as the effects of the No Treatment Alternative (4.2.14). In the small areas that would be treated over time across the landscape (under other NEPA documents), effects of the Continuation of Current Management Alternative would be substantially the same as those described in the Partial Treatment Alternative (4.6.14). The primary difference between the Partial Treatment and Continuation of Current Management Alternatives is the scale and rate at which treatments would occur across the landscape. This would be substantially slower than any of the Action Alternatives, but would still occur over time assuming project proposals occurred, were analyzed and funded.

4.5 Partial Treatment Alternative: Critical Elements

4.5.1 Areas of Critical Environmental Concern

There are no prescribed fire treatments proposed within any ACEC for the Partial Treatment Alternative, so no effects from proposed treatments to any ACEC would be expected. The implementation of this alternative could only affect the Fir Groves ACEC if prescribed fire burns out of the control area (measures to avoid this are part of the project design). The Fir Groves ACEC is vulnerable to fire treatments that escape the control lines because of the type and density of fuels contained on the site. The Fir Groves ACEC contains a very dense stand of grand fir, mixed with juniper and aspen in some areas, which if fire is introduced, could destroy the entire stand.

In the long term, the completion of the project would better protect the Fir Groves ACEC from catastrophic fire events by reducing fuels in the surrounding or adjacent vegetation types.

4.5.2 Air Quality

Air quality would be minimally affected by the Partial Treatment Alternative. Mechanical treatments in this alternative would also have minimal effects on air quality. Treatment with mechanized equipment would occur during the time of the year when dust production would be minimal. Mechanical work with chain saws would occur during the spring, summer, and fall months, but production of dust from that activity would be negligible.

Prescribed fire would occur during the spring, late summer, early fall (broadcast burning), and winter (jackpot, individual tree burning). Smoke production would be limited to the period of time from ignition to approximately 48 hours following the end of ignition. Smoke drift would primarily move east and southeast of the project area. No Class 1 airsheds or nonattainment areas would be affected by the prescribed fire actions. The communities of Frenchglen, Diamond, Fields, and Andrews would be notified of burning activities and the potential for temporary changes in air quality.

A lack of active management treatment within WSAs or Steens Mountain Wilderness would allow western juniper cover and density to increase, changing the fuel loading and continuity. Western juniper would increase the fuel loading and form a continuous fuel layer across what were formally mountain big sagebrush plant communities. Fires that burn in these areas would burn at a greater intensity and cause more severe wildfire effects than pre-expansion conditions. The additional fuel loading would also increase the level and duration of emission from fires. Wildfires would also ignite regardless of immediate and future weather patterns. Smoke could be forced into local communities or production could be great enough and over a long enough period to affect distant communities. Prescribed fires would be ignited considering the immediate and future weather patterns, reducing the potential for negative effects from smoke.

Actions from the Partial Treatment Alternative would help to reduce smoke emissions from fires by reducing fuel loading and continuity. Reestablishment of mountain big sagebrush, quaking aspen and riparian plant communities would help to restore historic fire regimes.

4.5.3 American Indian Traditional Practices

Fire and fire suppression activities may directly and indirectly affect American Indian Traditional Practices areas in various ways. Suppression activities such as OHV use, bulldozing control lines, and occupation of fire camps can damage American Indian Traditional Practices areas through sediment compaction and altered surface water drainage. Fire removes ground cover and exposes rock and soil to erosion, subjecting traditional use pre-contact/historic campsites to damage from wind and water erosion, and illegal artifact collecting.

Large burned acreage would mean greater exposure of surface sediments to erosion, subjecting campsites to damage from wind and water erosion, and illegal artifact collecting.

Under this prescription, American Indian Traditional Practice areas such as root plant populations are not substantially affected. However, if the burn plan calls for extreme heat generation to eliminate a target plant species that is difficult to remove, American Indian Traditional Practices areas could be affected. Nonetheless, the most important American Indian traditionally used plants are located in rocky, fire resistant plant communities. These lithisols are commonly used as fire breaks in control efforts. Even more important is that many of these species such as biscuitroot(s), bitterroot, and Indian carrot are dormant before the height of the fire season or prescribed burning season in the fall and are not affected except where ground fuels are thick enough to allow the fire to cook the soil.

Much of American Indian traditional use is intertwined so root gathering, though seen as economic, is a blend of economic, social, and spiritual activity. Disturbing this activity may inhibit the ongoing heritage of the American Indian tribes.

Post-fire suppression activities such as planned plantings and seeding can also affect areas important to American Indian Traditional Practices through soil/sediment compaction, alteration of groundcover and visibility, and the potential alteration of natural and Traditional use species growth and composition.

Potential affects to American Indian Traditional Practices would be eliminated by consultation and project redesign where necessary.

4.5.4 Cultural Heritage

Fire and fire suppression activities may directly and indirectly affect cultural resources in a number of ways. Effects could include destruction of burnable cultural resources (i.e., historic buildings and features); destruction of, or damage to, pre-contact rock art, surface scatters of stone artifacts, and waste stone debris; and damage to hydration rinds on obsidian artifacts.

Fire suppression activities such as OHV use, bulldozing of control lines, and occupation of fire camps can damage cultural resources through sediment compaction and artifact displacement and breakage. Soil chemistry at archaeological sites can be dramatically and permanently altered by fire retardants, especially in areas of low annual rainfall where leaching would be minimal. Fire removes ground cover and exposes rock and soil to erosion, subjecting subsurface archaeological site components and features to damage from wind and water erosion and illegal collecting.

Post-fire suppression activities such as planned plantings and seeding can also affect cultural resources through soil/sediment compaction, alteration of groundcover and visibility, and crushing damage to the site constituents.

Even though suppression can damage cultural resources in specific ways, well planned suppression would be preferable to allowing fires to burn unchecked. These short-term effects would be mitigated through prior cultural inventory, systematic surface artifact collection, and post-fire monitoring. After a few seasons of plant growth, ground cover decreases ground visibility.

Prior to project implementation, a Class III cultural resource inventory would be required. The survey would follow the terms of the *Protocol for Management Cultural Resources on Lands Administered by the Bureau of Land Management in Oregon*. These surveys would encompass all lands within the planned project area including Federal, State, and private holdings. These surveys would be restricted to those physical environments containing sufficient on-ground or created fuels that treatments could cause potential harm to lithic properties (see table below).

The District Archaeologist or designee would assess site exclusion or treatment modification during the treatment planning phase.

Table 4.1. Cultural Heritage Mitigation Measures

Planned Treatment	Protect cultural resource properties throughout the life of the project through avoidance.	Only heavy equipment using rubber tires would be utilized within site boundaries.	Heavy equipment would not be allowed within site boundaries during wet or soil saturated conditions.	Activity generated fuels would not be piled within the boundaries of sites.	No skidding, drilling, or mechanical seeding would be allowed within site boundaries.	Sites containing artifacts or features susceptible to fire damage and/or destruction would be protected during treatment through black-lining adjacent resources and appropriate ignition techniques.	An archaeologist would review burn plans prior to project implementation
Chain saw juniper			X	X			X
Mechanical mastication		X	X	X		X	X
Broadcast burning	X		X	X	X	X	X
Jackpot burning	X		X	X	X	X	X
Individual tree burning			X			X	X
Fencing			X				X
Reseeding/wheatgrass			X		X		X
Reseeding/native seed			X		X		X
Planting/woody species			X		X		X

Potential effects to cultural resources would be eliminated by project redesign or various scientific data recovery methods such as recordation, surface collection, subsurface testing, or excavation. The basis for this inventory and mitigation process would be Section 106 of the National Historic Preservation Act of 1966. A predictive model to locate significant sites would be created. Affects by other resource uses would be mitigated when found, on a case-by-case basis. Protection of cultural resource localities through law enforcement surveillance and other protective measures would occur.

Riddle Brothers Ranch Historic District

Prescribed burning can permanently affect key components within the Riddle Brothers Ranch Historic District (see the Riddle Brothers Ranch Historic District Cultural RMP). Wildfire, fire suppression, planting, seeding, commercial cutting of juniper, and the piling of woody debris all affect Historic Districts by altering those criteria that define the District as eligible for nomination to the National Register of Historic Places. These criteria include suppression activities such as OHV use, bulldozing control lines, and occupation of fire camps can damage all aspects of the “historic” structures and features and the American Indian site constituents within the Riddle Brothers Ranch Historic District.

Even though suppression can damage the Riddle Brothers Ranch Historic District in specific ways, well planned suppression would be preferable to allowing wildfires to burn unchecked within and immediately surrounding the Historic District. Potential effects to the Historic District would be eliminated by fire suppression project design including black lining and/or modified ignition techniques aimed at removing fire-prone vegetation from the Historic District (site preservation) and the removal of juniper limbs and boles to at least 50 feet from standing structures and features would mitigate this damage.

Post-fire suppression activities such as planned plantings and seeding can also affect the integrity of the Historic District through soil/sediment compaction, alteration of groundcover and visibility, crushing damage to the site constituents, and the alteration of the site environment (one key criterion for National Register eligibility). Potential effects to the Historic District from this activity would be eliminated by pre-planning for seeding and planting type, location, and compliance with eligibility criteria in consultation with the District Archaeologist would mitigate this damage.

4.5.5 Migratory Birds

General Analysis for Annual Treatments

Woodland species of migratory birds could be adversely affected by some features of the action alternatives since the main effect would be the cutting and burning of juniper woodlands. The reduction of invasive juniper each year would crowd returning birds into other woodland habitats near the treatments. This could reduce the productivity of the birds near the treatment area since crowding of birds into the remainder of the habitat results in greater species density in areas of limited resources. Over the course of the project, late transitional juniper in big sagebrush and juniper woodlands would be reduced by about 75.0 percent, which would affect local populations of woodland migratory birds especially those that use the denser stands of younger juniper. Activities, such as cutting and jackpot burning of trees and individual tree burning, may reduce the amount of scattered juniper that could reach woodland status during the life of this project. Other woodland species that nest and use younger juniper would be affected the most through loss of habitat. Most woodland species would still be present in the project area, but at reduced numbers. The cutting of juniper, if done before July 15, would affect those bird species nesting in juniper by destroying nests, eggs, and young in those nests. This would reduce productivity of these species and would add to the reduction in overall abundance of this suite of migratory birds.

Sagebrush-dependent species could be negatively affected since mountain and, to a much lesser extent, Wyoming big sagebrush would be burned along with the junipers in scattered and transitional stands. This burning would not be a complete burn (up to 50.0 percent canopy reduction of big sagebrush), but would reduce the big sagebrush that would be available for sagebrush nesting species. Affected species would be forced into nearby sagebrush habitat. The shifted populations would reduce the productivity of these birds; over the short term this could reduce species abundance though the species would still be present in the project area. In the long term (25 to 50 years) as sagebrush revegetates the burned areas, this would provide additional habitat for sagebrush-dependent species. Cutting and jackpot burning or individual burning of scattered junipers in big sagebrush vegetation types would have minimal affect on sagebrush species as most of the sagebrush canopy would be left intact and still useable by these species.

The effects of this level of burn could have beneficial effects for grassland species in the short term. Burned areas could stay in grassland dominated habitat for 25 years or longer depending on the elevation, species of sagebrush and the size of the burned area. Wyoming big sagebrush may not return to some burned areas for at least 40 to 50 years depending on the understory vegetation, while mountain big sagebrush could return to pre-burn densities in up to 20 to 25 years; although some sites within the project area have seen pre-burn densities return in 15 years. Low sagebrush may take more than 100 years to return to the burn areas. Shrub density would determine at what point the area is no longer useable by most grassland species.

Species that are habitat generalists, whether ground, shrub or tree nesters, could be negatively affected if the nesting habitat is significantly reduced. Burned areas would provide less vertical structure, which could force some species into other, more structurally diverse habitats adjacent to the treatment area or outside the project area. This displacement may also reduce the productivity of some of these species.

Habitat generalists could also be negatively affected if juniper treatments occur before July 15 through the direct loss of active nest sites with young. This type of action could reduce productivity in some local populations.

In the short term, riparian obligate species of migratory birds would not be affected by the removal of junipers from riparian areas since riparian shrub and woody species would be avoided during the burning process. Depending on the viability of or lack of remnant populations of woody riparian species, replanting with native stock could increase the rate at which riparian areas support desirable woody species. Riparian obligate species should have more available habitat in the long term as junipers are reduced in the riparian areas and replaced by willows, cottonwoods, or other riparian shrub and tree species.

Under this alternative, treatment actions would not take place in Steens Mountain Wilderness and WSAs. The affects of this alternative in the wilderness and WSAs would be the same as that described in the No Treatment Alternative. Those areas outside of wilderness and WSAs, mainly north of the North Loop Road would be affected as described in the general analysis above. The actions would be occurring over a smaller portion of the whole project area (~ 60,000 acres), so the project may be completed in a shorter timeframe. This would not necessarily allow for restoration of some burned big sagebrush vegetation to a 10.0 percent canopy cover before adjacent project units are treated. Grassland species of migratory birds would probably increase until sagebrush returned to burned areas.

4.5.6 Noxious Weeds

Noxious weed infestations could occur as a result of juniper expansion. Encroaching stands of juniper have the ability to out compete other native vegetation, thereby creating new niches that could be occupied by noxious weeds. Encroaching stands of juniper often alter the efficiency of noxious weed survey and treatment as compared to open rangeland because of difficulty maneuvering through the stand; however, juniper cutting that leaves juniper on the ground does not improve efficiency for the same reasons. This remnant juniper slash could allow new or existing noxious weed sites to spread undetected and potentially increase resistance to effective treatment.

The Partial Treatment Alternative of the North Steens Project would use prescribed fire, in addition to other methods, to restore rangeland habitat in the affected environment. Some noxious weeds possess the ability to spread rapidly through habitat disturbed by fire. Noxious weeds can capitalize on the nutrients released from burned vegetation; this also can occur due to the creation of bare spots and areas of reduced vegetation that can provide niches for noxious weeds to occupy. Biennial thistles, dalmatian toadflax, and medusahead rye are very effective at exploiting these niches. In addition, noxious weed seeds are easily introduced to these disturbed areas by birds, rodents, and livestock, infested vehicles, and from outside sources such as hunters and other recreationists. Incidentally, existing and new populations of weeds located within the North Steens Project Area could increase in number due to creation of potential seedbeds from fire disturbance related to the project. However, the proposed project area is unique in that it has relatively few infestations of noxious weeds and should resist any rapid spread of noxious weeds, particularly with an aggressive survey and treatment strategy.

Medusahead is one species of particular concern for several reasons. Populations are rapidly expanding in size throughout the District and new infestations are currently being documented. Medusahead responds aggressively to fire; it currently occupies small acreages within the project area, but Oregon BLM currently has no effective treatment against medusahead due to a 1987 Court Injunction. Given the scope and duration of the North Steens Project, mitigation for this noxious weed may need to occur. This could be in the form of buffer zones created around known infestations or exclusion of infested areas from treatment.

4.5.7 Paleontological Resources

Fire and fire suppression can directly and indirectly affect paleontological resources in a number of ways. Prescribed fire pre- and post-treatments (cutting and piling of woody debris, burning of the debris piles) affects paleontological resources through heat alteration of material remains, obscuring of sites, and sediment compaction. Suppression activities such as OHV use, bulldozing control lines, and occupation of fire camps can damage paleontological resources through sediment compaction and altered surface water drainage. Fire removes ground cover and exposes rock and soil to erosion, subjecting paleontological localities to damage from wind and water erosion and illegal collecting. Typically, the burn plan would call for extreme site-specific heat generation to eliminate western juniper, a difficult to remove target plant species (e.g., juniper). Paleontological resources could be affected by increased soil exposure and erosion resulting from the plant species removal as well as by exposure to extreme temperatures.

Post-fire suppression activities such as planned plantings and seeding could also affect paleontological resources through soil/sediment compaction, alteration of groundcover and visibility, and crushing damage to the site constituents.

Even though suppression could damage paleontological resources in specific ways, well planned suppression would be preferable to allowing fires to burn unchecked.

Potential affects to paleontological resources would be eliminated by project redesign or various scientific data recovery methods such as recordation, surface collection, subsurface testing, or excavation. Short-term effects would be mitigated through prior geology base modeling paleontological inventory, systematic surface fossil collection, and post-fire monitoring. After a few seasons of growth, plant cover should decrease ground visibility. Decreased visibility would affect paleontological locality through decreased potential for illegal collecting.

Protection of paleontological localities through law enforcement surveillance and other protective measures would occur under all alternatives.

4.5.8 Special Status Species – Fauna

The bald eagle would not be affected by this alternative. Since no actions would occur in the wilderness area, where the only suspected winter roost in the project area is located, there would be no potential positive or negative effects to bald eagles.

The Columbia spotted frog could be affected under this alternative the same as the No Treatment Alternative (4.1.8) since most known sites for this species are found in wilderness or WSAs.

Greater sage-grouse habitat in general, would be affected in the action alternatives through the cutting and burning of denser juniper woodlands. Most of the dense juniper woodlands, late stage transitional big sagebrush and juniper areas as well as a good portion of the mountain big sagebrush with limited juniper canopy would be treated with prescribed fire. This would reduce the juniper canopy and would convert these areas to grasslands for 25+ years until sagebrush can naturally revegetate the burned area. If the burn intensity is too high, then revegetation through seeding could be necessary to restore vegetative cover whether grass, forb or shrub. Adjacent to the dense juniper woodlands, greater sage-grouse habitat would be negatively affected since mountain big sagebrush and to a much lesser extent Wyoming big sagebrush could be burned along with the junipers. Most of the sagebrush associated with this level of burning is mixed in with denser juniper stands that are transitioning to woodlands. This method would not be used to the same extent in sagebrush with scattered junipers. Cutting and jackpot burning or individual burning of junipers in less dense stands would have minimal effect on greater sage-grouse habitat as most of the sagebrush canopy would be left intact and useable. In the long term as sagebrush revegetates the burned areas, additional habitat for greater sage-grouse would be created as sagebrush canopy cover increases in percentage.

Leks, which occur in low sagebrush sites, would not be affected unless cutting and jackpot burning of juniper trees occurred near a lek. This action would reduce the number of roost trees near the lek and reduce the possibility of predation on displaying greater sage-grouse.

Less dense stands of juniper within big sagebrush and low sagebrush vegetation types that would be treated with cutting and jackpot burning or individual tree burning would affect nesting habitat beneficially by reducing the number of raptor and raven perches while maintaining the canopy cover of sagebrush. Nesting habitat in big sagebrush could be affected if a prescribed burn is conducted to reduce the big sagebrush canopy and allow for grasses and forbs to revegetate after the burn. The greater the percentage of the canopy burned, the more nesting habitat would be affected. While this may improve aspects of habitat for greater sage-grouse such as forb and insect availability, the reduction in big sagebrush cover could affect the amount of suitable nesting sites for greater sage-grouse. Female greater sage-grouse would move to other available habitat but the probability of nesting success decreases.

Travel corridors would be opened up in areas that are juniper dominated. Areas that are cut and burned would have reduced numbers of dead standing trees, which may reduce the number of raptor perches. It is not known how dead standing trees affect greater sage-grouse use of burned areas. Presumably greater sage-grouse would be able to see raptors sitting in dead trees more easily than in live trees due to the lack of foliage. Once sagebrush cover returns, greater sage-grouse would have more protection while migrating between lower elevation nesting and early brood-rearing habitat and upper elevation late brood-rearing habitat. This would also be true for migration from higher elevations to lower elevation winter areas.

Under this alternative, these treatments would occur only outside of wilderness and WSAs so about 60,000 acres would be treated. The remaining acreage in the project area that is in wilderness or WSA could have effects on greater sage-grouse the same as that described in the No Treatment Alternative (4.1.8).

Northern goshawk nesting habitat in aspen stands would be avoided if nests are identified during surveys prior to treatment. Aspen stands that are treated via cutting and burning of juniper would be affected by the reduction of juniper and the release of new shoots after the burn. Depending on the size and density of the aspen stand after treatment (40+ years), they could provide nesting habitat for goshawks. Aspen stands in wilderness and WSAs would not be treated and would affect goshawks same as the No Treatment Alternative.

The cutting and burning of late transitional and dense juniper woodlands would decrease the number of trees that are available for nesting Swainson's hawk, but would open up grassland habitat for foraging. While the cutting and individual burning of juniper in low sagebrush would reduce the number of perches/roosts, it would still provide foraging habitat for this hawk. Since actions under this alternative would occur outside of wilderness and WSAs, habitat availability for nesting would be the same as in much of the project area same as the No Treatment Alternative.

In areas treated under this alternative, Preble's shrew habitat could be affected through the loss of sagebrush cover and aspen cover. While this shrew is associated with wet areas such as springs or streamside vegetation, it also uses sagebrush vegetation and aspen stands quite extensively. The removal of juniper from riparian areas and the restoration of riparian habitat would benefit this species in the long term. The loss of sagebrush and aspen vegetation types would affect other portions of the population by the reduction of suitable habitat and habitat fragmentation. Although the aspen stands would regenerate within a few years, the sagebrush would take longer and it may take many years for the Preble's shrew to repopulate areas. Those areas not treated in wilderness and WSAs could affect Preble's shrews as described in the No Treatment Alternative.

Wolverine habitat would not be affected since most of the actions in this alternative are not occurring in wolverine habitat.

California bighorn sheep habitat would not be affected by this alternative since most of the actions would occur outside of wilderness and WSAs where most of the bighorn sheep habitat exists. Effects would be the same as the No Treatment Alternative.

Roosting habitat for bats in cliffs, rock crevices, and abandoned mines would not be affected by this alternative. The cutting and burning of young juniper could increase foraging habitat for some species of bats and could reduce foraging area for those species that forage around junipers.

The cutting and burning of juniper would probably increase habitat for long-billed curlew by increasing grassland habitats. The new grasslands would be used relative to the distance from other habitats needed by the curlew such as meadow habitat for foraging.

The effects of this alternative on burrowing owls include potential habitat increases since new grasslands could be created with the reduction of juniper canopy cover.

4.5.9 Special Status Species – Flora

There are no known Federally-listed Threatened and Endangered plant species in the project area, but known Special Status plant sites do exist within the project area and more sites may be discovered during project clearance surveys. The influence of western juniper is widespread in the Burns District and reduction of this influence could have beneficial effects with regard to Special Status plants. Juniper reduction releases the understory vegetation; this release would reintroduce the components that once helped maintain balance with wildfire regimes (minus modern day excessive fuel loading). Juniper expansion can have negative effects on plant populations; most species cannot compete with juniper, which is a highly competitive plant species. Reducing the influence of juniper could be beneficial for Special Status plant populations currently being encroached upon.

Project areas would require completed botanical clearance surveys prior to project implementation; these can be accomplished in year by year to coordinate with the project timeline. With careful flagging and project implementation, this alternative could have significant positive effects on Special Status plant populations and minimal negative effects.

General effects of fire to plants are covered in the No Treatment Alternative Special Status - Flora Effects section.

Reduced size and intensity of fires would likely benefit plant populations by limiting the potential for catastrophic reductions in plant population size and the resulting genetic bottleneck that could provide an insurmountable obstacle to natural recovery.

Known or newly-discovered populations of Special Status plant species would be monitored to provide specific information on the condition of individual populations. Habitat required for Special Status plant species would be protected in accordance with project PDEs.

4.5.10 Wetlands and Riparian Zones and Water Quality

The Partial Landscape Alternative would not treat wilderness or WSR corridors that would leave several miles of untreated riparian habitat. The effects of juniper on riparian and aquatic ecosystem would continue over most of Steens Mountain. Benefits to desired riparian vegetation would be increased diversity, density, and vigor. The Partial Landscape Alternative will not facilitate meeting BLM management objectives because the riparian vegetation on Steens Mountain would continue to be encroached upon by and compete with juniper.

The effect of juniper on riparian areas in wilderness, WSR, and WSA would not be reduced and would likely lead to a downward trend in PFC as juniper colonizes riparian areas.

The Partial Landscape Alternative has a reduced risk of project-induced sedimentation and related potential for elevated water temperatures because the proposed treatment area is much smaller than other action alternatives. The likelihood of sediment inputs would be very low due to the size of the treatment area. Based on results of the East Ridge Project much of the existing riparian vegetation except for juniper would remain and buffer the stream channel contributing to improved or maintained water quality.

Riparian area function, complexity, and response to disturbance have been the focus of several research efforts. Riparian areas are dynamic ecosystems subject to some level of disturbance (Hibbs and Chan, 2001). Fire has been a natural mechanism of disturbance affecting aquatic ecosystems for thousands of years (Gresswell, 1999). In certain forested riparian areas, the fire return interval has been lower and fire severity has been more moderate than in adjacent uplands. In other areas, fires burn through riparian areas with some frequency (Dwire and Kauffman, 2003). On Steens Mountain, historic fires likely burned through riparian areas at lower frequency and intensity than uplands.

The proposed alternatives vary in the scale and type of riparian treatment. Juniper would be removed from riparian areas by burning, mechanical treatment (cut or girdle), or both. Prescribed fire ignited in the uplands could burn into riparian areas. Riparian areas with high fuel loading that have the potential to burn very hot would be pretreated by manual reduction to reduce fuel loads. Western juniper in riparian areas which are not burned, would be cut and burned individually to reduce the potential for impacts to riparian habitat quality.

The advantage of prescribed burning to treat riparian areas is related to control. If a prescribed fire is not burning as anticipated, ignition or treatment methods can be adjusted to meet objectives. Prescribed fire can be timed to reduce the risk of high burn intensity that ultimately affects vegetation mortality and impacts to soils. The effects of prescribed fire can be controlled by limiting the treatment area or managing the burn intensity relative to weather, and the physical, chemical, and biological characteristics of individual sites (Gresswell, 1999). By controlling prescribed fire size, intensity, and developing prescriptions that best suit the physical and biological characteristics of specific units, the level of effects can be reduced. Using prescribed fire on a unit-by-unit basis would allow techniques to be adjusted to better meet project objectives.

Treatment of juniper within riparian areas would have long-term benefits to stream systems and ecosystem integrity. Reeves, et al. (1995) stated that fire can be important for maintaining complex and productive habitats. After areas are treated, riparian vegetation would not be competing with juniper and desired channel functions and processes could be maintained. Healthy riparian areas would also maintain water quality and fish habitat. Given the treatment interval (e.g., years) impacts from treating one unit would allow some level of recovery before another unit is treated.

The risk of juniper effects to riparian areas in wilderness, WSR, and WSA would not be reduced. This would likely lead to a continued downward trend in PFC as juniper colonizes riparian areas. The Partial Landscape Alternative does not allow BLM to meet management objectives.

Monitoring and adaptive management is an important feature of all action alternatives. The potential risks and benefits associated with any management activity are clear in some cases; however, in most cases they are not. Recognizing the importance of learning from results of management actions, and adjusting management as necessary is critical (Walters, 1986) to effective management.

Riparian condition would be expected to improve wherever fire is introduced and juniper is removed. Stream corridors currently dominated by juniper would be revegetated with desired riparian species and fires within riparian areas would stimulate new growth of decadent and dying vegetation.

Riparian plant species are adapted to fluvial disturbance that facilitates survival and reestablishment following fires (Dwire and Kauffman, 2003). Several grasses and forbs increase reproductive output in the first few years post-fire (Kauffman, 1990). Water quality would improve with improved watershed function where erosion is minimized, sediment inputs are minimized, channel bank stability is reinforced, infiltration rates increase, and the potential for groundwater recharge is restored.

4.5.11 Wild and Scenic Rivers

Effects would be the same as those of the Continuation of Current Management Alternative.

4.5.12 Wilderness

Effects would be the same as those of the Continuation of Current Management Alternative.

4.5.13 Wilderness Study Areas

The wilderness values associated with Lower Stonehouse WSA would not be affected because less than 2.0 percent of this WSA is located within the project area and could potentially be affected.

For the wilderness values associated with the Blitzen River, Bridge Creek, High Steens, Home Creek, Lower Stonehouse, and South Fork Donner und Blitzen WSAs, the effects would be the same as the Continuation of Current Management Alternative.

4.6 Partial Treatment Alternative: Noncritical Elements

4.6.1 Biological Soil Crusts

The description of the factors influencing distribution of biological soil crusts (TR-1730-2) found in Chapter 3 of this document are utilized below as categories for the discussion of potential effects on biological soil crusts from selection of the Partial Treatment Alternative. For a description of how these factors may influence biological soil crust distribution, see the Biological Soil Crust section of Chapter 3 of this document.

Elevation - The Partial Treatment Alternative would reduce the continued modification of vegetative communities by juniper expansion in some portions of the project area. The focus of this modification would be in the juniper belt, which occurs primarily from 4,500 to 6,500 feet in elevation in the project area. Biological soil crusts may benefit from reduced juniper population expansion and associated cover. Biological soil crust benefits may be a function of light increase or moisture increase.

Soils and Topography - Both shallow less productive and deeper more productive soils support biological soil crusts. The juniper expansion issue affects these two generic soil categories differently. Juniper expansion is more rapid and the populations that occur are more dense in deeper more productive soils; whereas the shallow less productive soils are generally where juniper expansion is limited, but are also where old growth juniper tends to occur. The risk of catastrophic fire as an effect of selecting the Partial Treatment Alternative would be diminished in some areas, but could threaten some biological soil crusts in untreated areas with dense juniper stands. The risk of large-scale wildfire is much less of an issue where the soils are poor and shallow which is a function of the natural lack of fuels. Since biological soil crusts are more common in less productive soils with large interspaces between vascular plants, the larger percentage of biological soil crusts in the juniper belt should not be affected by large-scale fires.

Over the short term, there may be very little effect to biological soil crusts in untreated areas as a result of selecting the Partial Treatment Alternative. Over the long term, juniper populations could increase in untreated areas to the point where large-scale wildfires could scorch the soil and biological soil crusts.

Disturbance - Prescribed burning in the form of broadcast, jackpot or individual tree burning could have an effect on biological soil crusts. By removing biological soil crust cover through burning, some areas, especially areas with a major moss/shrub component, could experience prolonged biological soil crust recovery periods. The biological soil crusts in areas of naturally low fuels (low sagebrush sites) would have less likelihood of experiencing fire events and would proportionately have less effects.

The intent of the proposed prescribed fire events is to create a mosaic of seral stages in the vegetation. As a fire burns through an area some vegetation is left unaffected, this concept applies to biological soil crusts as well. The mosaic pattern in the vascular vegetation may be partially mirrored by the biological soil crust communities. The biological soil crusts also occur in areas without vegetation, so the total remaining biological soil crust cover in a burned area should be sum of the cover in the unburned vegetation and the untreated interspaces or areas of naturally low fuels.

Fencing would not have any major effect to biological soil crusts unless the structure concentrated wildlife or livestock in small areas resulting in localized compaction or mechanical disturbance.

Post-fire reseeding or planting of native or desirable nonnative vegetation could benefit biological soil crusts by providing more perennial plants to provide micro-site moisture soil stability. This method in concert with post-treatment rest from grazing has recently been shown to benefit biological soil crust recovery in moss dominated biological soil crust communities (Hilty, et al., 2004).

The use of large track or wheeled machines to either grind or cut and pile brush and trees could cause localized compaction to the soil and biological soil crusts.

By reducing the buildup of fuels, especially from increasing numbers of juniper, the chances of a catastrophic fire in the North Steens Project Area would be reduced as well as the potential for the creation of large uninterrupted burnt areas.

Effects to biological soil crusts in Wilderness or WSAs would be the same as the Continuation of Current Management Alternative.

Timing of precipitation - Moisture regimes can play a large role in biological soil crust community composition. Increased juniper cover reduces the available precipitation from each rain event. The amount of precipitation that reaches the ground in a stand of juniper can be very significantly altered compared to sagebrush-dominated systems. This moisture interception could account for the lack of abundant biological soil crust populations in expanded juniper populations where foliar cover has increased dramatically. The Partial Treatment Alternative would reduce the interception of precipitation in treated areas.

Information specific to the Andrews RA is currently being gathered via new monitoring efforts. The BMPs would be developed and implemented as determined necessary by the Field Manager.

4.6.2 Fire Management

Under the Partial Treatment Alternative, the effects on Fire Management would be the same as the Continuation of Current Management Alternative within WSAs and Steens Mountain Wilderness. Western juniper would continue to increase density and cover. Fuel continuity would continue to increase with the increasing western juniper in the WSA and Wilderness. Fires would burn through these areas at greater intensity and with higher severity than in adjacent sagebrush, quaking aspen or riparian plant communities. Mechanical and/or prescribed fire treatments would reduce the dominance of western juniper in mountain big sagebrush, quaking aspen, and riparian plant communities. Mechanical treatments in dense western juniper may be coupled with late fall, winter, and early spring burning of heavy fuels accumulations. Burning at this time of year would reduce the risk of ignition during fire season and reduce total heating on soil from fuels accumulations. In areas where machinery is used to pile western juniper, work would be done using low impact, tracked machines during the winter months when soils are frozen. Reductions in western juniper would also help to reduce fuels continuity and loading across the treated area.

Seeding drier sagebrush plant communities would help to reduce the influence of cheatgrass. Fuels continuity would be reduced when perennial plants reestablish in these seeded areas. The perennial plants would also help to reestablish an appropriate fire regime. Wildfires would be less likely to burn at frequent intervals because of the continuity of perennial vegetation. Establishment of Wyoming big sagebrush through seeding or planting would also help to reestablish an appropriate fire regime.

4.6.3 Fisheries

Treatment of riparian areas is not likely to effect fish because of the limited area proposed for treatment. Most streams on Steens Mountain would not be treated and, therefore, western juniper would continue to encroach on native riparian vegetation. This would likely contribute to a downward trend in PFC on these streams. The benefits of treatment would not be realized through much of the proposed project area.

Riparian condition within treated areas would likely improve. Maintaining or improving riparian function and restoring riparian vegetation would maintain or improve aquatic habitat and conditions for fish. While this alternative has the least potential for effect to fish, it also has the least potential benefits. The Partial Landscape Alternative does not fulfill management direction or projective objectives as well as the Limited Landscape Alternative and Full Landscape Alternative.

Fish are not expected to be directly affected from action alternatives. The fires within riparian areas would normally be of low intensity. Even with intense stand-replacing wildfires, fish killed by effects from the fire tends to be patchy and many times fish respond very positively in the aftermath of fire (Murphy, et al., 2000; personal observation 2000). Prescribed fire would be initiated at times when there is less risk of a high intensity burn or escaped fire. Fish in Steens Mountain Area evolved with fire as a mechanism of some level of disturbance, although historic fires are believed to have been of low intensity and low frequency. Based on results from East Ridge Project, riparian burning was patchy and most of the shade providing riparian vegetation was still viable.

There is a possibility that by allowing fire to burn riparian areas they would be completely consumed but that would not lead to the extirpation of redband trout in streams on Steens Mountain. Fire can affect fish directly but research has shown that fish often respond very positively to fire (Rieman, et al., 2000). Results of fires are often not consistent with the concept of fire as a catastrophic event, causing only negative changes in habitat conditions (i.e., loss of riparian cover, increased water temperatures, and fine sediments). The effects of fire are more likely to be episodic, dispersed through time and space. Species such as redband trout appear to be well adapted to such pulsed disturbance, however, maintenance of complex, well-connected habitats; across a mosaic of streams and watersheds is critical (Rieman, et al., 2000).

Sediment levels could increase in localized areas of treatment. The most likely scenario is that sediment levels may increase for a short time (<5 years) and on a limited scale. Impacts to fish from sediment inputs are expected to be minimal. This is based on results from the East Ridge Project where there was a good growth response by riparian vegetation to fire, the amount of riparian area that remained intact, and the amount of litter that was on the ground after similar treatments were completed.

There is potential for some areas to see higher maximum temperatures but they are not expected to be elevated to levels that would be detrimental to fish. This is because in most project units, riparian areas would still have vegetation remaining to provide shade.

Project design of treating different project units over a long period of time allows flexibility to reduce effects to fish. Treatment of western juniper in riparian areas would restore desired riparian vegetation species that play an important role in water storage and release, sediment capture, nutrient input, and shade. The late season release of cool groundwater is important for fish survival during low flows. Some of the treated juniper would fall into the stream channel and provide cover and habitat complexity for fish.

Prescribed fire and juniper treatment in riparian areas would likely have no effects to fish. Fish in many areas of Steens Mountain would have no chance of being affected by implementation of this alternative because of the limited area that would be treated. Most streams on Steens Mountain would not be treated and, therefore, western juniper would continue to invade riparian areas. This would most likely keep those streams in a slow downward trend. The benefits of the project would not be seen through much of the proposed project area.

Riparian conditions within the treated areas would likely improve. Maintaining or improving riparian function and restoring or rejuvenating riparian vegetation would maintain or improve aquatic habitat and conditions for fish. While this alternative has the least potential for effects to fish, it also has the least potential benefits to fish. The Partial Landscape Alternative does not fulfill management direction or projective objectives as well as the Limited Landscape Alternative and Full Landscape Alternative.

4.6.4 Forestry/Woodlands

Effects of the Partial Treatment Alternative would be the same as the Continuation of Current Management Alternative in WSAs and Wilderness. Western juniper would continue to increase density and cover at the expense of associated herbaceous and woody vegetation.

Areas outside of the Wilderness or WSA that have been cut and/or burned would transition toward sagebrush dominance. Initial stages would be dominated by herbaceous grasses. Ground cover would initially be similar or slightly below pre-burn conditions. However, within 2 to 4 years the herbaceous ground cover would surpass pre-treatment values. Sagebrush would begin to recolonize the burned areas within the first year, but may take up to 20 years to reach pre-burn cover values.

Standing dead western juniper trees would remain upright for approximately 10 years. Cut trees that are not burned would retain needles for 2 to 3 years. The rate of decomposition of woody material would depend on the amount of soil contact. Once wood contacts the soil surface the rate of decomposition would increase dramatically. Some of the larger cut trees would still be apparent for up to 15 years following cutting.

Quaking aspen and riparian hardwood stands outside of the Wilderness and WSA would revert from western juniper dominance toward hardwood dominance. Suckering from aspen and sprouting from riparian hardwoods would create a dense stand of stems initially, but would thin as intra-specific competitions increases. Areas that are only cut would also experience a release of younger western juniper. The result would be a mixed post-treatment stand of western juniper and hardwoods.

Overall, approximately 50.0 to 60.0 percent of the post-settlement woodlands within the non-Wilderness, non-WSA would be converted to sagebrush, quaking aspen, and riparian woodlands through the life of the project (25 years).

4.6.5 Livestock Grazing Management

The effects would be the same as the Continuation of Current Management Alternative in Wilderness and WSAs. Treatment of western juniper, cutting and/or burning, would increase herbaceous plant production and forage availability. The increase in forage would help to redistribute grazing across the project area. Currently livestock grazing is limited by forage availability in parts of the project area. Western juniper dominance has reduced the forage availability and livestock are forced to utilize a smaller area. Treatment of the western juniper woodlands would also help to increase the time that green forage is available. Livestock would tend to stay in the uplands for longer periods of time because of the green forage.

Seeding of lower elevation Wyoming big sagebrush plant communities would also help to spread use across the project area. Currently these areas are dominated by introduced annual plants. These plants do not produce as much as perennial plants and would also extend the green forage period. Establishment of seeded sagebrush would be facilitated by grazing in the seeded areas.

4.6.6 Recreation

Any area closed for pre-treatment, prescribed burning, or wildland fire use would displace users to adjacent areas. Even if the areas are not closed to the public, the sights, sounds, and traffic associated with pre-treatment, prescribed burning, or fire use would displace users. After pre-treatment and before prescribed burning, the presence of cut and dying trees would discourage public use. Cut trees on the ground would further discourage cross-country hiking, horseback riding, hunting, and backpacking. Smoke from any prescribed burning or fire would decrease visibility in and around Steens Mountain and could affect the health of sensitive visitors. Recreationists would avoid burned areas immediately after a prescribed burn or fire and for some time thereafter. Fire and prescribed burning in or near developed recreation sites could affect the quality of a visitor’s experience because of smoke and health and safety concerns. Protection of developed recreation sites could be improved through the use of prescribed burning to create fire breaks around the areas.

The regrowth of grasses and forbs, especially wildflowers, would eventually attract additional users to any burned areas. With treatment of aspen stands, increased aspen growth could increase the numbers of people visiting Steens Mountain to view the fall colors. Improved wildlife habitat could increase hunting opportunities and increase the numbers of hunters in ODFW's Steens Mountain unit. Many of these hunters concentrate their camping, scouting, and hunting activities along the Steens Mountain Loop Road and adjacent open roads. The increased number of hunters and vehicles during hunting seasons increases the potential for vehicles being driven off designated routes and causing violations in WSAs and Steens Mountain Wilderness.

The use of motorized or mechanized transport cross-country from the designated travel routes would create additional 2-track vehicle routes. These routes would attract additional cross-country use, especially during big game hunting seasons. These types of vehicle routes are very hard to close to further vehicle use.

4.6.7 Off-Highway Vehicles

The current CMPA designations for OHVs and mechanized vehicles would not be affected. Temporary closures associated with fires and prescribed burning would displace OHV and mechanized vehicle users to nearby designated roads and ways, possibly causing crowding and heavy use on those routes.

4.6.8 Social and Economic Values

Adoption of this alternative would slow and reverse the deterioration of rangeland conditions. As a result, there would be an improvement in wildlife habitat, which could better wildlife viewing and hunting opportunities. This betterment could have an effect on the local economy as more wildlife enthusiasts would likely visit the area and bring dollars to area businesses. An increase in healthy rangelands could encourage more tourism in general and be a boon to local businesses. Rangeland improvement could bring about increased sustainability for livestock operations, further improving the local economy.

4.6.9 Soils

Prescribed burning in the form of broadcast, jackpot or individual tree burning would not have an effect on soils resources other than adding ash to the upper layer increasing soil fertility. By removing vegetation through burning, some areas, especially areas with the major shrub component consisting of Wyoming or mountain big sagebrush, could experience wind or water erosion from the soil surface. The soils would have more stability in areas dominated by perennial grasses, rabbitbrush, or snowberry because those sites would revegetate more quickly.

Fencing would not have an effect to soils unless the structure concentrated wildlife or livestock in small areas causing compaction or erosion from the establishment of new trails.

Reseeding or planting of native or desirable nonnative vegetation would benefit soils by providing more perennial plants to hold the soil and reduce the chances of erosion.

The use of large track or wheeled machines to either grind or cut and pile brush and trees would cause localized compaction to the soil. Small vehicles, such as pickups, to be used in the implementation of the North Steens project or for subsequent firewood gathering would also cause small areas of soil compaction.

By reducing the buildup of fuels, especially from increasing numbers of juniper, the chances of a catastrophic fire in the North Steens Area would be reduced and the potential for erosion would also drop.

4.6.10 Transportation/Roads

Project implementation may temporarily restrict access to some routes during burning activities. Routes used as fire lines and as access to burn areas may experience heavy use resulting in limited to moderate damage. Damaged routes would be maintained as needed, consistent with identified maintenance standards.

4.6.11 Vegetation

The effects of the Partial Treatment Alternative would be the same as the Continuation of Current Management Alternative in the Wilderness and WSAs. Western juniper would continue to increase at the expense of the associated herbaceous and woody vegetation. Treatment in the post-settlement western juniper woodlands would shift plant composition toward herbaceous and shrubby vegetation. Burning would create an herbaceous plant community dominated by perennial grasses and forbs. Initial stages following the prescribed fire may be dominated or co-dominated by annual forbs. Many of these forbs are native and important forage species for many smaller mammal and avian species. Mountain big sagebrush and other associated shrubs would begin to reestablish within the first 3 to 5 years. Sprouting shrubs, rabbitbrush, snowberry, horse brush, and to some extent antelope bitterbrush would be the first to reestablish. Mountain big sagebrush must establish from seed, and therefore would take longer than sprouting shrubs.

Quaking aspen stands where western juniper has been cut or prescribed burned would shift toward a younger age class. The understory vegetation would also be released. Shrubs and herbaceous plants would dominate the post-cutting plant community and herbaceous plants would dominate the post-burn plant communities. Quaking aspen suckers would also begin to appear in the first year following treatment. The degree of suckering would be dependent on the condition of the pre-treatment clone and site productivity. More productive sites would have more suckers than less productive sites if the clone is capable of responding. Fencing the quaking aspen stand would help to ensure suckers obtain a height where browsing would not limit response. Fencing may not be necessary in quaking aspen stands greater than 75 acres. Impacts of browsing would be spread over a sufficient area to minimize effects.

Riparian areas would respond same as quaking aspen stands. High site productivity would help to increase response to cutting and burning. Riparian hardwoods would sprout following treatment. Areas that have been burned would be initially dominated by herbaceous plants. Similar to quaking aspen stands, the degree of sprouting would be dependent on condition of pre-treatment hardwoods and site productivity.

Drier Wyoming big sagebrush plant communities would be shifted toward dominance by perennial plants. Wyoming big sagebrush would also be planted in areas where shrub density and cover is below expected. Establishment of Wyoming big sagebrush would take a number of years to reach similar values to adjacent sagebrush stands.

Low sagebrush, mountain mahogany, and meadow plant communities are scattered throughout the project areas. None of these areas are targeted for treatment, but may be included in the project units. Low sagebrush and mountain mahogany plant communities occur on shallow soils. Low sagebrush areas are often used as fuel breaks and therefore would not be burned in prescribed fires. Mountain mahogany also occurs on shallow, rocky soils, but these stands have greater fuel loading and may burn. Mountain mahogany is a weak sprouter, but also a prolific seeder. Burning would decrease surface litter. The seed for mountain mahogany germinates best when on mineral soil.

Meadow communities would also be treated with other plant communities. The prescribed fires would remove current year's growth and have little effect on established perennial grasses and forbs.

4.6.12 Visual Resources

Broadcast prescribed burning would result in small to large irregular forms across the landscape. Initially, the forms would be predominantly black in color, but over time would become light to bright green or tan to yellowish, depending on the vegetation and season. Potentially strong texture contrasts would be created between the burned and unburned areas because of the differences in vegetation types (trees to dead trees, grasses, and forbs).

Jackpot burning would create small, irregularly shaped patches randomly placed throughout the landscape. The initial color would be black, but would fade over time and would be replaced by various shades of green from grasses and forbs. There would be minimal texture changes, unless large-scale juniper removal accompanies the jackpot burning.

Individual tree burning would create small-scale color contrasts, while strengthening the existing vertical forms and lines. Dark green trees with brown to gray vertical cylinders and horizontal to diagonal lines would become black vertical cylinders with short, black horizontal to diagonal lines.

Temporary or permanent barbed wire fencing would add short green vertical lines and long horizontal lines to the landscape. The horizontal lines would become invisible with increasing distance from the fencing. Temporary or permanent wood fences would contrast strongly with the existing landscape in most cases. Wood fences would add blocky, light-colored, horizontal rectangles to an overall darker and more vertical landscape.

Reseeding of crested wheatgrass and native vegetation with seed drills would create straight to curving lines of vegetation across the seeded areas. Use of broadcast seeders would result in random distributions of seeds with no discernible forms or lines.

Any planting in riparian areas or bitterbrush patches would be at such a small scale in the landscape that there would be no effects to visual resources.

Total juniper reduction would remove the vertical lines and forms and dark green colors attributable to junipers from the landscape, replacing them with horizontal lines and forms. Freshly cut, light tan tree trunks and stumps would contrast strongly with the grayish, reddish browns of juniper trunks, tan to brown to reddish soils, and various green shades of vegetation. These contrasts, and the vegetation color changes from green to red and tan, would be visible for approximately 6 months to 1½ years before prescribed burning occurs. Piling of cut junipers would result in numerous, rough, spherical forms irregularly scattered across the landscape. After jackpot or prescribed burning, some horizontal lines and forms would remain, but the vertical elements would be removed from the landscape.

Commercial use of cut juniper has the potential to create limb piles and numerous 2-track vehicle routes. Freshly cut, light tan branch ends, tree trunks, and stumps would contrast strongly with the grayish, reddish browns of juniper trunks, tan to brown to reddish soils, and various green shades of vegetation. The 2-track vehicle routes result in form, line, and color contrasts from crushing vegetation and exposing soils.

Cutting every third tree would add horizontal lines and forms to a mostly vertical landscape. Freshly cut, light tan tree trunks and stumps would contrast strongly with the grayish, reddish browns of juniper trunks, tan to brown to reddish soils, and various green shades of vegetation. These contrasts, and the vegetation color changes from green to red and tan, would be visible for approximately 6 months to 1½ years before prescribed burning occurs. After burning, the vertical lines and forms (blackened standing tree trunks) would be stronger. The burnt stumps and tree trunks would continue to attract attention if the cut ends are still recognizable as human caused.

Droop cutting would strengthen the vertical lines and forms by increasing the width of the forms and changing horizontal to diagonal lines to roughly vertical. Freshly cut, light tan branch ends would contrast strongly with the grayish, reddish browns of juniper trunks and various green shades of vegetation. These contrasts, and the vegetation color changes from green to red and tan, would be visible for approximately 6 months to 1½ years before prescribed burning occurs. After burning, the vertical lines and forms (blackened standing tree trunks) would be stronger.

Limb and girdle cutting would strengthen the vertical lines and forms by accentuating the existing lines and forms. Freshly cut, light tan branch ends would contrast strongly with the grayish, reddish browns of juniper trunks, tan to brown to reddish soils, and various green shades of vegetation. These contrasts, and the vegetation color changes from green to red and tan, would be visible for approximately 6 months to 1½ years before prescribed burning occurs. After burning, the vertical lines and forms (blackened standing tree trunks) would be stronger. Burnt branch ends and girdle cuts would continue to attract attention if they are not burned enough to make them unrecognizable as human caused.

Mechanical mastication would create small piles of wood chips and branches at the site of each tree. Short-term color contrasts would result from exposure of light tan to yellow wood. Color contrasts would decrease as the chips weather or are burned.

The use of explosives would add horizontal lines and forms to a mostly vertical landscape. Short-term color contrasts would also result from exposure of the light tan to yellow wood. Vegetation color changes from green to red and tan would be visible for approximately 6 months to 1½ years before prescribed burning occurs, if burning is part of the treatment.

In addition to the site-specific effects to visual resources from the above treatments, the Partial Treatment Alternative would introduce strong form, line, color, and texture contrasts into the characteristic landscape outside of WSAs and Steens Mountain Wilderness. Additional openings would be created increasing, and repeating, the existing random, patchy openings. Irregular lines would be created by the juxtaposition of burned and unburned areas. Colors within the burned areas would initially be black, but would rapidly fade and become greener than the surrounding sagebrush in the spring. The overall texture of the project area would become rougher with the creation of additional openings and smoother with the conversion juniper to grasses, forbs, and shrubs. VRM Class II, Class III, and Class IV objectives would be met.

Additionally, there is the potential for color and texture contrasts to develop between the treated lands outside the WSAs and Wilderness and the untreated lands within the WSAs and Wilderness. Should these contrasts develop, they could attract the attention of the casual observer and VRM Class I objectives may not be met.

Because no site-specific treatments are proposed for WSAs and Steens Mountain Wilderness, there would be no human-caused effects to visual resources in these areas. However, the potential would continue for large fires in WSAs and Steens Mountain Wilderness, which could blacken hundreds to thousands of acres. Fire could cause form, line, color, and texture contrasts. Form contrasts would arise from the large, irregular burned areas in a landscape of generally small, irregular patches of vegetation and rock outcrops. Lines contrasts would be the same as described above. Short-term color contrasts would result when the patchy black landscape is compared to the patchy to uniform gray-green and dark green vegetation. The alteration of moderately rough vegetation to a smoother, more uniform landscape would result in texture contrasts. VRM Class I objectives would be met, because these contrasts would not attract the attention of the casual observer more than any other fire.

4.6.13 Wild Horses and Burros

In untreated areas, the Partial Treatment Alternative could increase the likelihood of a decreased amount of forage available to all herbivores in the affected HMAs. Effects to wild horse populations could be pronounced if budgetary or operational restraints delay scheduled gathers. Increased inter-specific competition between wild horse populations and other animal populations reliant upon the same limited resources could be exacerbated if the Partial Treatment Alternative is selected.

In other areas where increased juniper management is proposed, the likelihood of an increased amount of forage available to all herbivores in the affected HMAs would exist. Effects to wild horse populations could be pronounced if gathers need to occur on shorter time sensitive timelines or if budgetary or operational restraints delay scheduled gathers. Inter-specific competition between wild horse populations and other animal populations reliant upon the same limited resources could be aided if the Partial Treatment Alternative is selected.

4.6.14 Wildlife

Pronghorn antelope would benefit from the various treatments, especially the cutting and burning of dense stands of juniper, which would convert to grasslands for several years after treatment. The increase in grasses and forbs would be a benefit to pronghorn. While the loss of juniper would affect some escape cover for pronghorn, this would have few affects. The cutting and jackpot burning or individual burning of juniper in low sagebrush vegetation types would benefit pronghorn by not reducing the cover of low sagebrush, which is important as part of their diet, but also for kidding cover. The burning of up to 50.0 percent of big sagebrush with only scattered juniper would release forbs in the understory that pronghorn would utilize. Depending on the size of the burn and available food sources post-treatment, pronghorn may make extensive use of burned areas. These actions under this alternative would affect only those areas outside of wilderness and WSAs. The rest of the project area would affect pronghorn habitat as described under the No Treatment Alternative (4.2.14).

In general, mule deer would be affected through the loss of juniper as thermal, escape and hiding cover through the cutting and burning of dense woodlands and late transitional sagebrush and juniper. Some juniper would be left along ridges and scattered throughout the landscape to try to maintain some travel corridors and refuge from heavy winter storms. The loss of up to half of the mountain big sagebrush with no juniper or less dense stands of juniper would provide some benefits as understory vegetation is released which would provide higher quality forage for mule deer during the spring when females are in need of increased nutrition for fetus growth. The loss of the mountain big sagebrush canopy cover would reduce the amount of area available for fawning especially around aspen stands. Although it has been shown that most fawning activity occurred near aspen stands, big sagebrush is also important hiding cover for fawns.

Mule deer would also be affected by the loss of Wyoming big sagebrush next to existing seedings in the lower elevations on the north and west sides of the project area. The seedings essentially provide very little structural diversity for mule deer and lack big sagebrush, which is a requirement during the winter months when the deer are mostly in that area. The loss of Wyoming big sagebrush next to these seedings reduces the winter habitat for mule deer, not only in the form of forage but also in the form of thermal cover. While the reduction of Wyoming big sagebrush may increase forb and grass composition in the understory, it also opens up the sites to invasion by cheatgrass, which is common in many of these lower elevation big sagebrush sites.

Bitterbrush, which is a preferred fall browse species for mule deer, would likely be lost in areas where prescribed fire is used to treat mountain big sagebrush. New seedlings may be seen in years following the burn depending on the seed caches created by small mammals and the viability of the seed cached. The loss of bitterbrush could have some effect on mule deer by reducing available browse during the fall and winter months.

Under this alternative, these actions would occur on only a portion of the project area and not in the wilderness or WSAs. The effects on mule deer habitat for these areas would be as described in the No Treatment Alternative.

Elk would be affected negatively by the loss of hiding and thermal cover due to the reduction of juniper in each unit but would be beneficially affected by the increase in the grass and forb layer after treatment. To the extent that aspen stands are treated under this alternative, there would be an increase of new aspen shoots, which elk would utilize. Since this alternative is only occurring outside of wilderness and WSAs, the effects on elk habitat in these areas would be the same as that described for the No Treatment Alternative.

Small mammals such as the various species of mice, voles and shrews, would be affected in the short term by the loss of habitat. Some species with wider ranges of variability in habitat requirements would survive and may thrive. Small mammals would not be evident in any numbers the first year following burning activities. As habitat conditions improve, they would immigrate into treated areas. The larger the area burned, the longer it would take for small mammals to return to treated areas. Fossorial animals such as gophers, should survive since they exist mainly underground and feed on roots. As forbs increase in the treated areas, fossorial animals may have increased food sources available. More mobile small mammals such as jackrabbits and cottontails would move to other habitat and would use the burn areas for foraging and untreated habitats for cover. As with other wildlife, under this alternative, the treated area does not include wilderness or WSAs so the effects to habitat would be the same as in these areas to that described in the No Treatment Alternative.

4.7 Limited Treatment Alternative: Critical Elements

4.7.1 Areas of Critical Environmental Concern

There are no treatments proposed within any ACEC for the Limited and Full Treatment Alternatives.

In the long term, the completion of the project would better protect the Fir Groves ACEC and the Rooster Comb RNA/ACEC from catastrophic fire events by reducing fuels in the surrounding or adjacent vegetation types.

4.7.2 Air Quality

Short-term effects on air quality from the Limited Treatment Alternative would be slightly greater than No Action or Partial Treatment Alternatives initially, but would be less in the long term because of the reduction in risk of large-scale fires. In the long-term conversion of post-settlement western juniper to sagebrush would reduce smoke emissions from fires and fire use fires. However, initially wildland fire use in the post-settlement western juniper stands would produce smoke for a longer period of time than fires in sagebrush or lighter fuels. The post-fire plant community would produce some windborne dust until the soil surface becomes wet.

Prescribed burning would occur during the spring, late summer, early fall (broadcast burning), and winter (jackpot, individual tree burning). Smoke production would be limited to the period of time from ignition to approximately 48 hours following the end of ignition. Smoke drift would primarily move east and southeast of the project area.

No Class 1 airsheds or nonattainment areas would be affected by the prescribed fire actions. The communities of Frenchglen, Diamond, Fields, and Andrews would be notified of burning activities and the potential for temporary changes in air quality.

Production of dust from the use of chain saws would be negligible. Heavy machinery would be used during the late fall, winter, and early spring when soil are frozen. Dust production at that time would be minimal.

4.7.3 American Indian Traditional Practices

Potential effects to American Indian Traditional Practices areas would be substantially the same as those described for the Partial Landscape Alternative. Potential affects to American Indian Traditional Practices would be eliminated by consultation and project redesign where necessary.

4.7.4 Cultural Heritage

Potential effects to Cultural Heritage and the Riddle Brothers Ranch Historic District areas would be substantially the same as those described for the Partial Treatment Alternative. Potential effects to Cultural Heritage and the Riddle Brothers Ranch Historic District would be eliminated by consultation and project redesign where necessary.

4.7.5 Migratory Birds

Refer to the general analysis in the Partial Treatment Alternative (4.5.5) for the effects of annual treatments on migratory birds. These annual treatments would occur over a larger area than in the Partial Treatment Alternative, which would have a greater effect on woodland species in the short and long term since juniper would be reduced to a greater extent over the landscape. In the short term, grassland species would have more habitats available over a greater portion of the landscape until shrub cover returns to burned areas. Shrub-dependent species would lose habitat same as the Partial Landscape Alternative but over a greater portion of the landscape. These species would benefit in the long term as shrub canopy cover increases. The amount of time for shrub cover to return to useable levels for these species would depend on the size and mosaic pattern of the burned area and available sources of seed in the proximity of the burned area.

4.7.6 Noxious Weeds

Potential effects would be the same as with the Partial Landscape Alternative, but with more fire disturbance and increased likelihood of noxious weed expansion.

4.7.7 Paleontological Resources

Potential effects to paleontological resources would be substantially the same as those described for the Partial Treatment Alternative except the potential for fire disturbance would still be higher in SMAs due to limited treatment methods. Potential effects to paleontological resources would be eliminated by consultation and project redesign where necessary.

Protection of paleontological localities through law enforcement surveillance and other protective measures would occur.

4.7.8 Special Status Species – Fauna

The bald eagle would not be affected by this alternative even though actions would take place in wilderness or WSA where a winter roost is suspected. Once winter roost trees are identified, the Burns District Bald Eagle Winter Roost Habitat Management Plan (1986) directs the BLM to conduct vegetation management around the roost to protect the roost tree and other possible future roost trees. This would occur during the late spring to fall months when the eagles would not be present. Other actions would be designed to avoid further treatments within 400 meters of the identified roost. Therefore, these actions would have no effect on the bald eagles.

The Columbia spotted frog would be affected by this alternative through the reduction of the juniper canopy, which would open up riparian areas for revegetation by riparian plant species. Increases in woody riparian species through natural revegetation or planting with native stock, could allow for expansion of beaver populations and pond habitat, which spotted frogs use. Depending on the progression of treatments in different project units, the resulting habitat changes may not occur for 15 to 20 years. Treatments would be designed to avoid existing spotted frog habitat.

Refer to the Partial Treatment Alternative (4.5.8) for general analysis of annual treatments on greater sage-grouse habitat. More acreage would be treated in this alternative over the life of the project so the effects described would occur over more of the landscape. Areas of juniper and mountain big sagebrush burned early in the project timeframe should be returning to a sagebrush-dominated structure useable by greater sage-grouse. Wyoming big sagebrush sites, if burned, would not return to a sagebrush-dominated site during the life of the project and may need to be reseeded depending on the rate of sagebrush return. Areas treated next to seedings on the north and west sides of the project area would create greater voids of nonsuitable habitat for sage-grouse.

Refer to the Partial Treatment Alternative for general analysis of annual treatments on Northern goshawk habitat. In this alternative, more aspens stands would be treated which increases the possibility of affecting goshawk habitat. If nest trees are identified during surveys, areas around the nest would be avoided for burning to preserve the nest trees. Cutting of juniper in the areas around the nest trees could take place after August 15 each year to allow the young of the year birds to fledge.

The effect of actions in this alternative on Swainson's hawk would be the same as the Partial Treatment Alternative except that juniper would be reduced over more of the landscape which may affect nesting habitat but would provide more foraging habitat as grasslands increase after treatments. There should still be suitable juniper trees for nesting for Swainson's hawk.

Habitat for Preble's shrew would be affected the same as that described in the Partial Treatment Alternative. More sagebrush, aspen, and riparian habitat would be treated over the length of the project but some areas treated early in the project should be returning to useable habitat by the end. Riparian areas and aspen stands should respond the quickest to treatments and return to useable habitat. The amount of time for Preble's shrew to return to former habitat would depend on the amount of suitable occupied habitat remaining, the spatial distribution of that habitat and the ability of remaining habitat to support viable populations that would sustain until such time that treated areas return to suitable habitat.

To the extent that treatments conducted under this alternative take place in the higher elevations of Steens Mountain, wolverine habitat could be affected. Most of the treatments in the project area are designed to treat juniper expansion. Most wolverine habitat in the project area has little to no juniper so no affects to wolverine habitat are anticipated.

Bighorn sheep habitat would be affected to the extent that actions occurred in that habitat. Since more actions would be conducted in wilderness and WSAs, it is possible that bighorn sheep habitat would be affected by the reduction of juniper, which would improve aspects of sheep habitat. The loss of shrubs would have some affect on the availability of some forage but the resulting increase in grasses and forbs would benefit bighorn sheep overall.

Effects to bats, long-billed curlew, and burrowing owls would be the same as those described in the Partial Treatment Alternative except that these effects would occur over more of the project area.

4.7.9 Special Status Species – Flora

Effects to this resource would be the same as those in the Partial Treatment Alternative in treated areas; and same as the effects stated in the No Treatment Alternative in untreated areas.

General effects of fire to plants are covered in the No Treatment Alternative Special Status - Flora Effects section.

Reduced size and intensity of fires would likely benefit plant populations by limiting the potential for catastrophic reductions in plant population size and the resulting genetic bottleneck that could provide an insurmountable obstacle to natural recovery.

With appropriate project design and mitigation for Special Status plant species sensitive to disturbance there would only be positive effects from ecosystem restoration efforts.

With regard to any Special Status Species mentioned in this document; the proposed treatments would not trend any of the Special Status Species toward listing.

4.7.10 Wetlands and Riparian Zones and Water Quality

The Limited Landscape Alternative would treat all riparian areas using prescribed fire that is anticipated will have less of an effect on riparian vegetation because juniper would be targeted individually and burned when the ground is frozen and fuel loading is controlled. Improved riparian vegetation diversity and ecosystem function is anticipated as a consequence. The Limited Landscape Alternative accommodates fulfillment of BLM management objectives.

All riparian areas would be treated by prescribed fire in the Limited Landscape Alternative. The risk of a short-term sediment pulses would be greater under this alternative. However, the effect is anticipated to have short-term effects because fire severity is expected to be low, the size of the treatment area would be small, and litter would trap sediment minimizing input to the stream channel. Based on results of the East Ridge Project it is anticipated that much of the existing riparian vegetation except for juniper would remain to act as a buffer to streams. Cutting juniper is not expected to exacerbate the input of sediment to streams. Downed logs that are not consumed by fire would act as sediment traps. This alternative would potentially increase sediment inputs in the short term but would provide long-term benefits to riparian functions that maintain channel structure, store groundwater for later release, and reduce sediment input. The Limited Landscape Alternative allows BLM to meet management objectives.

Riparian area function, complexity, and response to disturbance have been the focus of past research. Research indicates that riparian areas are dynamic and some level of disturbance is normal and expected (Hibbs and Chan, 2001) and that fire has been a natural mechanism of disturbance in aquatic ecosystems for thousands of years (Gresswell, 1999). In certain riparian forest areas, the fire return interval has been shorter, and fire severity has been moderate. In other areas, fires have burned through riparian areas with relative frequency (Dwire and Kauffman *in press*). On Steens Mountain, historic fires likely burned through riparian areas at lower frequency and intensity than the adjacent uplands (Jeff Rose, Fire Ecologist, personal communication).

The proposed alternatives vary in scale of the treatment area. Juniper would be removed from riparian areas by burning, mechanical treatment (cut or girdle), or both. Prescribed fire ignited in the uplands could burn into riparian areas. Riparian areas with high fuel loading that have the potential to burn very hot would be pretreated to reduce loads and offset unanticipated effects of a fire, which burns out of control. Western juniper in riparian areas that are not burned during the treatment would be cut and burned individually or in small piles in order to minimize the potential for effects.

The advantage to using prescribed fire to treat riparian areas is control. If a prescribed fire cannot be controlled, ignition or methods can be adjusted to meet objectives. Prescribed burning can be initiated at times and in ways to reduce the risk of a high intensity or high severity wildfire. The effects of a prescribed burn can be constrained or controlled by controlling the size of the treatment area and adjusting treatments relative to weather and site conditions (Gresswell, 1999). By controlling the size of the treatment area, intensity, and developing prescriptions that best suit the physical and biological characteristics of specific project units, the level of effects can be reduced. Using prescribed fire on a unit-by-unit basis would allow techniques to be adjusted to better meet project objectives.

This alternative would have long-term benefits to water quality and ecosystem integrity. Reeves, et al. (1995) stated that fire can be important for the maintenance of complex and productive habitats. After areas are treated, riparian vegetation could regain a foothold on the site in order that channel function and processes could be maintained or restored. Restored riparian function would contribute to overall improvements in water quality and aquatic habitat. The timeframe proposed for implementation would accommodate site recovery between treatments and would allow units to recover before other units are treated.

Monitoring and adaptive management is an important feature of this alternative and is considered insofar as potential risks and benefits will be greater or less depending on the understanding of the impacts that various treatments will have on a site. An adaptive management approach can be used to corroborate conclusions regarding the effect of treatment on various sites.

Riparian condition would be expected to improve as a result of treatment. Stream corridors currently dominated by juniper could be recolonized by desired riparian species and vegetative regrowth would be stimulated. Riparian species are adapted to disturbance so it is anticipated that sites will recover fairly quickly post-treatment (Dwire and Kauffman, 2003). Several grass and forb species should increase reproductive output in the first few years post-treatment (Kauffman, 1990). This would improve watershed stability and function by reducing the amount of exposed soil and thus the potential for erosion, stabilizing banks, increasing infiltration, and maintaining or restoring groundwater storage.

The East Ridge Project, ongoing in Kiger Gorge, in many respects is the same as the proposed North Steens Project. The vegetation along Kiger Creek has responded very well with new growth of cottonwood, willow, and alder. Prior to introducing fire into Kiger Gorge there was very little to no young cottonwood. The same response is expected throughout the streams in the North Steens Project Area.

Fire would be introduced to all riparian areas in the Limited Landscape Alternative. The risk of sedimentation of streams is anticipated as a short-term effect because fire severity is expected to be low, the size of the treatment area is generally small, and there would likely be litter throughout the burned area to trap sediment. Based on results of the East Ridge Project much of the existing riparian vegetation except for juniper would remain to act as a buffer to streams. Cutting juniper is not expected to result in sediment input to streams. Likewise, downed logs that are not consumed by fire would act as sediment traps. This alternative would potentially increase sediment inputs in the short term but would provide long-term benefits to riparian functions that maintain channel structure, store groundwater, and reduce sediment input.

4.7.11 Wild and Scenic Rivers

Scenic:
Wildfire:

Over the short term, wildfires would alter the scenic values from a landscape of unburned trees, riparian plant species, and other types of vegetation to one that is burned and thus blackened. A "low-intensity" burn would most likely burn in a patchwork "mosaic" of both burned and unburned areas.

In the event of a catastrophic, stand-replacing wildfire potentially large areas of the landscape and "view-shed" would be burned and blackened. Over the short term, such actions would change the color and form of the landscape. This would have to be considered to be a "natural" event as well.

Prescribed Fire:

The effects to scenic values within the WSR corridors from prescribed fire should be the same as those caused by wildfire.

Geologic:
Wildfire:

Wildfire should have no effect on the "geologic" ORV in any WSR corridor.

Prescribed Fire:

Prescribed fire should have no effect on the "geologic" ORV in any WSR corridor.

Recreational:
Wildfire:

The “recreational” ORV in the WSR corridors should have few effects to most wilderness visitors as natural wildfires would typically be avoided by individuals recreating in the wilderness. Over the short term, a fire in a particular location in the wilderness may cause visitors to move to a different locale, but the overall experience of this wilderness value should not be affected. This should be the case even if a wildfire needs to be suppressed by agency personnel. The exception to this situation (also short term) would be if the entire wilderness had to be closed to all public entry if the wildfire posed a hazard to human health and safety thus restricting the opportunity to recreate within the wilderness and the WSR areas.

Prescribed Fire:

The effects involved with prescribed fire should be the same as for wildfire described above except that certain areas of the wilderness and/or WSRs may be closed to public recreational use while Fire Management actions are taking place.

Fish:
Wildfire:

Over the short term, a natural wildfire could lead to the loss of stream bank vegetation causing the erosion of stream banks and slopes. This could lead to an increase in the sediment load and the turbidity in the WSRs over the short term. This could have a short to long-term overall effect on this ORV by adversely affecting the fisheries habitat.

Prescribed Fire:

The effects involved with prescribed fire should be the same as for wildfire described above.

Wildlife:
Wildfire:

Over the short term, the wildlife ORV in the WSRs could be affected by the temporary loss of habitat from a wildfire.

Prescribed Fire:

The effects involved with prescribed fire should be the same as for wildfire described above.

Vegetation:
Wildfire:

In areas where wildfires have burned with less intensity, the vegetation would most likely be a mosaic of burned and unburned areas. While some short-term effects may occur, these should not be too severe.

On the other hand, a high-intensity catastrophic wildfire could have much greater affects on vegetation, especially in the WSR riparian zones. Plant species composition could be changed over the long term and invasive weeds could become established because of such conditions.

Prescribed Fire:

The effects involved with prescribed fire should be the same as for wildfire described above.

Botanic :
Wildfire:

Effects to this ORV would be the same as those described in the Vegetation section above.

Prescribed Fire:

The effects involved with prescribed fire should be the same as for wildfire described above.

Cultural:
Wildfire:

Wildfire events could have a long-term effect on this ORV. Pre-historic archaeological sites along the area's WSR corridors could be damaged by fires of even low intensity. High-intensity fires of longer duration could potentially damage sites.

Prescribed Fire:

The effects involved with prescribed fire should be the same as for wildfire described above.

Historic:
Wildfire:

Fire events of any scale could have a substantial long-term negative effect on historic sites within the WSRs; this is especially true of older buildings. The principal and most important site, which could be affected by a wildfire, would be Riddle Brothers Ranch Historic District in the Donner und Blitzen WSR corridor. The potential for the loss of one or more structures from wildfire activity in the WSR corridor is significant.

Prescribed Fire:

The effects involved with prescribed fire should be the same as for wildfire described above.

4.7.12 Wilderness

Naturalness:
Wildfire:

Effects on naturalness to the wilderness environment through wildland fire use should be minimal to nonexistent. As lightning-ignited fires are an integral part of Steens Mountain ecosystem there would be no effects to natural conditions. The only exception to this fact is that as fires burn through stands of unnaturally overly-dense invasive juniper more trees may be burned than may have been in naturally occurring open, scattered stands of juniper, which has not been subjected to fire suppression activities. Most visitors to the area would not recognize this fact and whether or not the burned stands are overly-dense or scattered and open the general perception of wilderness visitors would be that such incidents are natural.

If a wildfire develops into a catastrophic, stand-replacing wildfire this would result in an unnatural condition caused by unnaturally overstocked juniper sites having dense interlocking canopy covers and excessive fuel buildups. A stand-replacing wildfire could have effects on soils, possibly leading to sterilization and excessive soil loss through erosion, which would not occur under normal conditions. Such an event could also lead to the temporary or permanent loss of native plant species and plant species composition. This situation could result in a temporary or permanent loss of naturalness as exotic plant species and noxious weeds invade the site and replace native plants.

This situation may have to be resolved through the reseeding and reestablishment of native plants, either by seeding or through plantings. In the event of such a possibility BLM Manual 8560 states in Section .36, subsection A, part 2 that: “Re-establishment of vegetation as a watershed-restoration measure, where there is no reasonable expectation of natural healing, would be accomplished using native or naturalized species. Overland motorized equipment would not be used where more primitive equipment can accomplish the restoration objectives. Exceptions must be fully justified, based upon serious imminent threat to high downstream values. Approval by the Director is required for all watershed restoration proposals.”

Even in the event of a situation such as a catastrophic stand-replacing wildfire most casual and untrained visitors to the Wilderness would view this as a naturally-occurring event.

On another note, if these natural wildfires become a threat to human life and/or property or threaten to burn outside of the Wilderness onto privately-owned lands then suppression actions would have to take place. In the event that fire suppression activities occur this would have an effect on naturalness as this process would be altered by the manipulation of the wildfire by fire fighting and suppression techniques. Visitors to the Wilderness would view such operations as an obviously unnatural situation.

Prescribed Fire:

Prescribed fire would have some noticeably different effects on the wilderness value of naturalness. Prescribed fires would be initiated and managed by human activities and the natural process would be trammeled. Fires would be set by BLM personnel on-the-ground and by hand (individuals and/or crews setting fires with torches or other devices).

Efforts such as those described above have been undertaken in seven wildernesses and two WSAs managed by the USDA Forest Service on the Apalachicola, Ocala, and Osceola National Forests in Florida. The effects to these areas for prescribed fire and the use of treatments were analyzed in the EA, “Prescribed Fire in Wilderness on the National Forests in Florida,” for which the decision document was signed in November of 1994. This was the first use of prescribed fire in any wildernesses in the National Forest System for the benefit of restoring wilderness environments, altered by decades of fire suppression activities, back to natural and self-maintaining fire-adapted ecosystems. In addition, BLM Hollister RA and National Park Service have been jointly burning Pinnacles National Monument Wilderness and adjoining BLM WSAs since the early 1980s.

In the case of Steens Mountain Wilderness efforts such as prescribed burning would be accomplished on a “one time only” basis. Prescribed burning would be undertaken only if wildfire could not accomplish the task of reducing the effects to the wilderness environment caused by unnatural large-scale invasive juniper irruptions in a set period of time, which is subject to periodic review. Such efforts would allow the wilderness ecosystem to get back to a naturally-functioning system in order to become self-maintaining and would be undertaken only once per any given site. After that time natural prescribed fire would be allowed to play its natural role in a naturally-functioning wilderness ecosystem with further intrusive human actions.

Wildness:
Wildfire:

Effects on wildness by wildfire should be the same as that of the effects to “naturalness” discussed above. The “untamed or wild state” of the wilderness should not be altered or affected by naturally-occurring fire use, which allows wildfire to function without restrictions and play its role in the natural environment.

Prescribed Fire:

Prescribed fire, as initiated by agency personnel in order to restore natural conditions to the wilderness environment would have effects on wildness. In this case the ignition and management of fire by agency personnel would amount to trammeling and restrict the freely-operating functions of the wilderness environment.

Solitude:
Wildfire:

For the most part wildfire should normally have little to no adverse effect on the experience of solitude to visitors in Steens Mountain Wilderness. Exceptions to this situation would be if, due to factors involving human health and safety, visitors needed to be contacted and notified of a potentially dangerous wildfire situation. In that case agency personnel would need to make contact with those visitors involved. This would result in a loss of solitude to the visitor, especially if the situation required their evacuation from the wilderness for safety reasons.
Visitor solitude may also be affected if fire suppression activities became necessary due to wildfire threats to human health and safety and private property. In this situation, fire suppression activities involving agency personnel and ground and aerial fire fighting equipment could have significant effects to visitor's experience of solitude in the wilderness.

Prescribed Fire:

In the case of personnel-ignited fires there would be notices posted at trailheads, BLM facilities, newspapers, and Web sites informing the public of planned ignitions and other project work relating to prescribed burning and/or other treatment work, which may be occurring in the Wilderness. In this way visitors may be able to avoid contact with personnel engaged in these types of activities if they so choose thus avoiding effects on their search for solitude.

In some cases prescribed fire could have affects on the solitude of wilderness visitors. If visitors fail to be informed about work activities which may be taking place in the Wilderness they may come in contact with personnel engaged in burning or site preparation and this may unexpectedly affect the experience of solitude which they had been anticipating. In addition, as described above in the Wildfire section prescribed fire operations, which may need to be suppressed and thus turn into suppression operations involving personnel and equipment may have an adverse effect on visitors' experience of solitude.

Primitive and Unconfined Recreation:
Wildfire:

There should be little effect to the "primitive and unconfined recreation" experience of most wilderness visitors as wildfires would typically be avoided by wilderness recreationists. While a fire in a particular location in the wilderness may cause visitors to move to a different locale the overall experience of this particular wilderness value should not be affected. This should be the case even if a wildfire needs to be suppressed by agency personnel. The exception to this situation would be if the entire wilderness had to be closed to all public entry if the wildfire posed a hazard to human health and safety thus restricting the opportunity to recreate within the wilderness.

Prescribed Fire:

The effects involved with prescribed fire should be the same as for wildfire described above.

Supplemental Values:
Wildfire:

The supplemental wilderness values for Steens Mountain Wilderness of "scenery," "vegetation," and "wildlife" would be affected by wildfire.

In areas where wildfires occurr the scenery would be changed from a landscape of unburned trees and other plants to one of burned and blackened vegetation. If the fire was a "cooler," low-intensity burn than the scenery would most likely a patch-work "mosaic" of burned and unburned areas. In the event of a catastrophic, stand-replacing wildfire potentially large areas of the landscape and "view-shed" would be burned and blackened.

These effects would be similar for the vegetation component of the supplemental wilderness values, as well.

Wildlife could be affected by the loss of habitat from a wildfire. The loss of feed would be an adverse effect on wildlife. The loss of wildlife “thermal cover” and “hiding cover” would most likely be an effect to wildlife populations, as well.

Prescribed Fire:

The effects to scenery, vegetation, and wildlife values from prescribed fire should be the same as those caused by wildfire.

4.7.13 Wilderness Study Areas

The wilderness values associated with Lower Stonehouse WSA would not be affected because less than 2.0 percent of this WSA is located within the project area and could potentially be affected.

The wilderness values associated with the Blitzen River, Bridge Creek, High Steens, Home Creek, Lower Stonehouse, and South Fork Donner und Blitzen WSAs would be affected as follows:

Naturalness:
Fires and prescribed burning would help maintain plant diversity and health of fire-dependent ecosystems in WSAs. This could improve or enhance the WSAs' ecological naturalness through the restoration of native plant communities. It could also help prevent the occurrence of stand-replacing wildfires in WSAs by reducing fuel loading.

Solitude:
Fires and prescribed burning could reduce solitude in the long-term through the reduction of vegetative screening. During the actual burns or fires, solitude would also temporarily be reduced by the increased presence of firefighters, their vehicles, and fire monitors.

Primitive and Unconfined Recreation:
Primitive and unconfined recreation would be slightly constrained in the short term, because areas would be closed to the public during any prescribed burning or fire. After a prescribed burn or wildfire, the presence of burned trees and blackened vegetation would continue to displace recreationists to other nearby, unburned areas. In the longer term, opportunities for primitive and unconfined recreation would increase as wildlife habitat improves, vegetation and wildflowers respond to the release of nutrients, and the landscape becomes more open and easily traversed.

Special Features:
Special features, especially greater sage-grouse habitat and mule deer winter range, could be expanded and improved. Restoration of riparian habitats would benefit redband trout and other aquatic species. Scenery could be enhanced through the greater diversity of landscapes that would be found in the WSAs.

4.8 Limited Treatment Alternative: Noncritical Elements

4.8.1 Biological Soil Crusts

The Limited Treatment Alternative would reduce the continued modification of vegetative communities by juniper expansion in larger portions of the project area than the Partial Treatment Alternative. Effects from this alternative in treated areas would be the same as those described in the Partial Treatment Alternative. Effects from this alternative in untreated areas would be the same as those described in the No Treatment Alternative.

Over the short term, there may be very little effect to biological soil crusts in untreated areas as a result of selecting the Limited Treatment Alternative. Over the long term, juniper populations could increase in untreated areas to the point where large-scale wildfires could scorch the soil and biological soil crusts.

Information specific to the Andrews RA is currently being gathered via new monitoring efforts. The BMPs would be developed and implemented as determined necessary by the Field Manager.

4.8.2 Fire Management

Mechanical and/or prescribed fire treatments would reduce the dominance of western juniper in mountain big sagebrush, quaking aspen, and riparian plant communities. Mechanical treatments in dense western juniper may be coupled with late fall, winter, and early spring burning of heavy fuels accumulations. Burning at this time of year would reduce the risk of ignition during fire season and reduce total heating on soil from fuels accumulations. In areas where machinery is used to pile western juniper, work would be done using low impact, tracked machines during the winter months when soils are frozen. Reductions in western juniper would also help to reduce fuels continuity and loading across the treated area.

Initially only wildland fire use would occur in Steens Mountain Wilderness and WSAs within the project area boundaries. Naturally-ignited fires rarely occur in desired locations and have a high potential to yield undesirable fire effects. Under this condition, fires in dense western juniper stands may only occur during severe weather conditions yielding severe fire effects. Fires under these conditions would not achieve resource objectives, and pose a significant threat to human life and adjacent private lands. Wildfires would be suppressed because of the threats to human life and private property. These fires would burn for a longer period of time because of the large woody fuel. Control would take a considerable amount of time if not assisted by rain or other favorable climatic conditions.

4.8.3 Fisheries

Direct effects to fish are not expected. Prescribed fire would be initiated when conditions are conducive to lower intensity burns, which would reduce the potential of losing desired riparian vegetation. Temperatures are not expected to increase to detrimental levels for aquatic organisms due to the likelihood of substantial riparian vegetation remaining onsite after treatment. Junipers cut in the riparian areas would not likely be completely consumed and the remnants would act as sediment traps.

Based on results from similar work completed in Kiger Gorge, sediment inputs would likely be minimal and short term. This is because riparian areas were not consumed in the prescribed fires and still acted as a barrier to upland sediment and the area was rapidly revegetated. Restoring riparian vegetation would lead to less sediment inputs than if juniper remained onsite.

Implementation of this alternative would follow management direction from the Steens Act (2000) and meet project objectives, but likely on a slower timeframe than the Full Landscape Alternative.

4.8.4 Forestry/Woodlands

The Limited Treatment Alternative would have the same effects on woodlands as the Partial Treatment Alternative with the following exceptions. The scope of the treatments would be expanded to include Steens Mountain Wilderness and WSAs. A larger area would be considered for treatment. Pre-settlement woodlands in Steens Mountain Wilderness and WSAs would also be treated. Addition of these areas would help to return these woodlands to a condition closer to historic than the present condition. Most of the pre-settlement woodlands contain old growth characteristics as identified by Waichler, et al., 2001. Reduction in the trees that have established after 1870 would help to restore old growth stand characteristics. Treatment in these stands would comprise less than 1.0 percent of the landscape.

A large proportion of the woodlands within the project area have established since the 1870s. Prior to western juniper establishment and growth these areas were primarily mountain big sagebrush plant communities. Treatment of the post-settlement stands would return these areas to sagebrush-dominated communities.

4.8.5 Livestock Grazing Management

Effects would be the same as the Partial Treatment Alternative with the following exception. A larger number of acres would be treated under this alternative. This would provide an increase in available forage. Currently livestock grazing is limited by forage availability. Western juniper dominance has reduced the forage availability and livestock are forced to utilize a smaller area. Treatment of the western juniper woodlands would increase the time that green forage is available. Livestock would tend to stay in the uplands for longer periods of time because of the green forage potentially reducing the effects on riparian areas.

Seeding of lower elevation Wyoming big sagebrush plant communities would also help to spread use across the project area. Currently these areas are dominated by introduced annual plants. These plants do not produce as much as perennial plants and would also extend the green forage period. Establishment of seeded sagebrush would be facilitated by grazing in the seeded areas.

4.8.6 Recreation

Any area closed for pre-treatment, prescribed burning, or wildland fire use would displace users to adjacent areas. Even if the areas are not closed to the public, the sights, sounds, and traffic associated with pre-treatment, prescribed burning, or wildland fire use would displace users. After pre-treatment and before prescribed burning, the presence of cut and dying trees would discourage public use. Cut trees on the ground would further discourage cross-country hiking, horseback riding, hunting, and backpacking. Smoke from any prescribed burning or wildfire would decrease visibility in and around Steens Mountain and could affect the health of sensitive visitors. Recreationists would avoid burned areas immediately after a prescribed burn or fire and for some time thereafter. Wildfire and prescribed burning in or near developed recreation sites could affect the quality of a visitors experience because of smoke and health and safety concerns. Protection of developed recreation sites could be improved through the use of prescribed burning to create fire breaks around the areas.

The regrowth of grasses and forbs, especially wildflowers, would eventually attract additional users to any burned areas. With treatment of aspen stands, increased aspen growth could increase the numbers of people visiting Steens Mountain to view the fall colors. Improved wildlife habitat could increase hunting opportunities and increase the numbers of hunters in ODFW's Steens Mountain unit. Many of these hunters concentrate their camping, scouting, and hunting activities along the Steens Mountain Loop Road and adjacent open roads. The increased number of hunters and vehicles during hunting seasons increases the potential for vehicles being driven off designated routes and causing violations in WSAs and Steens Mountain Wilderness.

The use of motorized or mechanized transport cross-country from the designated travel routes would create additional 2-track vehicle routes. These routes would attract additional cross-country use, especially during big game hunting seasons. These types of vehicle routes are very hard to close to further vehicle use.

4.8.7 Off-Highway Vehicles

The current CMPA designations for OHVs and mechanized vehicles would not be affected. Temporary closures associated with fires and prescribed burning would displace OHV and mechanized vehicle users to nearby designated roads and ways, possibly causing crowding and heavy use on those routes.

4.8.8 Social and Economic Values

Consequences of adopting this alternative would generally be the same as that for the Partial Treatment Alternative with the exception that in the Limited Treatment Alternative rangeland health would also be increased inside Wilderness, WSAs, and WSR corridors. Expansion of rangeland health in these management areas could lead to increased use and more tourism to the area. On the other hand, some who view these kinds of areas as off limits to any treatment might be less likely to visit once treatments are accomplished.

4.8.9 Soils

The Limited Treatment Alternative would reduce the continued modification of vegetative communities by juniper expansion in larger portions of the project area than the Partial Treatment Alternative. Effects from this alternative in treated areas would be the same as those described in the Partial Treatment Alternative. Effects from this alternative in untreated areas would be the same as those described in the No Treatment Alternative.

By reducing the buildup of fuels, especially from increasing numbers of juniper, the chances of a catastrophic fire in the North Steens Area would be reduced and the potential for erosion would also drop.

4.8.10 Transportation/Roads

Effects to this resource are the same as the Partial Treatment Alternative.

4.8.11 Vegetation

Effects on vegetation would be the same as the Partial Treatment Alternative, but the total number of acres available for treatment would increase under this alternative. Treatments would occur within Steens Mountain Wilderness and WSAs within the project perimeter. Initially relying on management of wildfires within Steens Mountain Wilderness would slow the return of these areas to sagebrush-dominated plant communities. Wildfires rarely ignite in desired locations and the fire effects do not always match our preconceived ideas. Most naturally-ignited fires within Steens Mountain Wilderness and WSAs would be small initially, but as adjacent areas are treated the size of the fires may increase.

4.8.12 Visual Resources

The Limited Treatment Alternative would reduce the continued modification of vegetative communities by juniper expansion in larger portions of the project area than the Partial Treatment Alternative. Effects from this alternative in treated areas would be the same as those described in the Partial Treatment Alternative. Effects from this alternative in untreated areas would be the same as those described in the No Treatment Alternative.

Because the only treatments proposed for WSAs and Steens Mountain Wilderness are natural and prescribed fire, there would be minimal human-caused effects to visual resources in these areas. The potential for large fires would be reduced, thereby reducing any potential visual effects. VRM Class I objectives would be met, because these treatments would not attract the attention of the casual observer more than any other fire.

4.8.13 Wild Horses and Burros

In some areas, the Limited Treatment Alternative could increase the likelihood of a limited amount of forage available to all herbivores in the affected HMAs. Effect to wild horse populations could be pronounced if budgetary or operational restraints delay scheduled gathers. Increased inter-specific competition between wild horse populations and other animal populations reliant upon the same limited resources would be less than the Partial Treatment and No Treatment Alternatives, but could still be exacerbated if the Limited Treatment Alternative is selected.

In areas where increased juniper management is proposed, the likelihood of an increased amount of forage available to all herbivores in the affected HMAs would exist. Effects to wild horse populations could be pronounced if gathers need to occur on shorter time sensitive timelines or if budgetary or operational restraints delay scheduled gathers. Inter-specific competition between wild horse populations and other animal populations reliant upon the same limited resources could be reduced if the Limited Treatment Alternative is selected.

4.8.14 Wildlife

Refer to the Partial Treatment Alternative (4.6.14) for the effects of annual treatments on different wildlife species. In this alternative, the effects would occur over a larger area since there would be some treatments in wilderness and WSAs.

4.9 Full Treatment Alternative: Critical Elements

4.9.1 Areas of Critical Environmental Concern

There are no prescribed fire treatments proposed within any ACEC for the Limited and Full Treatment Alternatives.

4.9.2 Air Quality

Short-term effects on air quality from the Full Treatment Alternative would be slightly greater than the other alternatives, but would be less in the long term because of the reduction in risk of large-scale wildfires. In the long term, conversion of post-settlement western juniper to sagebrush would reduce smoke emissions from wildfires and wildland fire use. There would also be less of an emphasis on wildland fire use initially. Treatments would be applied across the landscape.

Production of dust would be greatest in this alternative. However, dust production from the use of chain saws would still be negligible. Heavy machinery would be used during the late fall, winter, and early spring when soil are frozen. Dust production at that time would be minimal.

4.9.3 American Indian Traditional Practices

The Full Treatment Alternative would reduce the continued modification of vegetative communities by juniper expansion in larger portions of the project area than the Partial Treatment Alternative. Effects from this alternative in treated areas would be the same as those described in the Partial Treatment Alternative. Effects from this alternative in untreated areas would be the same as those described in the No Treatment Alternative.

Potential effects to American Indian Traditional Practices would be eliminated by consultation and project redesign where necessary.

4.9.4 Cultural Heritage

The Full Treatment Alternative would reduce the continued modification of vegetative communities by juniper expansion in larger portions of the project area than the Partial Treatment Alternative. Effects from this alternative in treated areas would be the same as those described in the Partial Treatment Alternative. Effects from this alternative in untreated areas would be the same as those described in the No Treatment Alternative.

4.9.5 Migratory Birds

Refer to the general analysis in the Partial Treatment Alternative (4.5.5) for the effects of annual treatments on migratory birds. These annual treatments would occur over a larger area than in the Limited Treatment Alternative during the life of the project. Approximately 150,000 acres would be treated during the course of the project with the emphasis on reduction of the juniper canopy. This should result in the juniper canopy being only 20.0 to 30.0 percent of present in the project area. Habitat for woodland species would decrease as well as populations of woodlands species. The amount of grassland habitat would increase over the course of the project, which would benefit grassland species. Sagebrush habitat would decrease during a portion of the project. The return of sagebrush to treated burned areas would depend on the elevation, the size of the burned area, the mosaic pattern of the burn, and available seed sources in close proximity to the burned area. The effects of these actions on riparian species would be the same as that described in the Partial Treatment Alternative except that more acreage would be treated than in the Limited Treatment Alternative.

4.9.6 Noxious Weeds

Potential effects would be the same as with the Partial Treatment Alternative and Limited Treatment Alternative, but with more fire disturbance and increased likelihood of noxious weed expansion.

4.9.7 Paleontological Resources

The Full Treatment Alternative would reduce the continued modification of vegetative communities by juniper expansion in larger portions of the project area than the Partial Treatment Alternative. Effects from this alternative in treated areas would be the same as those described in the Partial Treatment Alternative. Effects from this alternative in untreated areas would be the same as those described in the No Treatment Alternative.

Protection of paleontological localities through law enforcement surveillance and other protective measures would occur.

4.9.8 Special Status Species – Fauna

The effects of actions in this alternative on bald eagles and Columbia spotted frog would be the same as that described in the Limited Treatment Alternative (4.7.8).

Refer to the Partial Treatment Alternative (4.5.8) for general analysis of annual treatments on greater sage-grouse habitat. The most acreage, approximately 150,000 could be treated in this alternative over the life of the project so the effects described would occur over more of the landscape. The juniper canopy should be reduced to 20 to 30.0 percent of present in the project area. Areas of juniper and mountain big sagebrush burned early in the project timeframe should be returning to a sagebrush-dominated structure useable by greater sage-grouse. There would still be extensive areas of grasslands from more recent burns that would eventually return to a sagebrush-dominated canopy. Wyoming big sagebrush sites, if burned, would not return to a sagebrush-dominated site during the life of the project and may need to be reseeded depending on the rate of sagebrush return. Areas treated next to seedings on the north and west sides of the project area would create greater voids of nonsuitable habitat for sage-grouse.

The effects of this alternative on Northern goshawk would be the same as the Limited Treatment Alternative except that more aspen stands would be treated over the course of the project, which increases the possibility of affecting goshawk nesting and foraging habitat. Identified nest trees would be protected from treatment same as that described in the Limited Treatment Alternative.

The effects of actions in this alternative on Swainson's hawk would be the same as those described in the Limited Treatment Alternative except that juniper would be reduced the most over the life of the project. This would affect nesting habitat but suitable nest trees should remain in the project area. More foraging area would be available over the course of the project.

Habitat for Preble's shrew would be affected the same as that described in the Limited Treatment Alternative. More sagebrush, aspen and riparian habitat would be treated over the length of the project but some areas treated early in the project should be returning to useable habitat by the end. Riparian areas and aspen stands should respond the quickest to treatments and return to useable habitat. The amount of time for Preble's shrew to return to former habitat would depend on the amount of suitable occupied habitat remaining, the spatial distribution of that habitat and the ability of remaining habitat to support viable populations that would sustain until such time that treated areas return to suitable habitat.

To the extent that treatments conducted under this alternative take place in the higher elevations of Steens Mountain, wolverine habitat could be affected. Even though most of the treatments in the project area are designed to treat juniper expansion, project units occur in wolverine habitat, which could have an effect on habitat.

Bighorn sheep habitat would be affected same as the Limited Treatment Alternative. Since more actions would be conducted in wilderness and WSAs, bighorn sheep habitat would be affected by the reduction of juniper, which would improve aspects of sheep habitat. The loss of shrubs would have some affect on the availability of some forage but the resulting increase in grasses and forbs would benefit bighorn sheep overall.

Effects to bats, long-billed curlew, and burrowing owls would be the same as those described in the Partial Treatment Alternative except that these effects would occur over most of the project area.

4.9.9 Special Status Species – Flora

Effects to this resource would be the same as those in the Partial Treatment Alternative in treated areas; and same as the effects stated in the No Treatment Alternative in untreated areas.

General effects of fire to plants are covered in the No Treatment Alternative Special Status - Flora Effects section.

Reduced size and intensity of fires would likely benefit plant populations by limiting the potential for catastrophic reductions in plant population size and the resulting genetic bottleneck that could provide an insurmountable obstacle to natural recovery.

With appropriate project design and mitigation for Special Status plant species sensitive to disturbance there would only be positive effects from ecosystem restoration efforts.

With regard to any Special Status Species mentioned in this document; the proposed treatments would not trend any of the Special Status Species toward listing.

4.9.10 Wetlands and Riparian Zones and Water Quality

The Full Landscape Alternative would allow for treatment of all riparian areas and juniper could be cut by nonmechanized means in all wilderness, WSR corridors, and WSAs. Implementation of this alternative would likely reduce the time and uncertainty for successful removal of juniper compared to the Limited Landscape Alternative. This is because all treatment techniques would be used to ensure removal of juniper during the initial treatment. Positive benefits would be seen in the response of desired riparian vegetation. The Full Landscape Alternative would likely restore the health of riparian vegetation and riparian function in less time than the Limited Landscape Alternative. Implementation of this alternative would best follow management direction from the Steens Act (2000) and best meet project objectives.

The Full Landscape Alternative would reduce the continued modification of vegetative communities by juniper encroachment in larger portions of the project area than the Partial Landscape Alternative. Effects from this alternative in treated areas would be the same as those described in the Partial Landscape Alternative. Effects from this alternative in untreated areas would be the same as those described in the No Treatment Alternative.

4.9.11 Wild and Scenic Rivers

Scenic:
Wildfire: Effects from wildfire should be the same as “scenic” under the Limited Treatment Alternative.

Prescribed Fire: Effects from prescribed fire should be the same as “scenic” under the Limited Treatment Alternative.

Manual (using nonmotorized or nonmechanized equipment) Treatments: Scenic values within the WSR corridors would not be too negatively affected by the proposed work actions. Most of the work would be accomplished by the use of hand tools and would not affect large areas of scenic vistas. Worksites treated by manual labor would be relatively small in size and would often be screened from view by being contained within areas such as aspen stands.

Motorized/Mechanized (using motorized or mechanized equipment) Treatments: Effects should be the same as those noted above regarding manual treatments. Some effects could occur to scenic values if crews operating power equipment treated large landscape size areas. Caution should be taken to prevent such occurrences.

Geologic:
Wildfire: Geologic values would not be affected by this action.

Prescribed Fire: Geologic values would not be affected by this action.

Manual (using nonmotorized or nonmechanized equipment) Treatments: Geologic values would not be affected by this action.

Motorized/Mechanized (using motorized or mechanized equipment) Treatments: Geologic values would not be affected by this action.

Recreational:
Wildfire: Effects from wildfire should be the same as "recreational" under the Limited Treatment Alternative.

Prescribed Fire: Effects from prescribed fire should be the same as "recreational" under the Limited Treatment Alternative.

Manual (using nonmotorized or nonmechanized equipment) Treatments: Manual work activities involving the use of hand tools should have a minimal effect on recreational values in the WSR corridors. Exceptions may occur where crews would be working on sites in areas that are popular with recreationists, such as campsites or along trails. Such activities may have an effect on visitors' experiences.

Motorized/Mechanized (using motorized or mechanized equipment) Treatments: Effects of this action would be the same as those stated above in "manual treatments." Additional effects on recreationists may be disturbance caused by noise from power equipment.

Fish:
Wildfire: Effects from wildfire should be the same as "fish" under the Limited Treatment Alternative.

Prescribed Fire: Effects from prescribed fire should be the same as "fish" under the Limited Treatment Alternative.

Manual (using nonmotorized or nonmechanized equipment) Treatments: Adverse effects to fish should be minimal from these actions.

Motorized/Mechanized (using motorized or mechanized equipment) Treatments: Effects should be the same as noted in "manual treatments" above.

Wildlife:
Wildfire: Effects from wildfire should be the same as "wildlife" under the Limited Treatment Alternative.

Prescribed Fire: Effects from prescribed fire should be the same as "wildlife" under the Limited Treatment Alternative.

Manual (using nonmotorized or nonmechanized equipment) Treatments: Disturbance by human presence related to work activities could cause displacement of some wildlife. Wildlife could be affected by the presence of crews working on treatments in such areas as mountain mahogany and aspen stands, which are essential wildlife habitats.

Motorized/Mechanized (using motorized or mechanized equipment) Treatments: Effects on wildlife would be the same as those listed above. There may also be increased effects of disturbance and displacement of wildlife due to noise associated with the use of motorized equipment.

Vegetation:
Wildfire: Effects from wildfire should be the same as "vegetation" the Limited Treatment Alternative.

Prescribed Fire: Effects from prescribed fire should be the same as "vegetation" the Limited Treatment Alternative.

Manual (using nonmotorized or nonmechanized equipment) Treatments: Vegetation would not be greatly affected as all work would be accomplished by hand and so no single large portion would be affected. Sites treated by manual labor would be small in size, such as individual aspen stands, rather than large areas of the landscape.

Motorized/Mechanized (using motorized or mechanized equipment) Treatments: Most effects would be the same as those noted above in the Manual Treatments section, but larger areas of vegetation could more easily be affected by the use of power tools and caution would have to be used to prevent large-scale effects.

Botanic:
Wildfire: Effects from wildfire would be the same as "botanic" under the Limited Treatment Alternative.

Prescribed Fire: Effects from prescribed fire would be the same as "botanic" under the Limited Treatment Alternative.

Manual (using nonmotorized or nonmechanized equipment) Treatments: Botanic communities should be little affected by the use of manual treatments as the target species of such actions is the western juniper.

Motorized/Mechanized (using motorized or mechanized equipment) Treatments: Effects from these actions should be the same as stated in "manual treatments" above.

Cultural:
Wildfire: Effects from wildfire would be the same as "cultural" under the Limited Treatment Alternative.
Prescribed Fire: Effects from prescribed fire would be the same as "cultural" under the Limited Treatment Alternative.

Manual (using nonmotorized or nonmechanized equipment) Treatments: The use of manual treatments should have no effects on cultural values within the WSR corridors.

Motorized/Mechanized (using motorized or mechanized equipment) Treatments: The use of motorized and mechanized treatments should have no effects on cultural values within the WSR corridors.

Historic:
Wildfire: Effects from wildfire would be the same as "historic" under the Limited Treatment Alternative.

Prescribed Fire: Effects from prescribed fire would be the same as "historic" under the Limited Treatment Alternative.

Manual (using nonmotorized or nonmechanized equipment) Treatments: The use of manual treatments should have no effects on cultural values within the WSR corridors.

Motorized/Mechanized (using motorized or mechanized equipment) Treatments: The use of motorized and mechanized treatments should have no effects on cultural values within the WSR corridors.

4.9.12 Wilderness

Naturalness:
Wildfire: Effects from wildfire should be the same as "naturalness" under the Limited Treatment Alternative.

Prescribed Fire: Effects from prescribed fire should be the same as "naturalness" under the Limited Treatment Alternative.

Manual (using nonmotorized or nonmechanized equipment) Treatments: There would be some loss of naturalness through the use of treatments under this alternative. Treatments would include forms of human manipulation such as cutting and girdling of trees. While this work would be accomplished by manual (nonmechanical) labor such actions could not be considered to be natural and would somewhat reduce the wilderness value of naturalness.

Motorized/Mechanized (using motorized or mechanized equipment) Treatments: Treatments under this alternative using motorized and mechanical equipment, such as chain saws, would have effects on this wilderness value. Naturalness and natural processes would be affected and reduced by the use of such equipment within the Wilderness.

Wildness:
Wildfire: Effects from wildfire should be the same as “wildness” under the Limited Treatment Alternative.

Prescribed Fire: Effects from prescribed fire should be the same as “wildness” under the Limited Treatment Alternative.

Manual (using nonmotorized or nonmechanized equipment) Treatments: The wilderness value of wildness would be affected through the use of treatments under this alternative. Treatments would include forms of human manipulation such as cutting and girdling of trees. While this work would be accomplished by manual (nonmechanical) labor such actions would compromise the values of wildness.

Motorized/Mechanized (using motorized or mechanized equipment) Treatments: The use of motorized and/or mechanized equipment to accomplish the objectives of the proposed management goals would further compromise this wilderness value. Wildness would be affected by such actions.

Solitude:
Wildfire: Effects from wildfire should be the same as “solitude” under the Limited Treatment Alternative.
Prescribed Fire: Effects from prescribed fire should be the same as “solitude” under the Limited Treatment Alternative.

Manual (using nonmotorized or nonmechanized equipment) Treatments: The actual physical treatment of sites within the Wilderness should have no effect on the value of solitude to visitors. Rather solitude could be affected by the presence of individuals and crews working on sites in the area where visitors could be disturbed by their presence. Since only manual treatments would be performed under this action the disturbance of visitors by the use of equipment should be minimal.

Motorized/Mechanized (using motorized or mechanized equipment) Treatments: The use of motorized and mechanized equipment in juniper treatment sites would have an affect on the value of solitude for wilderness visitors. In addition to the disturbance of personnel working in the area effects from equipment noise would cause a reduction in the level of solitude for wilderness visitors who are located in the proximity of sites being treated.

Primitive and Unconfined Recreation:
Wildfire: Effects from wildfire should be the same as “primitive and unconfined recreation” under the Limited Treatment Alternative.

Prescribed Fire: Effects from prescribed fire should be the same as “solitude” under the Limited Treatment Alternative.

Manual (using nonmotorized or nonmechanized equipment) Treatments: Treatment of sites, which do not involve motorized or mechanized equipment and strictly involve the use of hand tools should have a minimal effect on recreational values in the Wilderness. The exception to this situation may be if crews were working on sites in areas, which are popular with recreationists, such as trails or campsites, and visitors’ experiences were affected as a result.

Motorized/Mechanized (using motorized or mechanized equipment) Treatments: Effects of this action would be the same as those stated above in the Manual Treatments section. Additionally, effects may be caused by noise from power equipment, the same as those noted in the Solitude section.

Supplemental Values:
Wildfire: The effects involved with wildfire should be the same as those described above for the Limited Treatment Alternative.

Prescribed Fire: The effects involved with prescribed fire should be the same as those described above for the Limited Treatment Alternative.

Manual (using nonmotorized or nonmechanized equipment) Treatments: The use of manual tools to perform treatments would have little affect on the supplemental wilderness values for Steens Mountain Wilderness of “scenery,” “vegetation,” and “wildlife.”

Scenery would not be affected to any great extent as all work of this nature would be done by hand and would not effect a large portion of any one area. Worksites treated by manual labor would be small in size and would not cover large expanses of the landscape.

Effects to vegetation would be the same as those of “scenery” and would only affect small areas of treated vegetation, such as individual aspen stands, rather than large view shed areas.

Wildlife could be affected by the presence of crews working on treatments in areas frequented by wildlife such as mountain mahogany and aspen stands. Disturbance by human activities could cause displacement of some wildlife.

Motorized/Mechanized (using motorized or mechanized equipment) Treatments: Effects on “scenery,” “vegetation,” and “wildlife” would be the same as those listed above for manual treatments. Some exceptions may occur. Additionally, there may be increased effects of disturbance and displacement of wildlife by noise associated with the use of motorized equipment. Larger areas of vegetation could be more readily affected by the use of power tools and caution would have to be observed to minimize effects to scenery.

4.9.13 Wilderness Study Areas

The wilderness values associated with Lower Stonehouse WSA would not be affected because less than 2.0 percent of this WSA is located within the project area and could potentially be affected.

The wilderness values associated with the Blitzen River, Bridge Creek, Home Creek, Lower Stonehouse, and South Fork Donner und Blitzen WSAs would be affected as follows:

Naturalness:
Fires and prescribed burning would help maintain plant diversity and health of fire-dependent ecosystems in WSAs. This could improve or enhance WSAs' ecological naturalness through the restoration of native plant communities. The potential for stand-replacing fires would be lessened by reducing the fuel loading.

However, the use of mechanical pre-treatments would seriously affect naturalness through the creation of human-caused features, especially stumps, cut log ends, cut branches, and girdling lines. Even after prescribed burning, many of these features may remain, increasing the presence of human's activities in the WSAs.

Solitude:
Fires and prescribed burning would reduce solitude through the reduction of vegetative screening. Pre-treatments activities would seriously affect solitude through the presence of people, the sounds of their vehicles and equipment, and the mechanical treatment of vegetation. During the actual prescribed burns or fires, solitude would further be reduced by the increased presence of firefighters, their vehicles, and fire monitors. Solitude would also be affected by presence of stumps, cut log ends, cut branches, and girdling lines that could still be visible after burning.

Primitive and Unconfined Recreation:
Primitive and unconfined recreation would be slightly constrained in the short-term, because areas would be closed to the public during any prescribed burning or fire. Prior to burning, cut trees and limbs would physically hinder the passage of recreationists. If areas are not burned after pre-treatment, cut limbs and branches would continue to hinder recreation activities. After an area is burned through prescribed burning or fire, the presence of burned trees and blackened vegetation would continue to displace recreationists to other nearby, unburned areas. In the longer term, opportunities for primitive and unconfined recreation would increase as wildlife habitat improves, vegetation and wildflowers respond to the release of nutrients, and the landscape becomes more open and easily traversed. However, downed and burned tree trunks and unburned tree trunks and branches could continue to restrict passage through a more open landscape.

Special Features:
Special features, especially greater sage-grouse habitat and mule deer winter range, would be expanded and improved. Restoration of riparian habitats would benefit redband trout and other aquatic species. Scenery could be enhanced through the greater diversity of landscapes that would be found in the WSAs.

4.10 Full Treatment Alternative: Noncritical Elements

4.10.1 Biological Soil Crusts

The Full Treatment Alternative would reduce the continued modification of vegetative communities by juniper expansion in larger portions of the project area than the Partial Treatment Alternative. Effects from this alternative in treated areas would be the same as those described in the Partial Treatment Alternative. Effects from this alternative in untreated areas would be the same as those described in the No Treatment Alternative.

Information specific to the Andrews RA is currently being gathered via new monitoring efforts. The BMPs would be developed and implemented as determined necessary by the Field Manager.

4.10.2 Fire Management

Effects from the Full Treatment Alternative would be the same as the Limited Treatment Alternative with the following exceptions.
Treatments would be implemented in Steens Mountain Wilderness and WSAs, following current agency policy. These treatments would increase the acreage treated in a year and reduce the time necessary to reestablish appropriate fire adapted plant communities and fire regimes.

Wildland fire use would be implemented after agency treatments reestablish the appropriate plant communities. Suppression actions may be greater than other alternatives. Suppression would be implemented to protect current projects and ensure that management actions achieve the desired results.

4.10.3 Fisheries

There would be no direct effects to fish with implementation of this alternative and expected effects to fish are same as the Limited Landscape Alternative. Prescribed fire would be used in all areas and junipers that are not removed from riparian areas by prescribed fire would be cut and burned individually.

This alternative would treat the greatest amount of land using prescribed fire. There would be approximately 45.0 to 60.0 percent of the uplands burned throughout the project area. Heavy fuels loads would be reduced by spreading the fuels out prior to burning riparian areas to ensure a low intensity fire, which would maintain riparian vegetation and litter to trap potential sediment delivery to streams. Junipers cut in the riparian areas would not likely be completely consumed and the remnants would act as sediment traps. Restoring riparian vegetation would lead to less long-term sediment input than if juniper remained onsite. Implementation of this alternative would follow management direction from the Steens Act (2000) and meet project objectives.

4.10.4 Forestry/Woodlands

The Full Treatment Alternative would restore old growth western juniper woodlands at a faster rate than the other alternatives.

4.10.5 Livestock Grazing Management

Effects of the Full Treatment Alternative would be the same as the Limited Treatment Alternative. A large portion of Steens Mountain Wilderness is not grazed by livestock. Additional forage produced by actions from this alternative would not be utilized by livestock.

4.10.6 Recreation

Any area closed for pre-treatment, prescribed burning, or wildland fire use would displace users to adjacent areas. Even if the areas are not closed to the public, the sights, sounds, and traffic associated with pre-treatment, prescribed burning, or fire use would displace users. After pre-treatment and before prescribed burning, the presence of cut and dying trees would discourage public use. Cut trees on the ground would further discourage cross-country hiking, horseback riding, hunting, and backpacking. Smoke from any prescribed burning or wildfire would decrease visibility in and around Steens Mountain and could affect the health of sensitive visitors. Recreationists would avoid burned areas immediately after a prescribed burn or wildfire and for some time thereafter. Wildfire and prescribed burning in or near developed recreation sites could affect the quality of a visitor's experience because of smoke and health and safety concerns. Protection of developed recreation sites could be improved through the use of prescribed burning to create fire breaks around the areas.

The regrowth of grasses and forbs, especially wildflowers, would eventually attract additional users to any burned areas. With treatment of aspen stands, increased aspen growth could increase the numbers of people visiting Steens Mountain to view the fall colors. Improved wildlife habitat could increase hunting opportunities and increase the numbers of hunters in ODFW's Steens Mountain unit. Many of these hunters concentrate their camping, scouting, and hunting activities along the Steens Mountain Loop Road and adjacent open roads. The increased number of hunters and vehicles during hunting seasons increases the potential for vehicles being driven off designated routes and causing violations in WSAs and Steens Mountain Wilderness.

The use of motorized or mechanized transport cross-country from the designated travel routes would create additional 2-track vehicle routes. These routes would attract additional cross-country use, especially during big game hunting seasons. These types of vehicle routes are very hard to close to further vehicle use.

4.10.7 Off-Highway Vehicles

The current CMPA designations for OHVs and mechanized vehicles would not be affected. Temporary closures associated with fires and prescribed burning would displace OHV and mechanized vehicle users to nearby designated roads and ways, possibly causing crowding and heavy use on those routes.

4.10.8 Social and Economic Values

Consequences of adoption of this alternative would essentially be the same as those of the Partial and Limited Treatment Alternatives.

4.10.9 Soils

The Full Treatment Alternative would reduce the continued modification of vegetative communities by juniper expansion in larger portions of the project area than the Partial Treatment Alternative. Effects from this alternative in treated areas would be the same as those described in the Partial Treatment Alternative. Effects from this alternative in untreated areas would be the same as those described in the No Treatment Alternative.

4.10.10 Transportation/Roads

Effects to this resource would be the same as the Partial Treatment Alternative.

4.10.11 Vegetation

Effects of the Full Treatment Alternative would be the same as the Limited Treatment Alternative. However, the timeframes would be shorter for the establishment of desired plant communities. Application of treatments in Steens Mountain Wilderness Area and WSAs would increase the acres treated each year. These areas would be converted to the desired plant communities. Following conversion of the plant communities, the return of appropriate fire regimes would also begin.

4.10.12 Visual Resources

The Full Treatment Alternative would reduce the continued modification of vegetative communities by juniper expansion in larger portions of the project area than the Partial Treatment Alternative. Effects from this alternative in treated areas would be the same as those described in the Partial Treatment Alternative. Effects from this alternative in untreated areas would be the same as those described in the No Treatment Alternative.

The site-specific treatments proposed for WSAs and Steens Mountain Wilderness would result in human-caused effects to visual resources in these areas. The potential for large fires would be reduced, thereby reducing any potential visual effects. VRM Class I objectives may not be met, because the site-specific treatments could attract the attention of the casual observer.

4.10.13 Wild Horses and Burros

In limited site-specific areas, the Full Treatment Alternative could increase the likelihood of limited forage available to all herbivores in the affected HMAs. Effect to wild horse populations could be pronounced if budgetary or operational restraints delay scheduled gathers. Increased inter-specific competition between wild horse populations and other animal populations reliant upon the same limited resources would be less than under the Partial Treatment and Limited Treatment Alternatives and greater under the No Action Alternative.

In areas where fairly immediate increased juniper management is proposed, the likelihood of an increased amount of forage available to all herbivores in the affected HMAs would exist. Effects to wild horse populations could be pronounced if gathers need to occur on shorter time sensitive timelines or if budgetary or operational restraints delay scheduled gathers. Inter-specific competition between wild horse populations and other animal populations reliant upon the same limited resources would be reduced if the Full Treatment Alternative is selected.

4.10.14 Wildlife

Refer to the Partial Treatment Alternative (4.6.14) for the effects of annual treatments on different wildlife species. In this alternative, the effects would occur over a larger area than the Limited Treatment Alternative. Approximately 150,000 acres would be treated during the course of the project with the emphasis on reduction of the juniper canopy. This should result in the juniper canopy being only 20.0 to 30.0 percent of present in the project area.

4.11 Cumulative Effects

Acres shown are taken from the Burns District GIS database and are rounded to the nearest acre.

4.11.1 Past Actions

See Map 2, Past Actions: Juniper Cuts and Wildland Fires (Prescribed and Natural).

The discussion of past, present, and reasonably foreseeable future actions utilizes two scales. The first is fine-scale, which for present purposes is defined as the proposed project area boundary. The second is mid-scale which is defined as the Burns District perimeter.

Fine-scale (Project Area) cultural burning practices
The indigenous populations of the Great Basin, including those who lived within the Steens Mountain Area, were actively utilizing fire at the time of American westward expansion. Extensive historic documentation details such use as a management tool for hunting, crop management, fireproofing areas, insect collection, pest management, warfare and signaling, economic extortion, clearing areas for travel, felling trees, and clearing riparian areas. Within the Great Basin, Steward documented fire use by Ash Valley and Mono Lake Paiutes as a tool to drive rabbits, antelope, and deer. Use of fire by “Snake Indians” (Paiute and Bannock) in eastern Oregon was reported in the journals of Peter Skene Ogden and in the ethnographic work of Olmer Stewart.

Oral histories from Basque sheepherders and their immediate descendants detail the practice of back burning as they led their flocks of sheep off rangelands at the end of each fall season. The documented reasons for this use of fire were to “clean the land and set the grass seeds for the next year” and in one case to follow the practice learned from the Paiute people.

Historic photographic records of Basque-use and old ranch-use areas in the northern extent of the project area show lands covered in forage with few ancient western juniper and sparsely spaced western juniper seedlings.

Early records from residents in the Harney Basin indicate western juniper was present in the late 1800s and early 1900s. The densities and distribution are not described in detail. However, written records indicate need to travel some distance to obtain needed wood fiber for various activities. Residents cut junipers for fence posts and firewood. Old weathered stumps are found across the project area. Reports from the Burns Times-Herald (1902) indicated most settlers in the Frenchglen area traveled to Jack Mountain west of the project area for juniper posts and firewood.

Mid-scale (Burns District) cultural burning practices
According to Shinn’s 1980 paper on historical range burning practices “broadcast burning by the native peoples of the inland Pacific Northwest was widespread and persisted over an extended period primevally. It may have dominated, perhaps largely pre-empted, natural burning in shaping aboriginal environments. The entry of European culture to the region interrupted native traditions in the use of wildland fire, altered their role in nature, and distorted their prior relation to grazing phenomena, causing fundamental shifts in native ecosystems which continue to this day.”

Suppression of fires in the early 1900s was primarily limited to forested areas of Harney County. Standing timber presented a much greater value than sagebrush. Sagebrush fires were not actively suppressed unless there was a threat to private property, primarily structures. Early ranchers and farmers understood that removal of sagebrush resulted in increased forage for livestock. However, the conversion came at the price of diminished current forage. The tradeoff was often enough to let fires burn. Following World War II there was an increase in the available workforce and large equipment, and increased suppression activities.

Fine-scale 20 - 21st century prescribed fire practices
Prescribed fire has been used as a land management tool in the project area for many years on both private and public lands. The objectives of these activities and the methodologies used to implement them have changed over time.

The following table displays prescribed fire acres by year within the project area. Some fires may have overlapped prior burn areas; this overlap acreage has not been adjusted in the table.

Table 4.2. Prescribed Wildfire Activity within the Project Area

Prescribed fire	
Year	**Acres**
1996	2,387
1997	7,731
1999	5,665
2001	9,668
2002	1,247
Other	135
Total Acres	**26,833**

Mid-scale 20 – 21st century prescribed fire practices
Prescribed fire has been used as a land management tool in the Burns District for many years on both private and public lands. The objectives of these activities and the methodologies used to implement them have changed over time.

The following table displays prescribed fire acres by year within the Burns District. Some fires may have overlapped prior burn areas; this overlap acreage has not been adjusted in the table.

Table 4.3. Prescribed Fire Activity within the Burns District

	Prescribed fire
Year	**Acres**
1980	5,748.51
1996	2,916.25
1997	10,870.08
1998	2,912.05
1999	18,543.95
2000	1,090.31
2001	29,315.85
2002	3,932.88
2003	1,553.25
2004	525.97
Other	2,049.19
Total Acres	**79,458.29**

Fine-scale 20 - 21st century wildfire
The following table displays wildfire acres by year within the project area. Some wildfires may have overlapped prior burn areas; this overlap acreage has not been adjusted in the table.

Table 4.4. Wildfire Acres within the Project Area

Year	**Acres**
1981	5,441.53
1982	3,309.50
1984	3,164.49
1987	3,731.05
1996	751.74
1997	3,237.02
1998	879.62
1999	3,202.32
2001	284.25
2002	138.74
Total	**24,140.26**

Mid-scale 20 - 21st century wildfire
The following table displays wildfire acres by year within the Burns District. Some fires may have overlapped prior burn areas; this overlap acreage has not been adjusted in the table.

Table 4.5. Wildfire Acres within the Burns District

Year	Acres
1980	10,566.50
1981	29,917.58
1982	10,383.81
1983	42,886.74
1984	37,460.73
1985	146,574.15
1986	7,046.48
1987	3,116.85
1988	3,278.47
1989	490.99
1990	96,875.61
1991	565.70
1992	10,863.97
1994	13,751.25
1995	3,574.50
1996	45,193.40
1997	8,282.52
1998	25,694.52
1999	13,305.02
2000	16,005.33
2001	43,551.85
2002	3,022.37
Total	**572,414.09**

Fine-scale 20th - 21st century juniper management
Approximately 2,732 acres (Burns District GIS Data) of existing juniper cuts are within North Steens project units. Data do not include years cutting occurred.

Mid-scale 20th - 21st century juniper management
Juniper management began in the mid to late 1980s in the Burns District with a few small cutting projects primarily for habitat improvement and fuels reduction. During the 1990s juniper cutting increased in scale (primarily in the Three River RA) and the objectives were more often for fuels management. The focus of juniper management was in several general areas in Three Rivers RA, including Stinkingwater Mountain Range; the National Forest interface with BLM-managed lands, and the south central portion of the Three Rivers RA to the north of the North Steens Project Area. Similar juniper management projects took place in the Andrews RA during the same period, but the juniper increase has less affected the majority of the Andrews RA.

In this century, projects combined juniper cutting and prescribed fire methods to treat vegetative communities on a landscape scale, recognizing cut juniper provides the fuel continuity required to carry a desirable fire across a landscape. Goals and objectives of these projects are those proposed in this document--to restore historic plant communities and reintroduce fire into fire-dependent systems.

Table 4.6. Juniper Cutting Acres within the Burns District (this table does not include the 2,732 acres of existing cuts in the project area)

Year	Acres
1987	42.98
1989	180.86
1994	528.92
1995	325.67
1996	165.51
1997	240.04
1998	221.39
1999	414.76
2000	909.59
2001	2,054.52
2002	4,739.17
2003	1,902.71
2004	5,619.65
Total	**17,345.77**

Natural Range of Variability

The concept of the natural range of variability has been explored to a great extent with regard to juniper expansion on Steens Mountain and the surrounding areas (see Chapters 1 and 2 of this document). The EOARC has done extensive research on various aspects of the subject. For the purposes of analysis and adaptive management it would be useful to describe the project area in terms that frame the natural range of variability of western juniper in the North Steens Project ecosystems.

These general descriptions fall into three condition categories:

1. Past condition.
2. Present condition (also see Chapter 3 of this document for current condition information).
3. Target future condition (see the description of the DRC in the Andrews/Steens PRMP/FEIS).

Past condition can be separated into recent past (0-140 ybp) and ancient past (140-10,000 ybp). Western juniper has expanded its range dramatically over the last 140 years, but this is not completely unique to juniper as there are other plant communities that have experienced change since population expansion into the western portions of the USA. Juniper expansion does however have some significant statistics to consider when looking at the natural range of variability question. For example over 90.0 percent of the 8 million acres of western juniper have developed in the last 100 years. While that is significant in itself, the real issue for consideration is how does this compare to prior juniper expansion in the historic record?

Relevant scientific literature identifies several main triggers to the recent expansion of western juniper woodlands. These include:

1. Climate shifts.
2. Fire suppression and changes in the Mean Fire Return Interval (MFRI).
3. Past grazing practices.

Climatic trends from 1850 to 1920 shifted to milder winters and greater annual precipitation across much of the Great Basin (Graumlich, 1987). This warmer, wetter period aligns with the peak period of woodland establishment. Holmes and others (1986) found that wet mild conditions promote vigorous juniper growth. Similar trends can also be found in the prehistoric record. During the Early Holocene (10,000 to 8,000 ybp), climate began to warm and juniper began to expand into higher elevations replacing sub-alpine forests (Betacourt, 1987). Juniper populations continued to fluctuate in the mid-Holocene (8,000 to 4,000 ybp) which was a warmer, drier period. Between 5,000 and 4,000 ybp, precipitation and temperatures increased. During this period of time the conditions favored grasses over other woody plants (Miller and Wigand, 1994).

Increases in grasses coincided with an increase in fire occurrence throughout the Great Basin. Woodlands of this time were probably very open and restricted to areas of little fuel accumulation. During the latter stages of the Holocene (2,500 to 140 ybp) climatic conditions varied greatly. Severe drought and major fires also occurred in this period of time. This resulted in dramatic declines in juniper and perennial grasses and the expansion of sagebrush and salt-desert shrub vegetation (Miller and Tausch, 2001).

The ebb and flow of the juniper woodlands over the last 10,000 years has occurred under different conditions. Recent increases (last 140 years) have occurred during a warming trend, but large increases in fires did not accompany the increasing temperatures. The magnitude of and rate of woodland expansion during the last 140 years exceeds any thing that occurred in a similar length of time during the last 5,000 years (Miller and Wigand, 1994). Additionally, recent work has examined the effects of the global CO_2 increase on woodland expansion (Knapp and Soulé, 1996). The increases in juniper do not coincide with the increases in global CO_2. However, more work is needed to examine the effects of tree growth related to increasing CO_2 and its effects on the competitive relationships between trees and understory plants.

The next two triggers are closely linked in time. Miller and Wigand (1994) identified lack of fire as one of the major differences between pre-historic and historic juniper increases. Domestic livestock were introduced during the 1860s and their numbers increased dramatically from the 1870s through the early 1900s (Miller and Tausch, 2002). Domestic grazing may have influenced juniper expansion by reducing fine fuels, which also altered the fire regime (Miller and Rose, 1999). Prior to these shifts in plant community dynamics, fires occurred on an average of 15 to 30 years MFRI. Western juniper expansion has drastically reduced aspen communities. Mean fire return intervals of these wetter, more productive plant communities were 60 to 90 years (Wall, et al., 2001). Estimations by Miller and Rose (1999) concluded that the MFRI for mountain big sagebrush and quaking aspen plant communities has increased to well over 200 years.

4.11.2 Present Actions

Fine-scale prescribed fire practices
Ongoing projects that combine juniper cutting and prescribed fire continue to be implemented on a limited scale within the project area. Ongoing projects include, but are not limited to Ruby Springs Fuels Reduction, Wildlands Juniper Management Area Demonstration Project, and East Ridge Prescribed Fire Project.

Mid-scale prescribed fire practices
The Three Rivers RA is currently utilizing prescribed fire to reduce fuels including juniper slash and for ecosystem restoration purposes. The scale is the same as juniper management activity in Three Rivers RA during the 1990s. Ongoing projects combining juniper cutting and prescribed fire activities in Three Rivers RA include, but are not limited to SHED, Devine Ridge, and Forks of Poison Creek.

Ongoing projects combining juniper cutting and prescribed fire are being implemented on a limited scale within the Andrews RA as stated in the Present Actions Fine-scale prescribed fire practices section above.

Fine-scale juniper management
Juniper management and prescribed fire activities have merged into single effort projects with follow-up treatments of prescribed fire and are described in the Present Actions Fine-scale prescribed fire practices section above.

Mid-scale juniper management
Juniper management and prescribed fire activities have merged into single effort projects with follow-up treatments of prescribed fire and are described in the Present Actions Mid-scale prescribed fire practices section above.

Present condition can be seen as the result of many factors including climate events, fire suppression practices, commodity production, and population increase. Prior to the expansion of nonindiginous people into the West, western juniper was limited to rocky ridge tops or shallow soil areas with sparse vegetation (West, 1984). Changes in the historic trends are readily apparent within the Burns District of the BLM and across the CMPA. Large areas of mountain big sagebrush and quaking aspen plant communities have shifted to dominance by western juniper. Changes in these plant communities have dramatic short- and long-term implications on soil stability and fertility, wildlife habitats, forage resources, and overall site diversity. Increases in western juniper have also altered the fuel loading and structure of many plant communities. In mature woodlands, there are approximately 10x the aboveground fuel loads compared to a pre-settlement mountain big sagebrush stand.

Historically, virtually all plant communities in the Burns District were subjected to fires. The resulting mosaic of plant communities enhanced the success and diversity of animal species and contributed to the ecological integrity of the entire region. In fire-dependent ecosystems, occasional fire is essential to the health and function of the natural system. The loss of natural disturbance events or at least the modification of those events can severely affect specific habitats and the sensitive species that live within them.

Map 4.2 (see Images and Maps CD). Potential Historic Sagebrush Distribution. Derived from 1980s Ecological Site Inventory Soils and Potential Plant Data (Burns GIS Database).

The western sage-grouse is a sagebrush obligate species and a good example of a species that can be affected as habitat is modified by the expansion of western juniper. This juniper expansion has resulted in a decrease of available sagebrush cover and the associated woody and nonwoody vascular and nonvascular plants.

Map 4.3 (see Images and Maps CD). Current Sagebrush (over 10.0 percent cover class) Distribution. Derived from 1980s Ecological Site Inventory General Vegetation Data (Burns GIS Database).

Refer to Map 1.1 (see Images and Maps CD). Current Juniper Expansion into Current Sagebrush Distribution. Derived from 1980s Ecological Site Inventory General Vegetation Data (Burns GIS Database).

Habitat in the project area that has been or is being affected by the same expansion includes, but is not limited to:

1. Mountain big sagebrush
2. Low sagebrush
3. Quaking aspen stands
4. Riparian plant communities
5. Wyoming big sagebrush

4.11.3 Reasonably Foreseeable Future Actions

Fine-scale Ecosystem Restoration (Prescribed fire and Juniper Cutting)
Small projects are being considered, but this project encompasses the entire fine-scale area and is the focus of future efforts.

Mid-scale Ecosystem Restoration (Prescribed fire and Juniper Cutting)
The Three Rivers RA is currently analyzing several project proposals similar to the North Steens Project proposals. These proposed projects are smaller than the North Steens Project and distributed across Three Rivers RA.

One project proposal (Five Creeks Restoration Project) is adjacent to the proposed North Steens Project Area. The proposed objectives and methods are the similar to those of the North Steens Project. Another project in near proximity to the Five Creeks Restoration Project Area is the Burnt Flat Project, which has not been developed to any certain degree yet.

The East Steens Restoration Project in Andrews RA proposes to restore ecologic function and interrupt the altered fire cycle perpetuated by cheatgrass invasions on the east face of Steens Mountain. There is some minimal juniper management proposed in this project. Prescribed fire could still be utilized in the Ruby Springs Fuels reduction effort as well.

It is reasonable to assume that similar projects could continue to be proposed in the Burns District for at least the next 10 to 20 years. Future project designs and scale may differ as new information is learned.

4.12 No Action Alternative A - No Treatment: Critical Elements

Assumptions common to all resources: The description of the potential cumulative effects of selecting the No Treatment Alternative contain two components: 1) Lack of landscape level juniper fuels treatment actions resulting in a continued expansion of western juniper in native habitats and associated changes in fuel arrangements (a sagebrush community transitions to a juniper woodland); and 2) Potential for high intensity and large extent fires due to more continuous juniper canopy (fuel). The descriptions of the environmental consequences include both assumptions.

Under the No Treatment Alternative, western juniper could continue to increase density and cover at the expense of the understory vegetation. Increasing juniper cover and density could also modify the plant communities fuel arrangement (closed juniper woodlands could replace sagebrush for example) across the project area with a concomitant increase in risk of large wildfires in juniper stands. Wildfires burning in these areas could burn with greater intensity and for longer duration due to the increase in continuous woody fuels in the juniper canopy. Unencroached plant communities have an increased ability to recover from fire events due to the intact plant community. In a late-transitional juniper woodland site, the understory has been greatly reduced or eliminated altogether. A lack of a healthy understory minimizes the potential positive responses to fire events such as a mosaic of seral stages in a healthy sagebrush community or a regenerated aspen stand and maximizes the potential negative effects such as soil loss or sterilization (from intense fires). As plant communities continue to transition to closed juniper woodlands over much of the landscape, post-fire event rehabilitation and operational costs would likely increase.

4.12.1 Areas of Critical Environmental Concern

The continued accumulation of western juniper fuels could create areas where wildfires may burn uncontrolled and destroy key elements of some ACECs. It would take many years to return the site to original condition following catastrophic fire.

4.12.2 Air Quality

The accumulation of juniper across the landscape and the continued suppression of wildfires would increase the likelihood of large catastrophic fires across the planning area. Similar situations could occur on adjacent lands and increase the likelihood of fires spreading to the project area. Wildfires would burn for longer periods and produce more smoke than average historic levels.

Smoke produced from fires within the planning area would contribute to regional haze downwind. Smoke emissions from fires may negatively affect areas as far away as the Grand Canyon.

4.12.3 American Indian Traditional Practices

The cumulative effects of all past, present and future vegetation affecting events could incrementally affect the overall economic floral species health and landscape vital to Indian traditional practices.

4.12.4 Cultural Heritage

Potential cumulative effects to cultural resources under the No Treatment Alternative could include the continued and accelerated damage to cultural site constituents from excessive heat fires, further exposure of site constituents to post-unmanaged wildfire, fire suppression activities, subsurface site alteration from juniper expansion into site areas, and increased illegal collection of cultural artifacts.

Potential cumulative effects to the Riddle Brothers Ranch Historic District under the No Treatment Alternative could include the heightened possibility of damage to the Historic District features from excessive and unmanaged fires, fire suppression activities, and the continued alteration of the District's visual landscape.

4.12.5 Migratory Birds

The cumulative effects area for migratory birds, Special Status Species – Fauna and wildlife in general covers more than the fine-scale but less than the mid-scale areas. Migratory birds and bats cover much more than any of the cumulative effects area but cumulative effects will be discussed mainly for nesting/roosting and foraging habitat within this defined area. The cumulative effects area for wildlife is defined as the following: Beginning at the junction of Hwy 205 and Diamond – Grain Camp Road, south on Hwy 205 on the west side of Steens Mountain to the junction with East Steens Road; north along this road to the junction with Hwy 78 at Folly Farm; west along a line from Folly Farm to the point of beginning.

Within this cumulative effects area, which is a little more than twice the acreage of the project area, about 66,000 acres have been treated with prescribed fire from 1992 to present and naturally-ignited fire has burned about 75,000 acres during that same time period. The 1992 date was chosen with the assumption that prescribed and naturally-ignited fires before that time have returned to a sagebrush canopy. This may not be the case for fires occurring in Wyoming big sagebrush or low sagebrush areas before, or since, that time. Approximately 47,000 acres of the effected area has been converted to crested wheatgrass seedings since the 1960s. The majority of seedings occur northwest of the project area. Some seedings (approximately 13,000 acres) were rehabilitation efforts after naturally-ignited fires. Crested wheatgrass still dominates with little to no reinvasion by sagebrush. The amount of juniper cuts that have occurred in this effects area includes the 2,700 acres within the project, plus about 3,000 acres north of the project area on the north end of Steens Mountain. Burns District GIS does not record cuts on private land. Approximately 180,000 acres in the cumulative effects area have some level of disturbance affecting the suitability of habitats for various migratory birds, Special Status animal and wildlife species.

Since no actions would take place under this alternative (with possibility of naturally-ignited wildfire and proposed projects such as the Five Creeks and East Steens restoration projects), the cumulative effects area for migratory birds would be about 250,000 acres.

The cumulative effects of this alternative on migratory birds would be loss of grassland, sagebrush, aspen, and riparian habitats and a subsequent decrease in species dependent on those habitats. This would continue indefinitely. Aspen and sagebrush would only be available at the higher elevations above the juniper. As juniper expands into lower elevations, most other habitats would be lost. This would favor woodland species in the long term over other suites of species. Activities outside the project area, including fire, would be the only forces reducing juniper within the cumulative effects area.

4.12.6 Noxious Weeds

Juniper expansion and wildfire events could continue to create expanses of modified habitat susceptible to invasion by noxious weeds. Survey and treatment would be difficult to perform and noxious weeds could continue to spread undetected. The application of approved noxious weed control methods including mechanical, biological, and chemical treatments on new and existing sites would continue to utilize an integrated weed management approach.

4.12.7 Paleontological Resources

Potential cumulative effects to paleontological resources under the No Treatment Alternative could include the continued or accelerated damage to paleontological site constituents from intense heat, further exposure of site constituents to post-unmanaged fire, fire suppression activities, and subsurface site alteration from juniper expansion into site areas.

4.12.8 Special Status Species – Fauna

Refer to the Cumulative Effects No Treatment Alternative Migratory Birds (4.12.5) section for the description of the cumulative effects area. Since no actions would take place within this alternative except for the possibility of naturally-ignited wildfire and proposed projects such as Five Creeks and East Steens restoration projects, the cumulative effects area affected by disturbance would be about 250,000 acres.

Continued expansion of juniper may eventually provide roost sites in areas other than the Donner und Blitzen River drainage. Bald eagles would not be affected under this alternative.

The following cumulative effects on Special Status Species - Fauna are the same effects as those analyzed in the No Treatment Alternative Effects Special Status Species – Fauna section discussed above. Effects not covered in the aforementioned section are cumulative effects and are listed below.

The cumulative effects of this alternative on greater sage-grouse would also include the following: Some areas treated in the past with prescribed fire or burned through wildfire should have returned to a sagebrush canopy that is useable by sage-grouse. Areas where juniper were cut and not burned should have returned to a sagebrush canopy during this time.

The cumulative effects of this alternative on Northern goshawk would also include the following: Remaining nesting habitat would be those aspen stands above the juniper belt, those aspen stands that have been treated in the juniper belt with prescribed fire, and where only juniper were cut or were burned through naturally-ignited fire.

The cumulative effects of this alternative on Swainson’s hawk would also include the following: While acreage of juniper would increase in the project area, proposed juniper reduction projects in other parts of the cumulative effects area would reduce nesting habitat and increase foraging habitat. Other past projects and wildfire have already reduced some possible nesting habitat and increased some foraging habitat.

The cumulative effects of this alternative on Preble’s shrew would also include the following: While Preble’s shrew habitat would be reduced in the project area, other past treatments and naturally-ignited fires and proposed treatments would in the long term restore some shrew habitat.

4.12.9 Special Status Species – Flora

Although unlikely, cumulative effects of the No Treatment Alternative could result in conditions that trend Special Status plant species toward listing under the ESA. The risk of greater intensity wildfires that are of longer duration and greater scale poses the greatest risk to Special Status plant species. Additional risks could occur as a result of moisture and light interception from increased juniper cover plant and the resulting modification to associated fuels. Species endemic to Steens Mountain are however generally located at elevations higher than where effects from juniper expansion and fires are not currently as great of an issue for concern.

4.12.10 Wetlands and Riparian Zones and Water Quality

Livestock have been grazed on Steens Mountain for well over a hundred years. Historic grazing practices were often detrimental because of the numbers of animals on the range and long grazing seasons. Riparian areas are sensitive to the effects of grazing and were severely degraded by early grazing practices. If riparian vegetation degrade, then water quality and fish habitat become degraded as well. Historic grazing has likely played a role in the expansion of juniper across the landscape. Grazing practices began changing with the passing of the Taylor Grazing Act of 1934.

Subsequent legislation has continued to drive improved range management across the west including Steens Mountain.

Much of Steens Mountain is now designated as wilderness with a no livestock grazing area that encompasses 97,995 acres of land. Depending on which alternative is selected, the project area may include a large part of the wilderness area. Current riparian conditions across Steens Mountain are good or improving in all but a few areas. The areas being encroached upon by juniper would begin degrading as riparian vegetation is extirpated.

There would be no manipulation of the succession from desired riparian communities to juniper stands in riparian areas. The effects of riparian areas being dominated by juniper are discussed above. These effects would likely be compounded with grazing. As banks became less stable from loss of riparian vegetation they would become more susceptible to effects from grazing. There would be cumulative effects to riparian areas, water quality, and fish habitat.

The East Ridge project is a scaled-down and limited version of the proposed North Steens project. The vegetation along Kiger Creek has responded very well with new growth of cottonwood, willow, and alder. Prior to introducing fire into Kiger Gorge there was very little to no young cottonwood. The same response is expected throughout the streams in the North Steens Project Area.

There are no expected cumulative effects to riparian areas, water quality, and fisheries from recreation and no treatment.

Image 4 (see Images and Maps CD). Juniper growing on terrace upstream of Page Springs.

4.12.11 Wild and Scenic Rivers

Scenic: Cumulative effects to WSRs values from the No Treatment Alternative include effects to the scenic qualities of river corridors if juniper expansion continues unabated. Wildfires also affect visual qualities of scenery by changed colors, textures, and landforms.

Geologic: There would be no effects to the geologic values within the WSR corridors either by juniper expansion or natural wildfires.

Recreational: If present trends continue, some recreational opportunities may be lost as junipers expand their range, overgrow recreation sites, and hinder access along the river corridors. Travel may be made more difficult and areas such as campsites may be lost. Naturally-occurring wildfires may have effects on recreational values if campsites or trails are damaged.

Fish: Soil erosion could increase as juniper continues to expand and create dense canopy cover, which would cause a loss of ground vegetation and an increase in erosion and water turbidity, reducing fish populations. Natural wildfires could have similar effects in areas of heavy juniper density where loss of vegetation could cause a loss in water quality, which would affect fisheries.

Wildlife: Loss of riparian habitat from increased expansion of juniper could also have effects to a variety of wildlife species. As riparian plant species are out competed by juniper there could be a loss of forage and hiding cover. Wildfires could also have the same effect if juniper stands burn in nonfire adapted riparian habitats, again causing the loss of feed and cover.

Vegetation: Similarly, vegetation in the riparian corridors of the WSRs could be affected by an increase in the coverage of juniper in those areas. Plant species native to those environments could be displaced. Intense wildfires caused by a loss of plants native to that environment could cause a change in species composition.

Botanic: Effects to botanic values could be the same as those noted in the preceding paragraph.

Cultural: An increase in juniper coverage and area should not in itself have an effect on cultural resources in the WSR corridors. Effects could result to those resources if wildfires burn in areas that have been encroached by junipers.

Historic: Juniper expansion in and of itself should have little affect on historic resources in the river corridors. Historic values in these areas could be affected in much the same way as cultural resources. There could be a loss of these resources if wildfires fueled by invasive junipers burn through areas having these resources.

4.12.12 Wilderness

Naturalness: Changes in the natural environment due to effects from continuing expansion of juniper could affect naturalness. Change in habitats caused by an increase in juniper would alter fire-adapted ecological systems. In addition, wildfire would burn over larger areas and with more intensity in areas that previously saw low intensity fires burn in lighter fuels. Increase in fuel loading caused by invasive juniper would fuel higher intensity fires. This would create an unnatural situation.

Wildness: There would be no obvious effects to wildness by an increase either in juniper expansion or in the possibly resulting high intensity wildfires. Increase in junipers and the resulting larger, hotter wildfires could be thought of as a normal function of wilderness environments.

Solitude: As with wildness it is expected solitude would not be affected by expansion of juniper in the Wilderness. Indeed, increased vegetative screening would enhance the perception of solitude by visitors.

In addition, since wildfires would be allowed to burn naturally and would only be suppressed if they became a threat to human life or property wilderness values of solitude would not be affected by the presence of fire fighting personnel or equipment.

Primitive and Unconfined Recreation: Some recreational activities could be affected by the increase in junipers into areas used for those purposes. Principally, wilderness campsites and trails could become overgrown by junipers. Some access to areas and sites use for recreation could also be affected over time.

Wildfires burning in areas of unnatural buildup of fuels could have effects on primitive recreational activities in wilderness. Areas used for those purposes could be burned and recreation opportunities lost.

Supplemental Values: Juniper expansion could affect supplemental wilderness values of scenery, vegetation, and wildlife. Scenery could be altered and vegetation type and composition changed as well as wildlife being affected mainly by changes to their habitat. Larger, more intense wildfires resulting from increase in fuels and coverage in wilderness could also have effects on all three of these values. Larger, catastrophic wildfires could alter scenic values and affect vegetation types and composition. Wildfires fueled by unnatural levels of fuel buildup could destroy wildlife forage and cover.

4.12.13 Wilderness Study Areas

Cumulative effects to WSA wilderness values from the No Treatment Alternative would include effects to naturalness, opportunities for solitude or primitive and unconfined recreation, and special features. Ecological naturalness would decrease, while wilderness naturalness would be maintained. Opportunities for solitude would be enhanced as vegetative screening increases or diminished should stand-replacing wildfires occur. Opportunities for primitive and unconfined recreation would be diminished as juniper densities increase or should stand-replacing fires occur. Special features, especially wildlife and Special Status animal species habitats, would be diminished through continuing juniper expansion.

4.13 No Treatment Alternative: Noncritical Elements

4.13.1 Biological Soil Crusts

General cumulative effects to biological soil crusts could include effects from alterations of historical fuel loads in the project area. Increased fuel loading can provide conditions leading to catastrophic fire events (resulting in the loss of biological soil crusts over large continuous areas). The loss of a mosaic of unburned biological soil crusts could result in an extended recovery time at that site. Even after early recovery, biological soil crusts in large uninterrupted burnt areas could be susceptible to disturbance from wind (dust) or water events.

The description of factors influencing distribution of biological soil crusts (TR-1730-2) found in Chapter 3 of this document are utilized below as categories for the discussion of potential cumulative effects on biological soil crusts from selection of the No Treatment Alternative. For a description of how these factors may influence biological soil crust distribution, see the Biological Soil Crust section of Chapter 3 of this document.

Elevation - The No Treatment Alternative would allow the continued modification of vegetative communities by juniper expansion. The focus of this modification would be in the juniper belt that occurs primarily from 4,500 to 6,500 feet in elevation area. Biological soil crust cover in this elevational range could decrease as factors such as light reduction, moisture interception are modified.

Soils and Topography - The risk of catastrophic fire would exist as an effect of selecting the No Treatment Alternative and could threaten remnant biological soil crusts in dense juniper stands in deep soils. Fire risk is much less of an issue where soils are poor and shallow, which is a function of the natural fuel lack. Since biological soil crusts are more common in less productive soils with large interspaces between vascular plants, large-scale fires should not affect the larger percentage of biological soil crusts in the juniper belt.

Short term, there should be very little effect to biological soil crusts in poor soil areas because of selecting the No Treatment Alternative. Long term, juniper populations could increase in poor soil areas to the point at which fire could scorch the soil and biological soil crusts.

Disturbance - Selection of the No Treatment Alternative could produce situations where large-scale, high intensity, wildfire events burn entire areas without leaving a mosaic of unburned vegetation. If this occurs, it could slow both short and long-term natural recovery of biological soil crusts considerably due to reliance on recolonization from fewer (maybe approaching zero) unburned biological soil crust populations.

Timing of precipitation - The amount of precipitation reaching the ground in a stand of juniper can be significantly altered compared to sagebrush-dominated systems. Short term, this reduction should not be a major factor influencing presence or absence of biological soil crusts. Long term, increased juniper cover could reduce precipitation penetrating the juniper canopy; this potentially could reduce the presence or absence of biological soil crust sites specifically.

Through new monitoring efforts, information specific to the Andrews RA is currently being gathered. The BMPs would be developed and implemented as determined necessary by the Field Manager.

4.13.2 Fire Management

Continued suppression would increase the likelihood of large catastrophic wildfires. Wildfire management actions would be limited to suppression. Wildfires would continue to be a rare event, but the risk would continue to increase with increasing fuels. Flame lengths and fire line intensity would increase. Presence of large catastrophic wildfires would require a larger number of local fire control resources. Either areas of high priority would be at risk, or fires would grow because of low resource levels. Most wildfire events occur in clusters because of ignition by convective storms. Multiple lightning strikes may ignite multiple fires. Potential for large, high intensity wildfires would increase the priority of suppression.

4.13.3 Fisheries

Livestock Grazing – Riparian communities would turn into juniper stands. Effects of juniper domination on riparian areas are discussed above. These effects would likely be compounded with grazing. As banks become less stable from loss of riparian vegetation they would become more susceptible to effects from grazing, leading to cumulative effects on fish habitat. Recreation (description of the action is in the No Action section of Cumulative Effects.) – There are no expected cumulative effects to riparian areas, water quality, and fisheries from recreation and no treatment.

4.13.4 Forestry/Woodlands

Increase in juniper would reduce the presence and diversity of other plant species. Diversity of wildlife species would decrease and favor woodlands species. The middle to high elevation mountain big sagebrush, quaking aspen, and riparian plant communities are important for many wildlife species that utilize these areas in spring, summer, and early fall.

The homogenization of the fuels layer would also place old growth juniper woodlands at risk of burning. The risk would be from fires burning into old growth stands from adjacent fully-developed woodlands and from an increase in younger juniper in these shallow soil areas.

4.13.5 Livestock Grazing Management

Increases in juniper would occur at the expense of forage species in the understory. Domestic livestock could be forced to graze at lower elevations, or in other pastures, for longer periods of time. Ultimately, when juniper woodlands are fully developed, forage for domestic livestock would be drastically decreased. Grazing would potentially increase on private lands. These lands are often in valley bottoms and near perennial water sources. The increase in use may have detrimental effects on these adjacent lands.

4.13.6 Recreation

Reduction of big game habitat could diminish recreation opportunities. The potential for stand-replacing wildfires would continue, possibly reducing or displacing recreation opportunities and affecting visitor safety.

4.13.7 Off-Highway Vehicles

There would be no cumulative effects to OHVs from the No Treatment Alternative.

4.13.8 Social and Economic Values

Historically, the economy within Harney County has been based on agricultural goods and related services. Although these continue to play a vital role, the current trend shows increasing revenues from tourism and recreation. Due to population increases in Oregon, as well as publicity the Steens Mountain Area is receiving, it is likely tourism and visitation to the area is likely to continue to increase in the reasonably foreseeable future. Economic activities conducted on lands within and adjacent to the project area, as well as economic conditions within the county, would produce cumulative effects on social and economic values. Anticipated recreation growth would increase the demand for recreation facilities across the area. Increased recreation and tourism could provide opportunities for growth in the retail and service sectors, thereby reducing unemployment. Growth in recreation and tourism could also lead to increased traffic, effects to the rural character of the region, and diminished opportunities for solitude or primitive experiences.

Under the No Treatment Alternative, effects of reduced rangeland health and forage production could affect agricultural production in the region and either put additional pressure on private lands or lead to a reduction in overall production, thus affecting the economy. Hunting and other recreational opportunities would likely be diminished.

4.13.9 Soils

The cumulative effects of this alternative on soils could only be significant if the accumulation of juniper creates a situation where catastrophic wildfire destroys much of the native vegetation. Many areas could continually experience various forms of wind and water erosion depending on the soil type. Increase in juniper would also add to the amount of bare ground beneath the woodland canopy, and erosion would increase. Soil would erode into streams and move into meadows in the valley bottoms. Productivity of lower elevation areas may increase with increasing soil but would occur at the expense of uplands.

4.13.10 Transportation/Roads

No effects are anticipated.

4.13.11 Vegetation

Cumulative effects to vegetation would be the same as those described in the Woodlands section. Primary expansion of juniper is occurring in mountain big sagebrush, middle elevation quaking aspen, riparian and low sagebrush plant communities. Steens Mountain Area has characteristics of the Basin and Range vegetation. The isolated mountains rise dramatically from the basin floor and form unique islands. Many plant species and assemblages of plant species are only found on these mountains. The simplification of the plant community by expansion of juniper would reduce the uniqueness and plant diversity of these areas.

4.13.12 Visual Resources

There would be no cumulative effects to Visual Resources from the No Treatment Alternative. However, in the absence of large or stand-replacing fires, a more continuous, dark-green band of junipers would develop across the western mid-slopes of Steens Mountain. VRM Class I, Class II, Class III, and Class IV objectives would be met.

4.13.13 Wild Horses and Burros

Wild horse habitat could decrease as tree and shrub densities increase. Available forage and foraging areas could decrease, which could cause animals to concentrate in areas with available forage. Such areas are those with diverse understory species. Increased wild horse utilization could stress understory plant species causing them to decline. With continued forage decline, AMLs for the affected HMAs could be reduced, thus shrinking the wild horse herd population. A reduced population size could also affect herd genetic diversity.

However, long term, available forage for wild horses could increase. As a result of increasing dense vegetation, wildfire could destroy sagebrush and juniper woodlands. This expanded grassland could result in more forage availability for wild horses, and wild horse concentration in the area would be expected to increase.

4.13.14 Wildlife

Refer to the Cumulative Effects No Treatment Alternative Migratory Birds (4.12.5) section for the description of the cumulative effects area. Since no actions would take place under this alternative (except for the possibility of naturally-ignited wildfire and proposed projects such as Five Creeks and East Steens restoration projects), the cumulative effects area affected by disturbance would be about 250,000 acres.

Even though effects in the project area would reduce habitat for most wildlife species in the absence of large naturally-ignited fires, other past actions and proposed actions should maintain or restore habitat in other parts of the cumulative effects area. Overall, this alternative would affect habitat for some species beneficially while others species are affected negatively.

4.14 No Action Alternative B - Continue Current Management Alternative: Critical Elements

Assumptions common to all resources: Under the Continuation of Current Management Alternative, western juniper could continue to increase density and cover at the expense of the understory vegetation. Increasing juniper cover and density could also modify the plant communities fuel arrangement (closed juniper woodlands could replace sagebrush for example) across the project area with a concomitant increase in risk of large wildfires in juniper stands. Fires burning in these areas could burn with greater intensity and for longer duration due to the increase in larger woody fuels. Unencroached sagebrush communities have an increased ability to recover from fire events, due to the intact sagebrush plant community. In a late-transitional juniper woodland site, the sagebrush understory has been greatly reduced or eliminated altogether; this lack of a healthy understory minimizes the potential positive responses to fire events (such as a mosaic of seral stages in a healthy sagebrush community) and maximizes the potential negative cumulative effects such as soil loss or sterilization (from intense fires). As juniper continued to transition to closed woodlands over much of the landscape, post-fire event rehabilitation and operational costs would likely increase.

In untreated areas, which would be the majority of the landscape, the cumulative effects of the Continuation of Current Management Alternative are substantially the same as the cumulative effects of the No Treatment Alternative. In the small areas treated over time across the landscape (under other NEPA documents), potential cumulative effects of the Continuation of Current Management Alternative would be substantially the same as those described in the Partial Treatment Alternative. The primary difference between the Partial Treatment and Continuation of Current Management Alternatives is the scale and rate at which treatments would occur across the landscape. Under the Continuation of Current Management Alternative, small juniper treatments could still be proposed, analyzed and implemented, but they would require new individual NEPA analyses. The rate at which the landscape could be treated would be substantially slower than any of the Action Alternatives, but could still occur.

4.14.1 Areas of Critical Environmental Concern

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading “Assumptions common to all resources.”

4.14.2 Air Quality

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading “Assumptions common to all resources.”

4.14.3 American Indian Traditional Practices

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading “Assumptions common to all resources.”

4.14.4 Cultural Heritage

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading “Assumptions common to all resources.”

4.14.5 Migratory Birds

The cumulative effects to this resource are the same as those described in Section 4.12.5 of this document.

4.14.6 Noxious Weeds

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading "Assumptions common to all resources."

4.14.7 Paleontological Resources

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading "Assumptions common to all resources."

4.14.8 Special Status Species – Fauna

The following cumulative effects on Special Status Species - Fauna are the same effects as those analyzed in the No Treatment Alternative Effects Special Status Species – Fauna (4.1.8) section discussed above. Effects not covered in the aforementioned section are cumulative effects and are listed below. Refer to the Cumulative Effects No Treatment Alternative Migratory Birds section for the description of the cumulative effects area.

The cumulative effects of this alternative on greater sage-grouse would include the following: although some areas treated with prescribed fire or burned through wildfire should have returned to sagebrush canopy that is useable by sage-grouse other recently-treated areas will be in a stage that is not suitable for use. Areas where juniper were cut and not burned should have returned to a sagebrush canopy during this time.

The cumulative effects of this alternative on Northern goshawk would include the following: remaining nesting habitat would be those aspen stands above the juniper belt, those aspen stands that have been treated in the juniper belt with prescribed fire, and where only juniper were cut or were burned through naturally-ignited fire.

The cumulative effects of this alternative on Swainson's hawk would include the following: while acreage of juniper would increase in the project area, proposed juniper reduction projects in other parts of the cumulative effects area would reduce nesting habitat and increase foraging habitat. Other past projects and wildfire have already reduced some possible nesting habitat and increased some foraging habitat.

The cumulative effects of this alternative on Preble's shrew would include the following: while Preble's shrew habitat would be reduced in the project area, other past treatments and wildfires and proposed treatments would in the long term restore some shrew habitat.

4.14.9 Special Status Species – Flora

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading "Assumptions common to all resources."

Although unlikely, cumulative effects of the Continuation of Current Management Alternative could result in conditions that trend Special Status plant species toward listing under the ESA. The risk of greater intensity fires that are of longer duration and greater scale poses the greatest risk to Special Status Plant species. Additional risks could occur as a result of moisture and light interception from increased juniper cover plant and the resulting modification to associated fuels. Species endemic to Steens Mountain are, however, generally located at elevations higher than where effects from juniper expansion and fires are not currently as great of an issue for concern.

4.14.10 Wetlands and Riparian Zones and Water Quality

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading "Assumptions common to all resources."

Livestock have grazed on Steens Mountain for well over a hundred years. Historic grazing was often detrimental because of the numbers of animals on the range and long grazing seasons. Riparian areas are sensitive to effects of grazing and early grazing practices severely degraded them. If riparian vegetation degrades, water quality and fish habitat become degraded as well. Historic grazing has likely played a role in the expansion of juniper across the landscape. Grazing practices began changing with the passing of the Taylor Grazing Act of 1934. Subsequent legislation has continued to drive improved range management across the west including Steens Mountain.

Much of Steens Mountain is now designated as wilderness with a no livestock grazing area that encompasses 97,229 acres of public land. Depending on which alternative is selected, the project area may include a large part of the wilderness area. Current riparian conditions across Steens Mountain are good or improving in all but a few areas. The areas being encroached upon by juniper would begin degrading as riparian vegetation is extirpated.

There would be no manipulation of the succession from desired riparian communities to juniper stands in riparian areas. The effects of riparian areas being dominated by juniper are discussed above. These effects would likely be compounded with grazing. As banks became less stable from loss of riparian vegetation they would become more susceptible to effects from grazing. There would be cumulative effects to riparian areas, water quality, and fish habitat.

Recreation – Steens Mountain has long been a destination outdoor experience for many people; its geography and diversity of plants and wildlife are unique. Recreation has probably never been a major force of degradation in the project area except perhaps in isolated cases.

Recreation is increasing in the project area and mostly consists of camping, hiking, fishing, birding, driving the Steens Mountain Loop, viewing wildflowers, running, and hunting. These activities normally cause very little effect on the land because there are few areas of concentrated use and because of regulations associated with the designation of Steens Mountain Wilderness Area, Donner und Blitzen WSR Corridor, and WSAs. Recreation would likely not be a cause of degradation to riparian areas, water quality, or fish habitat.

There are no expected cumulative effects to riparian areas, water quality, and fisheries from recreation and no action.

Habitat Improvement Projects – Past improvement projects include fencing of springs and riparian areas, stream channel alterations, noxious weed control, seedings, gauging stations, and water developments. Most effects from these actions were likely positive, except the Page Springs gauging weir is a barrier to most fish. The BLM is currently in the planning stages of creating fish passage over the weir. This would lead to benefits for redband trout and other fish.

Weed spraying would continue in some areas. Treatment of noxious weeds would follow the protocol and precautions for application during treatment, thus reducing potential for undesirable effects. This action would not lead to cumulative effects to riparian areas, water quality, and fish habitat.

Riparian plant species (willow, cottonwood, red osier dogwood) may be planted throughout the project area with stock collected from Steens Mountain. This would be beneficial to riparian area development, water quality, and fish habitat. Focus of planting would be on flood plains and terraces of waterways where riparian plants species are decadent, dead, or absent in places they likely existed in the past. On the Donner und Blitzen River, riparian plant species may be planted from Page Springs upstream up to the confluence with Little Blitzen River after the junipers in the planting area have been treated. As seen in photo 1 below, junipers occupy areas where riparian hardwoods would normally be found. Planting would likely be completed using a water-jet stinger that greatly enhances success of plantings. A water-jet incorporates a gas powered pump to produce a high powered stream of water that is used to put a small but deep (1-inch by 48-inch) hole in the ground for planting. Temporary fencing (2 to 5 years) of young cottonwood would likely be necessary to protect them from predation by wild ungulates. Materials may be flown in by helicopter or packed in using stock animals. Introducing riparian species in these areas would improve conditions within the redband trout reserve and WSR corridor.

Image 4 (see Images and Maps CD). Juniper growing on terrace upstream of Page Springs.

There are no expected cumulative effects to riparian areas, water quality, and fisheries from habitat improvement projects.

4.14.11 Wild and Scenic Rivers

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading “Assumptions common to all resources.”

4.14.12 Wilderness

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading “Assumptions common to all resources.”

4.14.13 Wilderness Study Areas

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading “Assumptions common to all resources.”

4.15 No Action Alternative B - Continuation of Current Management Alternative: Noncritical Elements

4.15.1 Biological Soil Crusts

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading “Assumptions common to all resources.”

4.15.2 Fire Management

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading “Assumptions common to all resources.”

4.15.3 Fisheries

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading “Assumptions common to all resources.”

4.15.4 Forestry/Woodlands

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading “Assumptions common to all resources.”

4.15.5 Livestock Grazing Management

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading “Assumptions common to all resources.”

4.15.6 Recreation

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading “Assumptions common to all resources.”

4.15.7 Off-Highway Vehicles

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading “Assumptions common to all resources.”

4.15.8 Social and Economic Values

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading “Assumptions common to all resources.”

Juniper treatments could still occur under this alternative and increased rangeland health could increase forage production for both wildlife and livestock. This increase could result in increasing economic opportunities that could foster more desirable recreation opportunities.

Under the Continuation of Current Management Alternative, effects of reduced rangeland health and forage production could affect agricultural production in the region and either put additional pressure on private lands or lead to a reduction in overall production, thus affecting the economy. Hunting and other recreational opportunities would likely be diminished.

4.15.9 Soils

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading “Assumptions common to all resources.”

4.15.10 Transportation/Roads

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading “Assumptions common to all resources.”

4.15.11 Vegetation

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading “Assumptions common to all resources.”

4.15.12 Visual Resources

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading “Assumptions common to all resources.”

4.15.13 Wild Horses and Burros

Cumulative effects to this resource are substantially the same as those contained in the No Treatment and Partial Treatment Alternatives as described in Section 4.14 of this document under the heading “Assumptions common to all resources.”

4.15.14 Wildlife

The cumulative effects to this resource are the same as those described in Section 4.13.14 of this document.

4.16 Partial Treatment Alternative: Critical Elements

4.16.1 Areas of Critical Environmental Concern

There would be no significant cumulative effects to ACECs under this alternative.

4.16.2 Air Quality

In the partial landscape alternative the reduction of even part of the juniper woodland would reduce the risk of large catastrophic wildfires and the level of smoke produced. The risk of fires in wilderness would continue to grow and summer smoke emissions would continue to be high during and after events. Prescribed burning would be conducted in late summer and fall. Smoke produced would be similar during the free burning stage of the fire, but the smoldering phases of the fire would not last as long as those of the larger fires. Reductions in juniper would also increase shrub and herbaceous vegetation. Smoke produced from wildfires in those post-treatment stands would be less than the fully-developed woodlands.

4.16.3 American Indian Traditional Practices

Effects to American Indian Traditional Practice use areas in the past could have included grazing pressure, OHV and mechanized vehicle use, more intensive public use pressure, and illegal collecting. Complete data are not available for the levels of current cumulative effects of unmanaged fire within the areas of American Indian Traditional Practices. Current cumulative effects to cultural resource resources are lowest where uses of public lands are restricted to those that cause the least ground disturbance.

Past effects on American Indian Traditional Practices within the project area, but unrelated to the current treatment plan, could include loss of access to traditional use areas and loss of ready access to floral, faunal, mineral, aquatic and water traditional use resources. These losses would have been more prevalent over the last 50 to 120 years with an increase in population, increased public ownership of lands and associated resources, changes in emphasis of overall land use, loss of winter burning regime, advent of mechanized vehicles, consistent fire suppression, and intensive ungulate grazing.

With adherence to planning restrictions as detailed in Chapter 4, effects under this alternative would cause negligible to no negative cumulative effects. Potential positive cumulative effects to certain root crops and areas of Traditional use are possible under this alternative.

4.16.4 Cultural Heritage

Effects to cultural resource sites in the past could have included grazing pressure, OHV and mechanized vehicle use, and illegal collecting. Complete data are not available for the levels of current effects within sites caused by unmanaged fire. Effects to cultural resource resources are lowest where uses of public lands are restricted to those that cause least ground disturbance.

Past effects to cultural resources within the project area but unrelated to the current treatment plan could have included loss of cultural artifacts from crushing, illegal collecting, and high heat fire. These losses would have been more prevalent over the last 50 to 100 years with the advent and increase in mechanized vehicles, fire suppression, and removal of topsoil exposing cultural artifacts to weathering and fire. Other past effects could have included crushing of cultural artifacts from cattle and/or sheep grazing, soil compaction, erosion, landscape modification, and the increased interest in collecting of artifacts. These activities may have buried sites.

As detailed in this chapter, adherence to planning restrictions would cause negligible to no cumulative effects under this alternative. However, greater ground visibility resulting from planned treatments could result in greater levels of illegal collecting within cultural resource localities in areas of heavy public use. This potential increase in illegal effects could contribute cumulatively, but only until the vegetation returned after several growing seasons. Any instance of degradation affects site information potential.

Effects to the Riddle Brothers Ranch Historic District could include continued juniper encroachment, legal and illegal mechanized vehicle use, more intensive public use, trespass by unauthorized public, and illegal collecting and/or vandalism. Photographic histories of the Riddle Brothers site show the steady progression of flora change, thus changing not only the landscape of the Historic District but increasing the potential of permanent and devastating fire damage.

As detailed in this chapter, adherence to planning restrictions would cause negligible to no cumulative effects under this alternative. Potential positive effects to the Historic District could include the lessening of potential for devastating fire damage and a return to the Historic District's original visual landscape.

4.16.5 Migratory Birds

Refer to Migratory Birds Cumulative Effects section under the No Treatment Alternative (4.12.5). Under the Partial Treatment Alternative actions would take place on about 60,000 acres within the project area.

The cumulative effects of this alternative on migratory birds would be the same as those described in the Partial Treatment Alternative. These effects would occur over most of the described cumulative effects area except in wilderness and WSAs.

4.16.6 Noxious Weeds

If juniper expansion continues to the detriment of other native vegetation, more opportunities for noxious weed invasion would occur. Reduction of juniper should reverse this process. Presently, few significant noxious weed infestations exist within the North Steens Project Area. However, the project area is increasingly visited by people arriving from areas infested with weeds. An increase in visitors increases the probability of noxious weed introductions. Initially, prescribed fire would open up available niches by creating disturbance. This combined with an increase in visitation and concomitant noxious weed introduction could cause an initial increase in new weed populations. However, once native vegetation is released in response to juniper removal the habitat would be more able to resist infestation. The long-term effect would be improved habitat and decreased frequency of noxious weed introduction and spread when combined with an aggressive survey and treatment strategy.

4.16.7 Paleontological Resources

Complete data are not available for the levels of current cumulative effects of unmanaged and managed fire; grazing pressure, OHV and mechanized vehicle use, and illegal collecting within paleontological sites. Current effects to paleontological resources are lowest where uses of public lands are restricted to those that cause the least ground disturbance.

Effects to paleontological resources within the project area, but unrelated to the current treatment plan, could include the loss of fossils from crushing, illegal collecting, and high heat fire. These losses would be incremental over time, but more prevalent over the last 50 to 100 years with the advent and increase in mechanized vehicles, fire suppression, and resultant removal of topsoil exposing fossils to weathering and fire. Other past effects could include crushing of fossils from cattle and/or sheep grazing, soil compaction, erosion, and landscape modification. Some sites may have been further buried by any of these activities.

As detailed in this chapter, adherence to planning restrictions would cause negligible to no cumulative effects under this alternative. Greater ground visibility resulting from planned treatments could result in greater but limited levels of illegal collecting within paleontological localities in areas of heavy public use. This potential increase in illegal effects could contribute to cumulative effects. Any instance of degradation cumulatively affects the site in terms of information potential.

4.16.8 Special Status Species – Fauna

Refer to the Cumulative Effects No Treatment Alternative Migratory Birds (4.12.5) section for the description of the cumulative effects area. Since actions would take place on about 60,000 acres within the project area under this alternative and with proposed projects such as the Five Creeks and East Steens restoration projects, the cumulative effects area affected by disturbance would be about 310,000 acres.

The cumulative effects of this alternative on bald eagles would be the same as that described in the Partial Treatment Alternative (4.5.8). Continued expansion of juniper may eventually provide roost sites in areas other than the Donner und Blitzen River drainage. Bald eagles would not be affected under this alternative.

The cumulative effects of this alternative on Columbia spotted frogs would be the same as that described in the Partial Treatment Alternative. Since there are no known populations of spotted frogs in the rest of the cumulative effects area, other past and proposed actions would have no effects on spotted frogs or their habitat.

The cumulative effects of this alternative on greater sage-grouse would be the same as that described in the Partial Treatment Alternative although some areas treated in the past with prescribed fire or burned in the past through wildfire should have returned to a sagebrush canopy that is useable by sage-grouse. Areas where juniper were cut and not burned should have returned to a sagebrush canopy during this time. Proposed actions in the cumulative effects area would reduce juniper while trying to restore sagebrush habitat in the long term.

The cumulative effects of this alternative on Northern goshawk would be the same as that described in the Partial Treatment Alternative. Nesting habitat would be increased in the long term outside wilderness and WSAs along with those stands above the juniper belt, which are extensive. Other past actions and proposed actions may help to restore aspen stands throughout the cumulative effects area.

The cumulative effects of this alternative on Swainson's hawk would be the same as that described in the Partial Treatment Alternative. While acreage of juniper would increase in wilderness and WSAs, proposed juniper reduction projects in other parts of the cumulative effects area would reduce nesting habitat and increase foraging habitat. Other past projects and wildfire have already reduced some possible nesting habitat and increased some foraging habitat.

The cumulative effects of this alternative on Preble's shrew would be the same as that described in the Partial Treatment Alternative. While Preble's shrew habitat would be reduced in the project area, other past treatments and naturally-ignited fires and proposed treatments would, in the long term, restore shrew habitat.

The cumulative effects of this alternative on wolverine, bats, long-billed curlew, and western burrowing owls would be the same as that described in the Partial Treatment Alternative. This, in combination with past actions and proposed actions, should have no cumulative effects on habitat for these species.

The cumulative effects of this alternative on California bighorn sheep would be the same as those described in the Partial Treatment Alternative except that through past actions and proposed actions, some juniper cover in sheep habitat has been, and more should be reduced, improving sheep habitat.

4.16.9 Special Status Species – Flora

Cumulative effects for this resource would be the same as the No Treatment Alternative for Special Status plant populations in wilderness, WSAs, and WSR corridors.

In fire adapted ecosystems the vast majority of plant species have co-evolved with and adapted to fire regimes. Plant populations that respond favorably to fire disturbance could see increases in numbers.

Some plant species are endemic to Steens Mountain; the vast majority of these species occur at an elevation where fire disturbance and juniper expansion are not a factor. Other species occur in areas where fuels are naturally low, and fire disturbance is not part of their normal disturbance cycle. For these species appropriate mitigation would be employed to ensure proper protection of the population.

With appropriate project design and mitigation (in areas outside of Wilderness, WSAs, and WSRs) for Special Status plant species, there would only be positive cumulative effects from ecosystem restoration efforts. Regarding Special Status Species mentioned in this document; the proposed treatments would not trend any toward listing in areas outside of Wilderness, WSAs, and WSRs.

4.16.10 Wetlands and Riparian Zones and Water Quality

Livestock Grazing – Grazed areas would be rested a minimum of 2 years following treatment, and monitoring would be continued. There would likely be some cumulative effects from grazing with action alternatives; however, the effects would likely be on a more isolated scale than with the No Action Alternatives. Grazing would be managed to reduce effects to riparian areas and reduce the level of cumulative effects.

Recreation – There are no expected cumulative effects to riparian areas, water quality, and fisheries from recreation and implementation of any action alternative.

Habitat Improvement Projects – There are no expected cumulative effects to riparian areas, water quality, and fisheries from recreation and implementation of any action alternative.

4.16.11 Wild and Scenic River

Cumulative effects for all WSR values from the Partial Treatment Alternative would be the same as the Continuation of Current Management Alternative.

4.16.12 Wilderness

All values: Cumulative effects for all Wilderness values from the Partial Treatment Alternative would be the same as the Continuation of Current Management Alternative.

4.16.13 Wilderness Study Areas

Cumulative effects to WSA wilderness values from the Partial Treatment Alternative would be the same as the Continuation of Current Management Alternative.

4.17 Partial Treatment Alternative: Noncritical Elements

4.17.1 Biological Soil Crusts

By reducing the buildup of fuels, especially from increasing numbers of juniper, the chances of a catastrophic fire in the North Steens Area would be reduced as well as the potential for the creation of large uninterrupted burnt areas.

Cumulative effects to biological soil crusts in Wilderness WSAs or WSR corridors would be the same as the Continuation of Current Management Alternative.

Due to the smaller scale active ecosystem management in the Partial Treatment Alternative, the cumulative effects to biological soil crusts would be less than the Limited or Full Treatment Alternatives over the short term, but may be greater over the long term if catastrophic wildfire occurs.

The description of the factors influencing distribution of biological soil crusts (TR-1730-2) found in Chapter 3 of this document are utilized below as categories for the discussion of potential cumulative effects on biological soil crusts from selection of the Partial Treatment Alternative. For a description of how these factors may influence biological soil crust distribution, see the Biological Soil Crust section of Chapter 3 of this document.

Elevation - The Partial Treatment Alternative would reduce the continued modification of vegetative communities by juniper expansion in some portions of the project area. The focus of this reduced modification would be in the juniper belt that occurs primarily from 4,500 to 6,500 feet in elevation in the project area. Biological soil crusts in this elevational range may benefit in the short and long term from increased light and moisture as a result of decreased interception from juniper.

Soils and Topography - Over the short term, there may be very little affect to biological soil crusts in untreated areas as a result of selecting the Partial Treatment Alternative. Over the long term, juniper populations could increase in untreated areas to the point where large-scale wildfires could scorch the soil and biological soil crusts.

Over the long term, the total biological soil crust cover may increase in the project area as treated areas with proper site-specific soil chemistry are restored to pre-juniper expansion conditions.

Disturbance - Prescribed burning in the form of broadcast, jackpot or individual tree burning could have a short-term effect on biological soil crusts. Over the long term, the overall seral stage representation of biological soil crusts should be a mosaic that mirrors to some extent the mosaic of vascular plant community seral stages.

By removing biological soil crust cover through burning, some areas, especially areas with a major moss/shrub component, could experience prolonged biological soil crust recovery periods. The biological soil crusts in areas of naturally low fuels (low sagebrush sites) would have less likelihood of experiencing fire events and would proportionately have less effects. Over the long term if these areas remain untreated due to priority or other limitation, effects from juniper expansion could slowly occur.

The intent of the proposed prescribed fire events is to create a mosaic of seral stages in the vegetation. As a fire burns through an area some vegetation is left unaffected, this concept applies to biological soil crusts as well. The mosaic pattern in the vascular vegetation may be partially mirrored by the biological soil crust communities. The biological soil crusts also occur in areas without vegetation, so the total remaining biological soil crust cover in a burned area should be sum of the cover in the unburned vegetation and the untreated interspaces or areas of naturally low fuels.

Fencing would not have any major effect to biological soil crusts unless the structure concentrated wildlife or livestock in small areas resulting in localized compaction or mechanical disturbance. The extent of this disturbance is influenced by the site-specific potential for biological soil crusts in the area that is to be fenced. Temporary fencing would have less long-term effects than permanent fencing.

Post-wildfire reseeding or planting of native or desirable nonnative vegetation could benefit biological soil crusts over the short term by providing more perennial plants to provide micro-site moisture soil stability. This method in concert with post-treatment rest from grazing has recently been shown to benefit biological soil crust recovery in moss dominated biological soil crust communities (Hilty, et al., 2004).

The use of large track or wheeled machines to either grind or cut and pile brush and trees would not result in long-term localized compaction to the soil and biological soil crusts.

By reducing the buildup of fuels, especially from increasing numbers of juniper, the chances of a catastrophic wildfire in the North Steens Area would be reduced as well as the potential for the creation of large uninterrupted burnt areas.

Effects to biological soil crusts in Wilderness or WSAs would be the same as the Continuation of Current Management Alternative.

Timing of precipitation - The Partial Treatment Alternative would reduce the interception of precipitation in treated areas. Interception may increase in untreated areas as a function of increasing juniper cover.

Information specific to the Andrews RA is currently being gathered via new monitoring efforts. The BMPs would be developed and implemented as determined necessary by the Field Manager.

4.17.2 Fire Management

Treatment of some areas in the project area would help to return the area to an appropriate fire regime and condition class. This could help fire crews with suppression because of the lower flame lengths and fire line intensity. As larger areas are restored, more naturally-ignited fires may be considered for wildland fire use. Some crews required to suppress wildfires in the western juniper woodlands may be able to be shifted to other areas because of the lower fire intensity. There would also be less holdover fires that ignite a single western juniper and tie up an engine of partial hand crew until suppressed.

4.17.3 Fisheries

Livestock Grazing - Areas of the project that are grazed would be rested a minimum of 2 years following treatment and monitoring would be continued. There would likely be minimal cumulative effects from grazing with action alternatives; however, the effects would likely be on a more isolated scale than with the Continuation of Current Management Alternative. Grazing would be managed to reduce effects to riparian areas and reduce the level of cumulative effects.

Recreation – There are no expected cumulative effects to riparian areas, water quality, and fisheries from recreation and implementation of any action alternative.

Habitat Improvement Projects – There are no expected cumulative effects to riparian areas, water quality, and fisheries from recreation and implementation of any action alternative.

4.17.4 Forestry/Woodlands

Treatment of western juniper in part of the planning area would help to increase the diversity at the plant community, watershed, and landscape level. Areas would be converted back to shrub dominance after passing through an herbaceous phase in some cases. Animal species that prefer shrub and herbaceous-dominated systems would increase in the project area. Areas that have been converted to shrub and herbaceous plant dominance would help to increase the connectivity of sagebrush plant communities.

Old growth western juniper and quaking aspen woodlands would also be restored by removal of post-settlement western juniper. These woodlands would provide habitat for many wildlife species onsite and from adjacent areas

4.17.5 Livestock Grazing Management

Reduction in western juniper in part of the planning area would help to increase the available forage in these areas. Total numbers of livestock may not increase, but distribution of the grazing season may increase with the reduction of western juniper. The increase in time spent in a pasture(s) would help to reduce grazing pressure on other areas in and adjacent to the project area.

4.17.6 Recreation

Recreation opportunities would be cumulatively enhanced through implementation of the Partial Treatment Alternative. Big game hunting, wildlife viewing, wildflower viewing, and a variety of other recreation opportunities would be improved. Visitor safety could also be improved through the reduced potential for stand-replacing fires. OHV and mechanized vehicle use on closed roads and ways would increase with increased visitation.

4.17.7 Off-Highway Vehicles

There would be no cumulative effects to OHVs from the Partial Treatment Alternative.

4.17.8 Social and Economic Values

Historically, the economy within Harney County has been based on agricultural goods and related services.

Although these continue to play a vital role, the current trend shows increasing revenues from tourism and recreation. Due to population increases in Oregon, as well as the publicity the Steens Mountain Area is receiving, it is likely tourism and visitation to the area are likely to continue to increase in the reasonably foreseeable future.

Economic activities conducted on lands within and adjacent to the project area, as well as economic conditions within the county, would produce cumulative effects on social and economic values. Anticipated recreation growth would increase the demand for recreation across the area. Increased recreation and tourism as promoted by the Andrews and Steens RMPs could provide opportunities for growth in the retail and service sectors, thereby reducing unemployment. Growth in recreation and tourism could also lead to increased traffic, effects to the rural character of the region, and diminished opportunities for solitude or primitive experiences.

Juniper treatment and increased rangeland health could increase forage production for both wildlife and livestock thereby increasing economic opportunities and fostering more desirable recreation opportunities.

4.17.9 Soils

There would be no significant cumulative effects to soils under this alternative. Treatment of western juniper would reduce the amount of soil being moved offsite by erosion. This would also reduce the amount of sediment in streams and ultimately in the meadow system at lower elevations outside of the project area.

4.17.10 Transportation/Roads

Maintenance of certain roads within the project area would improve vehicle access and may increase visitor use. Visitors seeking solitude may be negatively affected by the moderate increase in vehicular activity. Visitors driving for pleasure would benefit from the improved road conditions. An increase in private land use near the improved roads is also anticipated which may require additional signing to direct the public to open areas.

4.17.11 Vegetation

Cumulative effects to vegetation would be the same as those described in the Woodlands section. Diversity at the different spatial scales would be increased and the connectivity of shrub and herbaceous vegetation would be increased. The project area occupies the northern portions of a fairly continuous block of sagebrush plant communities. Reestablishment of the shrub communities would help to restore the sagebrush systems on a regional scale. This is important to animals that may utilize the habitat during only portions of the year.

4.17.12 Visual Resources

Cumulative effects to Visual Resources from the Partial Treatment Alternative would be varied. In general, the landscape would become rougher with the creation of additional openings in the juniper stands and smoother with the conversion of junipers to grasses, forbs, and shrubs. The landscape elements would also be more complex with the addition of many irregular forms and lines. The overall landscape color would become more light green and yellowish with fewer dark green junipers. Visual contrasts between treated and untreated areas may emphasize the untreated areas. VRM Class I, Class II, Class III, and Class IV objectives would be met.

4.17.13 Wild Horses and Burros

Future proposed activities, such as fuel treatments and fire managed for resource benefit could further benefit wild horse habitat. Future wild horse population management could also improve wild horse health characteristics. Implementing a combination of the alternatives or the proposed action could result in effects the same as those discussed in their respective sections.

4.17.14 Wildlife

Refer to the Cumulative Effects No Treatment Alternative Migratory Birds (4.12.5) section for the description of the cumulative effects area. Since actions would take place on about 60,000 acres within the project area under this alternative and with proposed projects such as the Five Creeks and East Steens restoration projects, the cumulative effects area affected by disturbance would be about 310,000 acres.

The cumulative effects of this alternative on wildlife species would be the same as the description of effects in the Partial Treatment Alternative (4.6.14). These effects, along with past actions and proposed actions, should improve conditions for most species in the long term. Overall, this alternative would affect habitat for some species beneficially while others species are affected negatively.

4.18 Limited Treatment Alternative: Critical Elements

4.18.1 Areas of Critical Environmental Concern

There would be no significant cumulative effects to ACECs under this alternative.

4.18.2 Air Quality

In the Limited Treatment Alternative the reduction of even part of the western juniper woodland would reduce the risk of large catastrophic fires and the level of smoke produced from those events. Reliance of wildland fire use in the wilderness during the early phases of the project may still increase the risk of large volumes of smoke, affecting summertime air quality downwind from the project area. However, as fires become more common in the project area the duration of the emissions would decrease as the fuels structure is shifted from trees to shrubs and herbaceous plants.

Prescribed burning would be conducted in the late summer and fall. Smoke produced from prescribed fires would be similar during the free burning stage of the fire, but the smoldering phases of the fire would not last as long as those of the larger fires. Reductions in western juniper would also increase shrub and herbaceous vegetation. Smoke produced by fires in those post-treatment stands would be less than the fully-developed woodlands.

4.18.3 American Indian Traditional Practices

With adherence to planning restrictions as detailed in Chapter 4, effects under this alternative would cause negligible to no negative cumulative effects. Potential positive cumulative effects to certain root crops and areas of Traditional spiritual use are possible under this alternative.

4.18.4 Cultural Heritage

The Limited Treatment Alternative would reduce the continued modification of vegetative communities by juniper expansion in larger portions of the project area than the Partial Treatment Alternative. Effects from this alternative in treated areas would be the same as those described in the Partial Treatment Alternative. Effects from this alternative in untreated areas would be the same as those described in the No Treatment Alternative.

With adherence to planning restrictions as detailed in Chapter 4, effects under this alternative would cause negligible to no negative cumulative effects. Potential positive cumulative effects to the Historic District could include the lessening of potential for devastating fire damage and a return to the Historic District’s original visual landscape.

4.18.5 Migratory Birds

Refer to the Cumulative Effects No Treatment Alternative Migratory Birds (4.12.5) section for the description of the cumulative effects area. Since actions would take place on about 100,000 acres within the project area under this alternative and with proposed projects such as the Five Creeks and East Steens restoration projects, the cumulative effects area affected by disturbance would be about 350,000 acres.

The cumulative effects of this alternative on migratory birds would be the same as those described in the Limited Treatment Alternative (4.7.5). These effects would occur over most of the described cumulative effects area due to past actions and proposed actions. Some sagebrush would be returning to treated areas while others are being treated in the effects area. Juniper woodlands would be reduced from present but areas would still have sufficient juniper to support woodland species. Grassland areas would increase for a few years then stabilize as these areas return to a sagebrush canopy then would decrease long term as proposed projects are completed. Riparian habitats should increase over time as treatments are completed and juniper reduced in these areas.

4.18.6 Noxious Weeds

Cumulative effects would be the same as the Partial Treatment Alternative but with decreased long-term noxious weed invasion due to further decreased juniper expansion from prescribed fire treatments.

4.18.7 Paleontological Resources

The Limited Treatment Alternative would reduce the continued modification of vegetative communities by juniper expansion in larger portions of the project area than the Partial Treatment Alternative. Effects from this alternative in treated areas would be the same as those described in the Partial Treatment Alternative. Effects from this alternative in untreated areas would be the same as those described in the No Treatment Alternative.

4.18.8 Special Status Species – Fauna

Refer to the Cumulative Effects No Treatment Alternative Migratory Birds (4.12.5) section for the description of the cumulative effects area. Since actions would take place on about 100,000 acres within the project area under this alternative and with proposed projects such as the Five Creeks and East Steens restoration projects, the cumulative effects area affected by disturbance would be about 350,000 acres.

The cumulative effects of this alternative on bald eagles would be the same as that described in the Limited Treatment Alternative (4.7.8). There would be no effects of this alternative on bald eagles.

The cumulative effects of this alternative on Columbia spotted frogs would be the same as that described in the Limited Treatment Alternative. Since there are no known populations of spotted frogs in the rest of the cumulative effects area, other past and proposed actions would have no effects on spotted frogs or their habitat. Overall, reduction of juniper in riparian areas and restoration of those habitats would be beneficial for spotted frogs.

The cumulative effects of this alternative on greater sage-grouse would be the same as that described in the Limited Treatment Alternative although some areas treated in the past with prescribed fire or burned in the past by wildfire should have returned to a sagebrush canopy that is useable by sage-grouse. Areas where juniper were cut and not burned should have returned to a sagebrush canopy during this time. Proposed actions in the cumulative effects area would reduce juniper more area while trying to restore more sagebrush habitat in the long term.

The cumulative effects of this alternative on Northern goshawk would be the same as that described in the Limited Treatment Alternative. Nesting habitat would be increased in the long term. Other past actions and proposed actions should help to restore aspen stands throughout the cumulative effects area.

The cumulative effects of this alternative on Swainson’s hawk would be the same as that described in the Limited Treatment Alternative. Proposed juniper reduction projects in other parts of the cumulative effects area would reduce nesting habitat and increase foraging habitat. Other past projects and wildfire have already reduced some possible nesting habitat and increased some foraging habitat.

The cumulative effects of this alternative on Preble’s shrew would be the same as that described in the Limited Treatment Alternative. While Preble’s shrew habitat would be reduced more in the project area, proposed treatments in other parts of the cumulative effects area would reduce habitat even more. Other past treatments and naturally-ignited fires in the cumulative effects area should be returning to shrew habitat. In the long term, shrew habitat would be restored once juniper cover is reduced in sagebrush, aspen, and riparian habitats.

The cumulative effects of this alternative on wolverine, bats, long-billed curlew, and western burrowing owls would be the same as that described in the Limited Treatment Alternative. This, in combination with past actions and proposed actions, should have no cumulative effects on habitat for these species.

The cumulative effects of this alternative on California bighorn sheep would be the same as those described in the Limited Treatment Alternative except that through past actions and proposed actions, some juniper cover has been reduced in sheep habitat and more should be reduced improving aspects of sheep habitat.

4.18.9 Special Status Species – Flora

In fire adapted ecosystems the vast majority of plant species have co-evolved with and adapted to fire regimes. Plants that respond favorably to fire disturbance could see increases in their population numbers.

Some plant species are endemic to Steens Mountain; the vast majority of these species occur at an elevation where fire disturbance and juniper expansion are not a factor for concern. Other species occur in areas where fuels are naturally low and fire disturbance is not part of their normal disturbance cycle. For these species appropriate mitigation would be employed to ensure proper protection of the population.

With appropriate mitigation for Special Status plant species sensitive to disturbance there would only be positive cumulative effects from ecosystem restoration efforts. With regard to any Special Status Species mentioned in this document; the proposed treatments would not trend any of the Special Status Species toward listing.

Special Status Species populations in Wilderness, WSAs, and WSR corridors could be affected differently due to the limited set of tools available in the SMAs. These effects relate to the change in potential for catastrophic fires of greater intensity, duration, and scale.

The Limited Treatment Alternative would reduce the continued modification of vegetative communities by juniper expansion in larger portions of the project area than the Partial Treatment Alternative. Effects from this alternative in treated areas would be the same as those described in the Partial Treatment Alternative. Effects from this alternative in untreated areas would be the same as those described in the No Treatment Alternative.

4.18.10 Wetlands and Riparian Zones and Water Quality

Livestock Grazing - Areas of the project that are grazed would be rested a minimum of 2 years following treatment and monitoring would be continued. There would likely be some cumulative effects from grazing with action alternatives; however, the effects would likely be on a more isolated scale than with the Continuation of Current Management Alternative. Grazing would be managed to reduce effects to riparian areas and reduce the level of cumulative effects.

Recreation – There are no expected cumulative effects to riparian areas, water quality, and fisheries from recreation and implementation of any action alternative.

Habitat Improvement Projects – There are no expected cumulative effects to riparian areas, water quality, and fisheries from recreation and implementation of any action alternative.

4.18.11 Wild and Scenic Rivers

Scenic: Cumulative effects for these WSR values from the Limited Treatment Alternative would be the same as the No Action and Partial Treatment Alternatives. Additional effects to these values caused by the use of prescribed fire would be the same as those from wildfire.

Geologic: Cumulative effects for these WSR values from the Limited Treatment Alternative would be the same as the No Action and Partial Treatment Alternatives. There should be no additional effects to this value from the use of prescribed wildfire.

Recreational: Cumulative effects for these WSR values from the Limited Treatment Alternative would be the same as the No Action and Partial Treatment Alternatives. Effects from the use of prescribed fire should be the same as those caused by natural wildfire except that some selected recreational areas may be temporarily closed to public use by agency personnel during periods of project work.

Fish: Cumulative effects for these WSR values from the Limited Treatment Alternative would be the same as the No Action and Partial Treatment Alternatives. Effects from the use of prescribed fire would be the same as those from wildfire.

Wildlife: Cumulative effects for these WSR values from the Limited Treatment Alternative would be the same as the No Action and Partial Treatment Alternatives. Effects from the use of prescribed fire would be the same as those from wildfire.

Vegetation: Cumulative effects for these WSR values from the Limited Treatment Alternative would be the same as the No Action and Partial Treatment Alternatives. Effects from the use of prescribed fire would be the same as those from wildfire except areas, which may be susceptible to noxious weed infestations, may not be intentionally burned.

Botanic: Overall effects to this ORV would be the same as for those noted in the Vegetation section above.

Cultural: Cumulative effects for these WSR values from the Limited Treatment Alternative would be the same as the No Action and Partial Treatment Alternatives. Effects from the use of prescribed fire would be the same as those from wildfire.

Historic: Cumulative effects for these WSR values from the Limited Treatment Alternative would be the same as the No Action and Partial Treatment Alternatives. Effects from the use of prescribed fire would be the same as those from wildfire.

4.18.12 Wilderness

Naturalness: Cumulative effects for these Wilderness values from the Limited Treatment Alternative would be the same as the No Action and Partial Treatment Alternatives.

The use of prescribed fire, which is initiated and managed by agency personnel, would have an effect on the natural process. Naturalness would be reduced from the effects of the manipulation of fire in the ecosystems by humans.

Wildness: Cumulative effects for these Wilderness values from the Limited Treatment Alternative would be the same as the No Action and Partial Treatment Alternatives.

Again, wildness would be reduced by human intervention from the use of prescribed fire rather than allowing natural processes to operate freely.

Solitude: Cumulative effects for these Wilderness values from the Limited Treatment Alternative would be the same as the No Action and Partial Treatment Alternatives.

Affects on visitors' experience of solitude may be affected by the presence of personnel performing prescribed fire operations in the Wilderness. Such effects can be avoided by posting notices, which would alert the public about such activities. Areas could also be closed to the public during operation periods to avoid affecting the values associated with solitude.

Primitive and Unconfined Recreation: Cumulative effects for these Wilderness values from the Limited Treatment Alternative would be the same as the No Action and Partial Treatment Alternatives, including effects associated with prescribed Fire Management.

Supplemental Values: Cumulative effects for these Wilderness values from the Limited Treatment Alternative would be the same as the No Action and Partial Treatment Alternatives, including effects associated with prescribed Fire Management.

4.18.13 Wilderness Study Areas

Cumulative effects to WSA wilderness values from the Limited Treatment Alternative would include effects to naturalness, opportunities for solitude or primitive and unconfined recreation, and special features. Ecological naturalness would be improved, while wilderness naturalness would be maintained. Opportunities for solitude would be diminished with the reduction of vegetative screening; however, topographic screening would not be affected. Opportunities for primitive and unconfined recreation would be enhanced through improved wildlife habitat and more open landscapes. Special features, especially wildlife and Special Status animal species habitats, would be improved.

4.19 Limited Treatment Alternative: Noncritical Elements

4.19.1 Biological Soil Crusts

Due to the limited use of methods for active ecosystem management in the Limited Treatment Alternative, the general cumulative effects to biological soil crusts would be greater than the Partial Treatment Alternative and less than the Full Treatment Alternative over the short term, but may be greater than the Full Treatment Alternative over the long term if catastrophic wildfire occurs.

The Limited Treatment Alternative would reduce the continued modification of vegetative communities by juniper expansion in larger portions of the project area than the Partial Treatment Alternative. Effects from this alternative in treated areas would be the same as those described in the Partial Treatment Alternative. Effects from this alternative in untreated areas would be the same as those described in the No Treatment Alternative.

4.19.2 Fire Management

Treatment would help to return the area to an appropriate fire regime and condition class. This could help fire crews with suppression because of the lower flame lengths and fire line intensity. As larger areas are restored, more wildfires may be considered for wildland fire use. Some crews required to suppress wildfires in the western juniper woodlands may be able to be shifted to other areas because of the lower fire intensity. There would also be less holdover fires that ignite a single western juniper and tie up an engine of partial hand crew until suppressed. Crews could be sent to higher priority fires when the area has been converted to appropriate fire regimes.

4.19.3 Fisheries

Livestock Grazing - Areas of the project that are grazed would be rested a minimum of 2 years following treatment and monitoring would be continued. There would likely be minimal cumulative effects from grazing with action alternatives; however, the effects would likely be on a more isolated scale than with the Continuation of Current Management Alternative. Grazing would be managed to reduce effects to riparian areas and reduce the level of cumulative effects.

Recreation – There are no expected cumulative effects to fisheries from recreation and implementation of any action alternative.

Habitat Improvement Projects – There are no expected cumulative effects to fisheries from recreation and implementation of any action alternative.

4.19.4 Forestry/Woodlands

Treatment of western juniper in part of the planning area would help to increase the diversity at the plant community, watershed, and landscape level. Areas would be converted back to shrub dominance after passing through an herbaceous phase in some cases. Conversion to shrub and herbaceous plant communities would be quicker than the Partial Treatment Alternative because of the inclusion of some mechanical treatments in the WSAs. Animal species that prefer shrub and herbaceous-dominated systems would increase in the project area. Areas that have been converted to shrub and herbaceous plant dominance would help to increase the connectivity of sagebrush plant communities.

Old growth western juniper and quaking aspen woodlands would also be restored by removal of post-settlement western juniper. These woodlands would provide habitat for many wildlife species onsite and from adjacent areas.

4.19.5 Livestock Grazing Management

Reduction in western juniper in part of the planning area would help to increase the available forage in these areas. Total numbers of livestock may not increase, but distribution of the grazing season may increase with the reduction of western juniper. The increase in time spent in a pasture(s) would help to reduce grazing pressure on other areas in and adjacent to the project area. The time to reach this outcome would be less in the Limited Treatment than the Partial Treatment Alternative.

Restoration of adjacent seeded areas may be accelerated with the increased forage produced by the treatment of western juniper. Forage production may be sufficient in most years to defer use of adjacent seeded areas until native shrubs and grasses can be reestablished.

4.19.6 Recreation

Cumulative effects to Recreation from the Limited Treatment Alternative would be the same as the Partial Treatment Alternative.

4.19.7 Off-Highway Vehicles

There would be no cumulative effects to OHVs from the Limited Treatment Alternative.

4.19.8 Social and Economic Values

Historically, the economy within Harney County has been based on agricultural goods and related services. Although these continue to play a vital role, the current trend shows increasing revenues from tourism and recreation. Due to population increases in Oregon, as well as publicity the Steens Mountain area is receiving, tourism and visitation are likely to continue to increase in the reasonably foreseeable future. Economic activities conducted on lands within and adjacent to the project area, as well as economic conditions within the county, would produce cumulative effects on social and economic values. Anticipated recreation growth would increase the demand for recreation across the area. Increased recreation and tourism as promoted by the Andrews/Steens RMPs could provide opportunities for growth in the retail and service sectors, thereby reducing unemployment. Growth in recreation and tourism could also lead to increased traffic, effects to the rural character of the region, and diminished opportunities for solitude or primitive experiences.

Juniper treatment and increased rangeland health could increase forage production for both wildlife and livestock thereby increasing economic opportunities and fostering more desirable recreation opportunities.

4.19.9 Soils

There would be no significant cumulative effects to soils under this alternative. The beneficial effects of reducing western juniper dominance on many sites would protect soil resources.

4.19.10 Transportation/Roads

Maintenance of certain roads within the project area would improve vehicle access and may increase visitor use. Visitors seeking solitude may be negatively affected by the moderate increase in vehicular activity. Visitors driving for pleasure would benefit from the improved road conditions. An increase in private land use near the improved roads is also anticipated which may require additional signing to direct the public to open areas.

4.19.11 Vegetation

Cumulative effects to vegetation would be the same as those described in the Woodlands section. Diversity at the different spatial scales would be increased and the connectivity of shrub and herbaceous vegetation would be increased. The project area occupies the northern portions of a fairly continuous block of sagebrush plant communities. Reestablishment of the shrub communities would help to restore the sagebrush systems on a regional scale. This is important to animals that may utilize the habitat during only portions of the year.

4.19.12 Visual Resources

Cumulative effects to Visual Resources from the Partial Treatment Alternative would be varied. In general, the landscape would become rougher with the creation of additional openings in the juniper stands and smoother with the conversion of junipers to grasses, forbs, and shrubs. The landscape elements would also be more complex with the addition of many irregular forms and lines. The overall landscape color would become more light green and yellowish with fewer dark green junipers. Visual contrasts between treated and untreated areas would be reduced when compared to the Partial Treatment Alternative. VRM Class I, Class II, Class III, and Class IV objectives would be met.

4.19.13 Wild Horses and Burros

Future proposed activities, such as fuel treatments and fire managed for resource benefit could further benefit wild horse habitat. Future wild horse population management could also improve wild horse health characteristics. Implementing a combination of the alternatives or the proposed action could result in effects same as those discussed in their respective sections.

4.19.14 Wildlife

Refer to the Cumulative Effects No Treatment Alternative Migratory Birds (4.12.5) section for the description of the cumulative effects area. Since actions would take place on about 100,000 acres within the project area under this alternative and with proposed projects such as the Five Creeks and East Steens restoration projects, the cumulative effects area affected by disturbance would be about 350,000 acres.

The cumulative effects of this alternative on wildlife species would be the same as the description of effects in the Limited Treatment Alternative (4.8.14). These effects, along with past actions and proposed actions, should improve conditions for most species in the long term. Overall, this alternative would affect habitat for some species beneficially while others species are affected negatively.

4.20 Full Treatment Alternative: Critical Elements

4.20.1 Areas of Critical Environmental Concern

There would be no significant cumulative effects to ACECs under this alternative.

4.20.2 Air Quality

In the Full Treatment Alternative the reduction of western juniper would reduce the risk of large catastrophic fires and the level of smoke produced from those events. Reliance of fire use in the wilderness during the early phases of the project may still increase the risk of large volumes of smoke, affecting summertime air quality downwind from the project area. However, as fires become more common in the project area the duration of the emissions would decrease as the fuels structure is shifted from trees to shrubs and herbaceous plants.

Prescribed burning would be conducted in the late summer and fall. Smoke produced by wildfire would be similar during the free burning stage of the fire, but the smoldering phases of the fire would not last as long as those of the larger fires. Reductions in western juniper would also increase shrub and herbaceous vegetation. Smoke produced by fires in those post-treatment stands would be less than the fully-developed woodlands.

4.20.3 American Indian Traditional Practices

General cumulative effects to Traditional Practice use areas in the past could include grazing pressure, OHV and mechanized vehicle use, more intensive public use pressure, and illegal collecting (see the Andrews/Steens PRMP/FEIS at 4.10.5 – page 4-149). Complete data are not available for the levels of current cumulative effects of unmanaged fire within the areas of American Indian Traditional Practices. Current cumulative effects to cultural resource resources are lowest where uses of public lands are restricted to those that cause the least ground disturbance.

Educated assumptions concerning past cumulative effects to American Indian Traditional Practices within the project area, but unrelated to the current treatment plan, could include loss of access to traditional use areas and the loss of ready access to floral, faunal, mineral, aquatic, and water traditional use resources and practices. These losses would be more prevalent over the last 50 to 120 years with the advent and increase in sedentary populations, Federalizing of lands and associated resources, change in emphasis of overall land use, loss of past winter burning regime, advent of mechanized vehicles, consistent fire suppression, and intensive ungulate grazing.

With adherence to planning restrictions as detailed in Chapter 4, effects under this alternative would cause negligible to no negative cumulative effects. Potential positive cumulative effects to certain root crops and areas of Traditional spiritual use are possible under this alternative.

4.20.4 Cultural Heritage

General cumulative effects to cultural resource sites in the past could include grazing pressure, OHV and mechanized vehicle use, and illegal collecting (see the Andrews/Steens PRMP/FEIS at 4.9.5 – page 4-143). Complete data are not available for the levels of current cumulative effects within the sites caused by unmanaged fire. Current cumulative effects to cultural resource resources are lowest where uses of public lands are restricted to those that cause the least ground disturbance.

Educated assumptions concerning past cumulative effects to cultural resources within the project area but unrelated to the current treatment plan could include loss of cultural artifacts from crushing, illegal collecting, and high heat fire. These losses would be more prevalent over the last 50 to 100 years with the advent and increase in mechanized vehicles, fire suppression, and the removal of topsoil exposing cultural artifacts to weathering and fire. Other past cumulative effects could include crushing of cultural artifacts from cattle and/or sheep grazing, soil compaction, erosion, landscape modification, and the increased interest in collecting of artifacts. Some sites may have been further buried by any of these activities.

With adherence to planning restrictions as detailed in Chapter 4, effects under this alternative would cause negligible to no cumulative effects. Greater ground visibility resulting from planned treatments could result in greater levels of illegal collecting within cultural resource localities in areas of heavy public use. This potential increase in illegal effects could contribute to potential cumulative effects, but only until the vegetation returned within several growing seasons. Any instance of degradation cumulatively affects the site in terms of information potential.

General cumulative effects to the Riddle Brothers Ranch Historic District could include the continued floral (juniper) encroachment, legal mechanized vehicle use, more intensive public use pressure, trespass by unauthorized publics, and illegal collecting and/or vandalism. Photographic histories of the Riddle Brothers show the steady progression of flora change, thus changing not only the landscape of the Historic District but increasing the potential of permanent and devastating fire damage.

With adherence to planning restrictions as detailed in Chapter 4, effects under this alternative would cause negligible to no negative cumulative effects. Potential positive cumulative effects to the Historic District could include the lessening of potential for devastating fire damage and a return to the Historic District’s original visual landscape.

4.20.5 Migratory Birds

Refer to the Cumulative Effects No Treatment Alternative Migratory Birds (4.12.5) section for the description of the cumulative effects area. Since actions would take place on about 150,000 acres within the project area under this alternative and with proposed projects such as East Steens restoration project, the cumulative effects area affected by disturbance would be about 400,000 acres.

The cumulative effects of this alternative on migratory birds would be the same as those described in the Full Treatment Alternative (4.9.5). These effects would occur over most of the described cumulative effects area due to past actions and proposed actions. Some sagebrush would be returning to treated areas while others are being treated in the effects area. Juniper woodlands would be reduced the most from present but areas of juniper would still be available to support woodland species. Grassland areas would increase for a few years then stabilize, as these areas return to a sagebrush canopy then would decrease long term as proposed projects are completed. Riparian habitats should increase over time as treatments are completed and juniper reduced in these areas.

4.20.6 Noxious Weeds

Cumulative effects would be the same as the Partial Treatment Alternative and Limited Treatment Alternative, but with decreased long-term noxious weed invasion due to further decreased juniper expansion from prescribed fire treatments.

4.20.7 Paleontological Resources

Complete data are not available for the levels of current cumulative effects of wildfire, prescribed fire, and wildland fire use; grazing pressure, OHV and mechanized vehicle use, and illegal collecting within paleontological sites (see the Andrews/Steens PRMP/FEIS at 4.8.5 – page 4-136). Current cumulative effects to paleontological resources are lowest where uses of public lands are restricted to those that cause the least ground disturbance.

Educated assumptions concerning past cumulative effects to paleontological resources within the project area, but unrelated to the current treatment plan, could include the loss of fossils from crushing, illegal collecting, and high heat fire. These losses would be incremental over time, but more prevalent over the last 50 to 100 years with the advent and increase in mechanized vehicles, fire suppression, and the resultant removal of topsoil exposing fossils to weathering and fire. Other past cumulative effects could include crushing of fossils from cattle and/or sheep grazing, soil compaction, erosion, and landscape modification. Some sites may have been further buried by any of these activities.

With adherence to planning restrictions as detailed in Chapter 4, effects under this alternative would cause negligible to no cumulative effects. Greater ground visibility resulting from planned treatments could result in greater but limited levels of illegal collecting within paleontological localities in areas of heavy public use. This potential increase in illegal effects could contribute to potential cumulative effects, but only until the vegetation returned within very few growing seasons. Any instance of degradation cumulatively affects the site in terms of information potential.

4.20.8 Special Status Species – Fauna

Refer to the Cumulative Effects No Treatment Alternative Migratory Birds (4.12.5) section for the description of the cumulative effects area. Since actions would take place on about 150,000 acres within the project area under this alternative and with proposed projects such as East Steens restoration project, the cumulative effects area affected by disturbance would be about 400,000 acres.

The cumulative effects of this alternative on bald eagles would be the same as that described in the Full Treatment Alternative (4.9.8). There would be no effects of this alternative on bald eagles.

The cumulative effects of this alternative on Columbia spotted frogs would be the same as that described in the Full Treatment Alternative. Since there are no known populations of spotted frogs in the rest of the cumulative effects area, other past and proposed actions would have no effects on spotted frogs or their habitat. Overall, reduction of juniper in riparian areas and restoration of those habitats would be beneficial for spotted frogs.

The cumulative effects of this alternative on greater sage-grouse would be the same as that described in the Full Treatment Alternative although some areas treated in the past with prescribed fire or burned in the past through naturally-ignited fire should have returned to a sagebrush canopy that is useable by sage-grouse. Areas where juniper were cut and not burned should have returned to a sagebrush canopy during this time. Proposed actions in the cumulative effects area would reduce juniper the most while trying to restore the most sagebrush habitat in the long term.

The cumulative effects of this alternative on Northern goshawk would be the same as that described in the Full Treatment Alternative. Nesting habitat would be increased the most in the long term. Other past actions and proposed actions should help to restore aspen stands throughout the cumulative effects area.

The cumulative effects of this alternative on Swainson's hawk would be the same as that described in the Full Treatment Alternative. Proposed juniper reduction projects in other parts of the cumulative effects area would reduce nesting habitat and increase foraging habitat. Other past projects and wildfire have already reduced some possible nesting habitat and increased some foraging habitat. Overall, while nesting habitat would be reduced the most, Swainson's hawks would still have sufficient nesting habitat and foraging habitat.

The cumulative effects of this alternative on Preble's shrew would be the same as that described in the Full Treatment Alternative. While Preble's shrew habitat would be reduced the most in the project area, proposed treatments in other parts of the cumulative effects area would reduce habitat even more. Other past treatments and naturally-ignited fires in the cumulative effects area should be returning to shrew habitat. In the long term, shrew habitat would be restored the most once juniper cover is reduced in sagebrush, aspen, and riparian habitats.

The cumulative effects of this alternative on wolverine, long-billed curlew, and western burrowing owls would be the same as that described in the Full Treatment Alternative. This, in combination with past actions and proposed actions, should have no cumulative effects on habitat for these species.

The cumulative effects of this alternative on bats would be the same as those effects described in the Full Treatment Alternative. The effects would be over a larger area due to past actions and proposed actions. For those species of bats that utilize juniper habitat for foraging, that habitat would decrease the most in this alternative. Most of these species probably utilize other habitats for foraging and in the long term would not be affected through actions in this alternative.

The cumulative effects of this alternative on California bighorn sheep would be the same as those described in the Full Treatment Alternative except that through past actions and proposed actions, some juniper cover has been reduced in sheep habitat. This alternative would reduce juniper cover the most and should improve aspects of sheep habitat the most.

4.20.9 Special Status Species – Flora

Cumulative effects for all Special Status populations in the project area would be substantially the same as the Partial and Limited Treatment Alternatives cumulative effects on Special Status plant populations outside of the Wilderness, WSAs, and WSR corridors.

The rate of treatment and the intensity of any natural or prescribed fire in Wilderness, WSAs, and WSR corridors could influence potential cumulative effects to Special Status Species of flora. Special Status Species populations in Wilderness, WSAs, and WSR corridors could be affected differently due to the project review method that determines what tools are available in the SMAs. These potential effects relate to the change in potential for catastrophic fires of greater intensity, duration, and scale that could occur as a result of longer timeframes for treatment in the SMAs.

The Full Treatment Alternative would reduce the continued modification of vegetative communities by juniper expansion in larger portions of the project area than the Partial Treatment Alternative. Effects from this alternative in treated areas would be the same as those described in the Partial Treatment Alternative. Effects from this alternative in untreated areas would be the same as those described in the No Treatment Alternative.

In fire adapted ecosystems, the vast majority of plant species have co-evolved with and adapted to fire regimes. Plant populations that respond favorably to fire disturbance could see increases in their population numbers.

Some plant species are endemic to Steens Mountain; the vast majority of these species occur at an elevation where fire disturbance and juniper expansion are not a factor for concern. Other species occur in areas where fuels are naturally low and fire disturbance is not part of their normal disturbance cycle. For these species, appropriate mitigation would be employed to ensure proper protection of the population.

With appropriate adherence to PDEs for Special Status plant species there would only be positive cumulative effects from ecosystem restoration efforts. With regard to any Special Status Species mentioned in this document, the proposed treatments would not trend any of the Special Status Species toward listing.

4.20.10 Wetlands and Riparian Zones and Water Quality

Livestock Grazing - Areas of the project that are grazed would be rested a minimum of 2 years following treatment and monitoring would be continued. There would likely be some cumulative effects from grazing with action alternatives; however, the effects would likely be on a more isolated scale than with the Continuation of Current Management Alternative. Grazing would be managed to reduce effects to riparian areas and reduce the level of cumulative effects.

Recreation – There are no expected cumulative effects to riparian areas, water quality, and fisheries from recreation and implementation of any action alternative.

Habitat Improvement Projects – There are no expected cumulative effects to riparian areas, water quality, and fisheries from recreation and implementation of any action alternative.

4.20.11 Wild and Scenic Rivers

Scenic: Cumulative effects for these WSR values from the Full Treatment Alternative would be the same as the Limited Treatment Alternative.

In addition, manual and motorized/mechanized treatments should have few effects on this value as long as caution is taken to keep the project areas limited in size and unobtrusive.

Geologic: Values in this ORV would not be affected by any proposed actions.

Recreational: Cumulative effects for these WSR values from the Full Treatment Alternative would be the same as the Limited Treatment Alternative.

Manual treatments may have some affects associated with disturbing recreationists if work is performed in areas that are used for activities such as campsites and trails. Motorized/mechanized treatments would have the same effects as well as additional effects on visitor disturbance caused by noise from the use of power tools.

Fish: Cumulative effects for these WSR values from the Full Treatment Alternative would be the same as the Limited Treatment Alternative.

Effects to fish from manual and motorized/mechanized treatments should be minimal.

Wildlife: Cumulative effects for these WSR values from the Full Treatment Alternative would be the same as the Limited Treatment Alternative.

The presence of crews working on manual treatments could have effects of disturbing and displacing wildlife, especially in areas utilized by wildlife for forage and cover. Motorized/mechanized treatments would have the same effects as well as additional disturbance effects to wildlife caused by noise from the use of power tools.

Vegetation: Cumulative effects for these WSR values from the Full Treatment Alternative would be the same as the Limited Treatment Alternative.

In addition, manual and motorized/mechanized treatments should have few effects on this value as long as caution is taken to keep the project areas limited in size.

Botanic: Cumulative effects for these WSR values from the Full Treatment Alternative would be the same as the Limited Treatment Alternative.

Manual and motorized/mechanized treatments should have little effect on botanic values as western juniper would be the only plant species directly affected.

Cultural: Cumulative effects for these WSR values from the Full Treatment Alternative would be the same as the Limited Treatment Alternative.

Manual and motorized/mechanical treatments should have no affect on cultural values within the WSR corridors.

Historic: Cumulative effects for these WSR values from the Full Treatment Alternative would be the same as the Limited Treatment Alternative.

Manual and motorized/mechanical treatments should have no affect on cultural values within the WSR corridors.

4.20.12 Wilderness

Naturalness: Cumulative effects for these Wilderness values from the Full Treatment Alternative would be the same as the Limited Treatment Alternative.

Naturalness would be affected and reduced by the use of both manual and motorized/mechanized treatments. Such actions would be intentional human manipulation of the wilderness environment, thus causing a loss of naturalness.

Wildness: Cumulative effects for these Wilderness values from the Full Treatment Alternative would be the same as the Limited Treatment Alternative.

Effects on wildness by manual and motorized/mechanized treatments would be the same as those noted above in the Naturalness section.

Solitude: Cumulative effects for these Wilderness values from the Full Treatment Alternative would be the same as the Limited Treatment Alternative.

Affects on solitude by manual treatments should be minimal for most wilderness visitors. Some effects to visitor solitude may occur if they come in contact with personnel working on treatment areas. Additional affects to solitude would occur from noise generated by the use of power tools under the motorized/mechanized tool option.

Primitive and Unconfined Recreation: Cumulative effects for these Wilderness values from the Full Treatment Alternative would be the same as the Limited Treatment Alternative.

Affects from the use of manual and motorized/mechanized treatments would be the same as those noted above in the Solitude section.

Supplemental Values: Cumulative effects for these Wilderness values from the Full Treatment Alternative would be the same as the Limited Treatment Alternative.

The use of manual and motorized/mechanized treatments should have few affects on “scenery” and “vegetation” values as long as project treatment areas remain small in size and unobtrusive in nature. “Wildlife” values could be affected if animals are disturbed or displaced by contact with work crews in habitat areas. Additional affects to wildlife could occur from noise produced by the use of motorize/mechanized power tools.

4.20.13 Wilderness Study Areas

Cumulative effects to WSA wilderness values from the Full Treatment Alternative would include effects to naturalness, opportunities for solitude or primitive and unconfined recreation, and special features. Ecological naturalness would be improved, while wilderness naturalness would be diminished. Opportunities for solitude would be diminished with the reduction of vegetative screening and the evidence of human’s actions; however topographic screening would not be affected. Opportunities for primitive and unconfined recreation would be enhanced through improved wildlife habitat and more open landscapes or diminished by down trees and increased shrub densities. Special features, especially wildlife and Special Status animal species habitats, would be improved.

4.21 Full Treatment Alternative: Noncritical Elements

4.21.1 Biological Soil Crusts

By reducing the buildup of fuels, especially from increasing numbers of juniper, the chances of a catastrophic fire in the North Steens Area would be reduced as well as the potential for the creation of large uninterrupted burnt areas.

Due to the use of additional methods for active ecosystem management in the Full Treatment Alternative the general cumulative effects to biological soil crusts would be greater than the Partial and Limited Treatment Alternatives over the short term, but may be less than the Partial and Limited Treatment Alternatives over the long term if the potential for catastrophic wildfire is reduced.

The Full Treatment Alternative would reduce the continued modification of vegetative communities by juniper expansion in larger portions of the project area than the Partial Treatment Alternative. Effects from this alternative in treated areas would be the same as those described in the Partial Treatment Alternative. Effects from this alternative in untreated areas would be the same as those described in the No Treatment Alternative.

4.21.2 Fire Management

Treatment would return the area to an appropriate fire regime and condition class. The Full Treatment Alternative would achieve this goal faster than the other alternatives. Fire line intensity and flame lengths would be less in areas dominated by herbaceous or shrubby vegetation. This could help fire crews with suppression because of the lower flame lengths and fire line intensity.

As larger areas are restored, more naturally-ignited fires may be considered for fire use. Some crews required to suppress fires in the western juniper woodlands may be able to be shifted to other areas because of the lower fire intensity. There would also be less holdover fires that ignite a single western juniper and tie up an engine of partial hand crew until suppressed. Crews could be sent to higher priority fires when the area has been converted to appropriate fire regimes.

4.21.3 Fisheries

Livestock Grazing - Areas of the project that are grazed would be rested a minimum of 2 years following treatment and monitoring would be continued. There would likely be minimal cumulative effects from grazing with action alternatives; however, the effects would likely be on a more isolated scale than with the Continuation of Current Management Alternative. Grazing would be managed to reduce effects to riparian areas and reduce the level of cumulative effects.

Recreation – There are no expected cumulative effects to fisheries from recreation and implementation of any action alternative.

Habitat Improvement Projects – There are no expected cumulative effects to fisheries from recreation and implementation of any action alternative.

4.21.4 Forestry/Woodlands

Treatment of western juniper across the planning area would help to increase the diversity at the plant community, watershed, and landscape level. Areas would be converted back to shrub dominance after passing through an herbaceous phase in some cases. Conversion to shrub and herbaceous plant communities would be quicker than the Partial Treatment Alternative because of the inclusion of some mechanical treatments in the WSAs. Animal species that prefer shrub and herbaceous-dominated systems would increase in the project area. Areas that have been converted to shrub and herbaceous plant dominance would help to increase the connectivity of sagebrush plant communities.

Old growth western juniper and quaking aspen woodlands would also be restored by removal of post-settlement western juniper. These woodlands would provide habitat for many wildlife species onsite and from adjacent areas.

4.21.5 Livestock Grazing Management

Reduction in western juniper in part of the planning area would help to increase the available forage in these areas. Total numbers of livestock may not be increase, but distribution of the grazing season may increase with the reduction of western juniper. The increase in time spent in a pasture(s) would help to reduce grazing pressure on other areas in and adjacent to the project area. The time to reach this outcome would be less in the Limited Treatment than the Partial Treatment Alternative.

Restoration of adjacent seeded areas may be accelerated with the increased forage produced by the treatment of western juniper. Forage production may be sufficient in most years to defer use of adjacent seeded areas until native shrubs and grasses can be reestablished.

4.21.6 Recreation

Cumulative effects to Recreation from the Full Treatment Alternative would be the same as the Partial Treatment Alternative.

4.21.7 Off-Highway Vehicles

There would be no cumulative effects to OHVs from the Full Treatment Alternative.

4.21.8 Social and Economic Values

Historically, the economy within Harney County has been based on agricultural goods and related services. Although these continue to play a vital role, the current trend shows increasing revenues from tourism and recreation. Due to population increases in Oregon, as well as publicity the Steens Mountain area is receiving tourism and visitation are likely to continue to increase in the reasonably foreseeable future. Economic activities conducted on lands within and adjacent to the project area, as well as economic conditions with in the county, would produce cumulative effects on social and economic values. Anticipated recreation growth would increase the demand for recreation across the area. Increased recreation and tourism as promoted by the Andrews/Steens RMPs could provide opportunities for growth in the retail and service sectors, thereby reducing unemployment. Growth in recreation and tourism could also lead to increased traffic, effects to the rural character of the region, and diminished opportunities for solitude or primitive experiences.

Juniper treatment and increased rangeland health could increase forage production for both wildlife and livestock thereby increasing economic opportunities and fostering more desirable recreation opportunities.

4.21.9 Soils

There would be no significant cumulative effects to soils under this alternative. Treatment of western juniper would reduce the amount of soil being moved offsite by erosion. This would also reduce the amount of sediment in streams and ultimately in the meadow system at lower elevations outside of the project area.

4.21.10 Transportation/Roads

Maintenance of certain roads within the project area would improve vehicle access and may increase visitor use. Visitors seeking solitude may be negatively affected by the moderate increase in vehicular activity. Visitors driving for pleasure would benefit from the improved road conditions. An increase in private land use near the improved roads is also anticipated which may require additional signing to direct the public to open areas.

4.21.11 Vegetation

Cumulative effects to vegetation would be the same as those described in the Woodlands section. Diversity at the different spatial scales would be increased and the connectivity of shrub and herbaceous vegetation would be increased. The project area occupies the northern portions of a fairly continuous block of sagebrush plant communities. Reestablishment of the shrub communities would help to restore the sagebrush systems on a regional scale. This is important to animals that may utilize the habitat during only portions of the year.

4.21.12 Visual Resources

Cumulative effects to Visual Resources from the Partial Treatment Alternative would be varied. In general, the landscape would become rougher with the creation of additional openings in the juniper stands and smoother with the conversion of junipers to grasses, forbs, and shrubs. The landscape elements would also be more complex with the addition of many irregular forms and lines. The overall landscape color would become more light green and yellowish with fewer dark green junipers. There would be no visual contrasts between treated and untreated areas, because all areas would be treated. VRM Class I objectives for WSAs and Steens Mountain Wilderness would not be met. VRM Class II, Class III, and Class IV objectives would be met.

4.21.13 Wild Horses and Burros

Future proposed activities, such as fuel treatments and fire managed for resource benefit could further benefit wild horse habitat. Future wild horse population management could also improve wild horse health characteristics. Implementing a combination of the alternatives or the proposed action could result in effects same as those discussed in their respective sections.

4.21.14 Wildlife

Refer to the Cumulative Effects No Treatment Alternative Migratory Birds (4.12.5) section for the description of the cumulative effects area. Since actions would take place on about 150,000 acres within the project area under this alternative and with proposed projects such as East Steens restoration project, the cumulative effects area affected by disturbance would be about 400,000 acres.

The cumulative effects of this alternative on wildlife species would be the same as the description of effects in the Full Treatment Alternative (4.10.14). These effects, along with past actions and proposed actions, should improve conditions for most species in the long term. Overall, this alternative would affect habitat within the cumulative effects area the most for some species beneficially while others species are affected negatively.

4.22 Comments on Cumulative Effects

As the Council on Environmental Quality (CEQ), in guidance issued on June 24, 2005, points out, the "environmental analysis required under NEPA is forward-looking," and review of past actions is required only "to the extent that this review informs agency decision-making regarding the proposed action." Use of information on the effects of past actions may be useful in two ways according to the CEQ guidance. One is for consideration of the proposed action's cumulative effects, and secondly as a basis for identifying the proposed action's effects.

The CEQ stated in this guidance that "[g]enerally, 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." This is because a description of the current state of the environment inherently includes the effects of past actions. The CEQ guidance specifies that the "CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions." Our information on the current environmental condition is more comprehensive and more accurate for establishing a useful starting point for a cumulative effects analysis, than attempting to establish such a starting point by adding up the described effects of individual past actions to some environmental baseline condition in the past that, unlike current conditions, can no longer be verified by direct examination.

The second area in which the CEQ guidance states that information on past actions may be useful is in "illuminating or predicting the direct and indirect effects of a proposed action." The usefulness of such information is limited by the fact that it is anecdotal only, and extrapolation of data from such singular experiences is not generally accepted as a reliable predictor of effects. However, "experience with and information about past direct and indirect effects of individual past actions" have been found useful in "illuminating or predicting the direct and indirect effects" of the proposed action in the following instances: The basis for predicting the effects of the proposed action and its alternatives is based on published empirical research and the general accumulated experience of the resource professionals in the agency with similar actions.

Minimal scoping comments on this project suggested analysis of the effects of certain individual past actions which have not been considered in this document as they are beyond the scope of the current analysis and would not be useful for illuminating or predicting the effects of the proposed action. However, much information is known about past and present actions in the mid- and fine-scale levels of analysis. To the extent research and data can be applied to assist in the understanding of this landscape in motion; BLM has described what is known about the factors and events that influence this dynamic landscape. The cataloging of past actions has been assisted by research conducted in and adjacent to the project area and the vast amount of information contained in GIS databases, which are maintained at the Burns District Office.

4.23 Compliance with the Interim Management Policy (IMP) for Lands under Wilderness Review

Any action proposed for a WSA needs to be compliant with the WSA IMP. The following summary discussion looks at proposed activities in the alternatives to determine if compliance with the WSA IMP. Full analyses can be found in the Environmental Consequences chapter.

The preservation of wilderness values is the "overriding consideration" of WSA management. Wilderness values include roadlessness, naturalness, opportunities for solitude, primitive and unconfined recreation, and supplemental values.

- No landscape-based, fuels treatment actions would be undertaken in the WSAs in the No Treatment Alternative.
- Small-scale (existing management level) fuels treatments could occur in the WSAs across the landscape in the Continuation of Current Management. Wilderness values would be protected and preserved due to the defined scale and rate (refer to Chapter 2 - Development of Alternatives) at which the landscape could be treated.
- The Partial and Limited Treatment Alternatives would allow only wildfire or natural and prescribed fire in the WSAs to accomplish landscape-based fuels treatments. Wilderness values would be protected.
- The Full Treatment Alternative would allow the entire range of treatments (except for motorized transport) described in the EIS to occur in the WSAs.

The IMP nonimpairment criteria require that any uses, facilities, or activities in a WSA be temporary. They may be allowed if easily removed, cause no surface disturbance, are not permanent, and do not degrade wilderness values. Exceptions to the nonimpairment criteria are emergencies, reclamation activities for IMP violations, grandfathered or valid existing rights, uses that clearly protect or enhance wilderness values, and reclamation of pre-FLPMA impacts.

- No fuels-related activities would be undertaken in the WSAs in the No Treatment Alternative or past current levels in the WSAs in the Continuation of Current Management Alternative. Nonimpairment criteria would be met.
- The Partial and Limited Treatment Alternatives would also meet the nonimpairment criteria because the proposed actions would not cause surface disturbance, are temporary, and do not degrade any wilderness values.
- The Full Treatment Alternative, if selected, would require further mitigation and would be implemented within WSAs to ensure compliance with the WSA IMP.

Cumulative Effects.

Many minor effects of nonimpairing uses or facilities could accumulate to a point at which the total effect would impair wilderness suitability by either creating effects that overall are noticeable, or by degrading the area's wilderness values so far as to constrain Congress's decision concerning wilderness.

- No fuels-related actions would occur in the WSAs in the No Treatment Alternative or past current levels in the Continuation of Current Management. There would be no cumulative effects from any new BLM actions.
- The Partial Treatment Alternative and Limited Treatment Alternative would not cause cumulative effects that may impair the WSAs' suitability for wilderness designation without careful mitigation. Pre-burn treatments would be designed to work within the Interim Management Policy to minimize effects to wilderness characteristics
- Elements of the Full Treatment Alternative could result in cumulative effects that impair the WSAs' suitability for wilderness designation. Portions of the project area were treated in the past and Congress designated them as wilderness under the Steens Act; however, the evidence of cut stumps and other remnants of mechanical treatment have the potential to impair the natural character of the treated area.

An action that enhances wilderness values is one that clearly restores, protects, or maintains wilderness values. Though they may enhance wilderness values, these allowable actions must still be carried out in a manner, which is least disturbing to the site. In order to determine whether or not a proposed action enhances wilderness values, the original wilderness inventory information for the particular wilderness value(s) must be reviewed.

- No fuels-related actions would occur in the WSAs in the No Treatment Alternative or past current levels in the Continuation of Current Management. The identified wilderness values would be protected and maintained.
- The Partial Treatment Alternative and Limited Treatment Alternative would protect and maintain wilderness values because minimal activities would occur in the WSAs.
- The Full Treatment Alternative, if selected, would require further mitigation and would be implemented within WSAs to ensure compliance with the WSA IMP.

Existing facilities. Existing facilities (for example, ways and wildlife and livestock developments) may be used as long as no new effects are created that would impair the area's wilderness suitability.

- Existing ways would not be used for fuels treatment in the No Treatment Alternative and not past current levels in the ongoing fuels treatment projects under the Continuation of Current Management Alternative. There would be no additional effects.
- Vehicle use of ways under the Partial Treatment Alternative would be minimal. The WSAs' wilderness suitability would not be affected.

- Vehicle use of ways under the Limited Treatment Alternative could have the potential to cause new effects to the WSAs if vehicle use is not minimized.
- Vehicle use of ways under the Full Treatment Alternative would require further mitigation and would be implemented within WSAs to ensure compliance with the WSA IMP.

Any action in a WSA should be substantially unnoticeable. The action should be a minor feature of the area or not distinctly recognizable as being human-made or human-caused.

- The results of the No Treatment and the actions proposed in the Continuation of Current Management would be substantially unnoticeable in that no actions past current levels would be taken to remove the WSA juniper stands.
- The results of the actions proposed in the Partial Treatment Alternatives and Limited Treatment Alternative would be substantially unnoticeable because prescribed fires would mimic the effects of natural wildfires.
- The results of the action proposed in the Full Treatment Alternative would not be noticeable. Evidence of pre-burning treatments would be unrecognizable as being human-caused because burning would significantly eliminate the evidence of any pre-burning treatments. The Full Treatment Alternative, if selected, would require further mitigation and would be implemented within WSAs to ensure compliance with the WSA IMP.

Although not required, the use of the minimum tool concept in WSA management is recommended. The methods and equipment in a WSA action should be the least impacting. The method and equipment need only be feasible and are not necessarily the most economic means of accomplishing the action.

- No fuels-related actions would occur in the No Treatment Alternative and not past current levels in the Continuation of Current Management. Use of the minimum tool concept is not applicable.
- The minimum tool for the Partial Treatment Alternative and Limited Treatment Alternative would be managed fires (natural and prescribed).
- Pre-burning treatments, as proposed in the Full Treatment Alternative, would be implemented depending on location and existing fuel load. In some cases, pre-burning treatments would be required to ensure protection of natural habitat values, such as cutting small juniper fuels around old-growth juniper trees, to avoid loss of old-growth juniper trees in a treatment or fire event.

Program-specific guidance applicable to the North Steens Project is found in two sections of the WSA IMP. The first, under “WATERSHED REHABILITATION AND VEGETATIVE MANIPULATION,” lists "Prescribed fire may be used where necessary to maintain fire-dependent natural ecosystems" as a limited exception to the general prohibition on vegetative manipulation. The second, under “FIRE MANAGEMENT,” states, "BLM will conduct all prescribed fire . . . in accordance with Fire Management activity plans and subsequent operational plans for all WSAs, using caution to avoid unnecessary impairment of the area's suitability for preservation as wilderness."

- The program-specific guidance is applicable to the No Treatment Alternative and Partial Treatment Alternative to the extent it relates to site-specific and not to landscape treatments.
- The use of prescribed fire, as proposed in the Continuation of Current Management, Limited Treatment, and Full Treatment Alternatives, would be in conformance with the program-specific guidance.
- Implementation of the full suite of mechanical vegetation treatments, as proposed in the Full Treatment Alternative, would require further mitigation to be in conformance with the program-specific guidance. Treatments would be the minimum necessary to accomplish the objectives.

Summary: The No Treatment, Continuation of Current Management, Partial Treatment, and Limited Treatment Alternatives would be in compliance with the WSA IMP. The Full Treatment Alternative, if selected, would require further mitigation and would be implemented within the WSAs to ensure compliance with the WSA IMP.

5 LIST OF PREPARERS

5.1 Introduction

This DEIS was prepared by an ID Team of resource specialists from the Burns District Office. This proposal has been discussed and developed within BLM for several years and many changes to the project design have occurred. The SMAC has been provided project updates, site tours, and opportunities to provide input and recommendations to BLM under their authority provided in the Steens Act (Section 131).

This project was originally called the Bridge Creek Project and encompassed 40,000 acres. Over the years project prototypes varied and the project grew into a proposal that now includes roughly 336,000 acres and is titled the North Steens Ecosystem Restoration Project.

The BLM initially considered this an EA-level project, but recognized the need to scope the project with the interested public.

5.2 Public Participation

A notice of public scoping was posted on the Burns District internet site on January 5, 2005, and published in the *Burns Times-Herald*. A mailing with project information and draft alternatives was sent to 238 organizations and individuals nationwide. The public scoping period occurred over 40 days and generated a wide variety of scoping comments. Twenty-two comment letters were received.

As a result of responses to scoping, the BLM determined that due to the enlarged scope and scale of the project, an EIS should be prepared. The Notice of Intent published in the *Federal Register* (July 21, 2005) provided for an additional 15-day public comment period on the DEIS, which was advertised through the news media and a newsletter to the North Steens mailing list. Four comment letters were received.

5.3 Bureau of Land Management RMP/EIS Team

Karla Bird*	Management Representative – Andrews RA Field Manager
Gary Foulkes*	NEPA Support
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Interdisciplinary Team	Resource(s)
Elizabeth Coahran	Cultural, Paleontology, American Indian Traditional Practices
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Rhonda Karges*	Management Support
Douglas Linn*	Biological Soil Crusts, Special Status Species – Flora, Vegetation, Wild Horses
Mike McGee*	Fisheries, Redband Trout Reserve, Water Resources, Riparian Areas, Special Status Species - Fauna
John Neeling*	Wilderness, WSRs
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Casey Pevey	Noxious Weeds
Jeff Rose*	Grazing Management, Woodlands, Fire Management, Vegetation, Air Quality
Mark Sherbourne	Transportation
Cam Swisher*	Grazing Management
Evelyn Treiman*	Recreation, OHVs, Visual Resources, WSAs

*Core Team Member

5.4 Cooperating Agencies

Burns Paiute Tribe
Harney County
Harney Soil and Water Conservation District
Oregon Department of Environmental Quality
Oregon Department of Fish and Wildlife
U.S. Department of Agriculture, Eastern Oregon Agricultural Research Center
U.S. Fish and Wildlife Service, Ecological Services
U.S. Fish and Wildlife Service, Malheur National Wildlife Refuge

6 GLOSSARY, BIBLIOGRAPHY, AND INDEX

6.1 Glossary

A

Adaptive management – A type of natural resource management in which decisions are made as part of an ongoing process. Adaptive management involves testing, monitoring, evaluation, and incorporating new knowledge into management approaches based on scientific findings and the needs of society. Results are used to modify management policy.

Advanced ecological status – A biotic community with a high similarity to a defined or perceived potential natural community (PNC) for an ecological site, usually late-seral or PNC ecological status.

Allotment – A specific portion of public land allocated for livestock grazing, typically with identifiable or fenced boundaries and permitted for a specified number of livestock.

Allotment (grazing) – Area designated for the use of a certain number and kind of livestock for a prescribed period of time.

Allotment Management Plan (AMP) – A plan for managing livestock grazing on specified public land.

Animal unit – One cow, one cow/calf pair, one horse, or five sheep.

Animal Unit Month (AUM) – The forage needed to support one cow, one cow/calf pair, one horse, or five sheep for 1-month. Approximately 800 pounds of forage.

Appropriate management level – An established population range that represents the number of animals that the designated HMA can sustain and that results in a thriving natural ecological balance with other uses and resources common to the area and avoids deterioration of the public range.

Area of Critical Environmental Concern (ACEC) – Area where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect humans from natural hazards.

B

Basalt – A dark, heavy, fine-grained silica-poor igneous rock composed largely of iron and magnesium minerals and calcium-rich plagioclase feldspars.

Basin (river) – In general, the area of land that drains water, sediment, and dissolved materials to a common point along a stream channel. River basins are composed of large river systems. In this EIS, the term refers to the equivalent of a third field hydrologic unit code, an area of about nine million acres, such as the Salmon River basin. It also is used to refer in general to the Interior Columbia River Basin.
Best Management Practices (BMPs) – A set of practices which, when applied during implementation of management actions, ensures that negative impacts to natural resources are minimized. BMPs are applied based on site-specific evaluation and represent the most effective and practical means to achieve management goals for a given site.

Biological soil crust - Lichens, mosses, green algae, fungi, cyanobacteria, and bacteria growing on or just below the surface of soils.

Bureau of Land Management (BLM) (Bureau) – Government agency with the mandate to manage Federal lands under its jurisdiction for multiple uses.

BLM assessment species – Plant and animal species on List 2 of the Oregon Natural Heritage Database, or those species on the Oregon List of Sensitive Wildlife Species (OAR 635-100-040) that are identified in BLM Instruction Memorandum OR-91-57 and are not included as Federal candidate, State listed, or BLM sensitive species.

BLM sensitive species – Plant or animal species eligible for Federal listed, Federal candidate, State listed, or State candidate (plant) status, or on List 1 in the Oregon Natural Heritage Database, or approved for this category by the BLM State Director.

BLM tracking species – Plant and animal species on List 3 and 4 of the Oregon Natural Heritage Database, or those species on the Oregon List of Sensitive Wildlife Species (OAR 635-100-040) that are identified in BLM Instruction Memorandum OR-91-57 and are not included as Federal candidate, State listed, BLM sensitive, or BLM assessment species.

C

Candidate Species – Any species included in the *Federal Register* Notice of Review that are being considered for listing as threatened or endangered by the U.S. Fish and Wildlife Service.

Canopy – In a forest, the branches from the uppermost layer of trees; on rangeland, the vertical projection downward of the aerial portion of vegetation.

Colluvium – Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Commodities – Goods and services produced by industries which include but are not limited to agriculture, livestock grazing, and mining.

Condition Class - A representation of the degree of departure from the historic/wildfire regime. Broken into three classes (see Table 3.6).

Consultation – (1) An active, affirmative process that (a) identifies issues and seeks input from appropriate American Indian governments, community groups, and individuals; and (b) considers their interests as a necessary and integral part of the BLM's and U.S. Forest Service's decision-making process. (2) The Federal Government has a legal obligation to consult with American Indian Tribes. This legal obligation is based in such laws as the Native American Graves Protection and Repatriation Act, the American Indian Religious Freedom Act, and numerous other Executive Orders and statutes. This legal responsibility is, through consultation, to consider Indian interests and account for those interests in the decision. (3) The term also refers to a requirement under Section 7 of the ESA for Federal agencies to consult with the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service with regard to Federal actions that may affect listed threatened and endangered species or critical habitat.

Corridor (landscape) – Landscape elements that connect similar patches of habitat through an area with different characteristics. For example, streamside vegetation may create a corridor of willows and hardwoods between meadows or through a forest.

D

Deep soil – A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Developed recreation – Recreation that requires facilities which in turn result in concentrated use of an area; for example, a campground.

Dispersed recreation – Recreation that does not occur in a developed recreation site; for example, hunting or backpacking.

Disturbance – Refers to events that alter the structure, composition, or function of terrestrial or aquatic habitats. Natural disturbances include, among others, drought, floods, wind, fires, wildlife grazing, insects, and pathogens. Human-caused disturbances include actions such as timber harvest, livestock grazing, roads, and the introduction of exotic species.

E

Early Successional Stage - A successional stage, or collection of stages, that occur immediately following a disturbance.

Ecological Site Inventory (ESI) – The basic inventory of present and potential vegetation on BLM rangelands. Ecological sites are differentiated on the basis of the kind, proportion, or amount of plant species.

Ecological status – The present state of vegetation of a range site in relation to the potential natural community for that site. Four classes are used to express the degree to which the production or composition of the present plant community reflects that of the potential natural community (climax):

Ecological Status (Seral stage)

Percent of Community in Climax Condition:

	76-100
Late-seral	51-75
Mid-seral	26-50
Early-seral	0-25

Ecosystem – A complete, interacting system of living organisms and the land and water that make up their environment; the home places of all living things, including humans.

Ecosystem management – The use of a "whole-landscape" approach to achieve multiple-use management of public lands by blending the needs of people and environmental values in such a way that these lands represent diverse, healthy, productive, and sustainable ecosystems.

Endangered species – Any species defined under the Endangered Species Act (ESA) as being in danger of extinction throughout all or a significant portion of its range. Listings are published in the *Federal Register*.

Environmental Assessment (EA) – One type of document prepared by Federal agencies in compliance with the National Environmental Policy Act (NEPA) which portrays the environmental consequences of proposed Federal actions which are not expected to have significant effects on the human environment.

Environmental Impact Statement (EIS) – One type of document prepared by Federal agencies in compliance with the National Environmental Policy Act (NEPA) which portrays the environmental consequences of proposed major Federal actions expected to have significant impacts on the human environment.

F

Federal Land Policy and Management Act of 1976 (FLPMA) – Law mandating that the BLM manage lands under its jurisdiction for multiple uses. Establishes guidelines for its administration; and provides for the management, protection, development, and enhancement of the public lands, among other provisions.

Fire Management Plan (FMP) – A strategic plan that defines a program to manage wildland and prescribed fires and documents the Fire Management Program in the approved land use plan. The plan is supplemented by operational procedures such as preparedness plans, preplanned dispatch plans, prescribed fire plans, and prevention plans.

Fire regime – The characteristics of fire in a given ecosystem, such as the frequency, predictability, intensity, and seasonality of fire across a landscape.

Fire return interval – The number of years between fire events for a specified area.

Flood plain – A nearly level alluvial plain that borders a stream and is subject to inundation under flood-stage conditions unless protected artificially. It is usually a constructional landform built of sediment deposited during overflow and lateral migration of the stream.

Forb – Any herbaceous plant that is not a grass or a grass like species. Broad-leafed plants; includes plants that commonly are called weeds or wildflowers.

Functional at Risk (FAR) - Riparian/wetland areas that are in functional condition but an existing soil, water, or vegetation attribute makes them susceptible to degradation.

G

Geographic Information System (GIS) – An information processing technology to input, store, manipulate, analyze, and display data; a system of computer maps with corresponding site-specific information that can be combined electronically to provide reports and maps.

H

Herd Management Area (HMA) – A geographic area identified in a Management Framework Plan or Resource Management Plan for the long-term management of a wild horse herd.

Hiking trail - A pathway created and maintained by human foot traffic, saddle or pack stock, or constructed and maintained for these uses.

Hydrologic Unit Code (HUC) – A coding system developed by the U.S. Geological Service to map geographic boundaries of watersheds of various sizes.

I

Incident commander – Individual responsible for the management of all incident (fire) operations.

Interim Management Policy for Lands Under Wilderness Review (WSA IMP) – Policy for managing public lands under wilderness review. Section 603(c) of the FLPMA states: "During the period of review of such areas and until Congress has determined otherwise, the Secretary shall continue to manage such lands according to his authority under this Act and other applicable laws in a manner so as not to impair the suitability of such areas for preservation as wilderness, subject, however, to the continuation of existing mining and grazing uses and mineral leasing in the manner and degree in which the same was being conducted on the date of approval of this Act: Provided, that, in managing the public lands the Secretary shall by regulation or otherwise take any action required to prevent unnecessary or undue degradation of the lands and their resources or to afford environmental protection."
Intermittent stream – A stream, or reach of a stream, that flows for prolonged periods only when it receives groundwater discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

J-K

L

Landscape level - In each allotment or pasture in the project area, there are situations that individually would warrant action by the BLM. By considering a wider project area, the BLM ensures individual actions are considered, evaluated, and coordinated with other actions in the vicinity in the context of all activities addressing the wider problem of juniper expansion.

Landscape scale - For this EIS purpose the 336,000-acre project area as opposed to smaller individual projects.

Late Successional Stage - A successional stage, or collection of stages, that occur many years after disturbance. Often related to climax or a stable, self-perpetuating plant community.

M

Management direction – A statement of goals and objectives, management prescriptions, and associated standards and guidelines for attaining them.

Mechanized equipment - Any machine that uses or is activated by either a living or nonliving power source. This includes, but is not limited to, chain saws, power drills, aircraft, generators, motor vehicles, snow machines, etc. The term does not include shavers, wristwatches or clocks, flashlights, cameras, camp stoves, cell phones, radio transmitters/receivers, GPS units or other similar small hand held or portable equipment.

Mechanized vehicle (for OHV) - Any vehicle, device, or contrivance that has moving parts for moving people or material in or over land, water, snow, or air. This includes, but is not limited to, sailboats, sailboards, hang gliders, parachutes, bicycles, game carriers, carts, and wagons. It does not include wheelchairs, horses, or other pack stock, skis, snowshoes, nonmotorized river craft, sleds, travois, or similar devices without moving parts.

Mid-transitional juniper woodland – Juniper has become codominant in a specific plant community or site.

Mitigation – Measures designed to counteract environmental impacts or to make impacts less severe.

Monitoring – The periodic and systematic collection of resource data to measure progress toward achieving objectives.

Monitoring and evaluation – The collection and analysis of data to evaluate the progress and effectiveness of on-the-ground actions in meeting resource management goals and objectives.

Motor vehicle - Any vehicle, device, or contrivance which is self-propelled and is used for moving people or materials in or over land, water, snow, or air and is powered by a motor or engine.

Motorized equipment - Any machine that uses or is activated by a motor, engine, or other power source. This includes, but is not limited to, chain saws, power drills, aircraft, generators, motor vehicles, snow machines, etc. The term does not include shavers, wristwatches or clocks, flashlights, cameras, camp stoves, cell phones, radio transmitters/receivers, GPS units or other similar small hand held or portable equipment.

Multiple use – Management of public land and its resources to best meet various present and future needs of the American people. This means coordinated management of resources and uses to assure the long-term health of the ecosystem.

N

National Environmental Policy Act of 1969 (NEPA) – Law requiring all Federal agencies to evaluate the impacts of proposed major Federal actions with respect to their significance on the human environment.

National Wildlife Refuge (NWR) – An area administered by the U.S. Fish and Wildlife Service for the purpose of managing certain fish or wildlife species.

Natural wildland fire – Lightning-ignited fire in natural vegetation.

Naturalness (a primary wilderness value) – An area that generally appears to have been affected primarily by the forces of nature with the imprint of people's work substantially unnoticeable.

Noxious weed – A plant specified by law as being especially undesirable, troublesome, and difficult to control. A plant species designated by Federal or State law as generally possessing one or more of the following characteristics: aggressive and difficult to manage; parasitic; a carrier or host of serious insects or disease; or nonnative, new, or not common to the United States. According to the Federal Noxious Weed Act (PL 93-639), a noxious weed is one that causes disease or has other adverse effects on man or his environment and, therefore, is detrimental to the agriculture and commerce of the United States and to the public health.

O

Objectives (management) – A description of a desired condition for a resource. Objectives can generally be quantified and measured and, where possible, have established timeframes for achievement.

Off-Highway Vehicle (OHV) – Any motorized vehicle capable of, or designed for, travel on or immediately over land, water, or other natural terrain, excluding the following: 1) any nonamphibious registered motorboat; 2) any military, fire, emergency, or law enforcement vehicle while being used for emergency purposes; (3) any vehicle whose use is expressly permitted by the authorized officer, or otherwise officially approved; 4) vehicles in official use; and 5) any combat or combat support vehicle when used in times of national defense emergencies.

Old-growth juniper – Juniper that has certain morphological features or was growing prior to 1870. Old-growth juniper usually occurs in specific areas where wildland fires are less common (rocky areas with low fuels).

P

Perennial – A plant that lives for three or more years.

Perennial stream – A stream in which water is present during all seasons of the year.

Permeability – The quality of the soil that enables water to move downward through the profile, measured as the number of inches per hour that water moves downward through the saturated soil.

pH value – A numerical designation of acidity and alkalinity in soil.

Playa - A flat area at the bottom of a desert basin, sometimes temporarily covered with water.

Pocket – A “juniper pocket” is three or more juniper in close association.

Prescribed burning – Controlled application of fire to wildland fuels in either their natural or modified state, under specified environmental conditions which allow the fire to be confined to a predetermined area and at the same time to produce the fire line intensity and rate of spread required to attain planned resource management objectives.

Prescribed fire – Any fire ignited by management actions to meet specific objectives. A written and approved prescribed fire plan must exist, and NEPA requirements (where applicable) must be met prior to ignition. The introduction of fire to an area under regulated conditions for specific management purposes (usually vegetation manipulation).

Prescribed natural fire - A naturally-ignited fire that is managed for resource benefits. Currently called Wildland Fire Use.

Prescription – Written statement defining objectives to be attained, as well as measurable criteria which guide the selection of appropriate management actions. Prescription criteria may include safety, economic, public health, environmental, geographic, administrative, social or legal considerations under which the fire will be allowed to burn.

Primary wilderness values – The primary or key wilderness values described in the Wilderness Act by which WSAs and wildernesses are managed to protect and enhance the wilderness resource. Values include roadlessness, naturalness, solitude, primitive and unconfined recreation, and size.

Primitive and unconfined recreation (a primary wilderness value) – nonmotorized and undeveloped types of outdoor recreation activities. Refers to wilderness recreation opportunities such as nature study, hiking, photography, backpacking, fishing, hunting, and other related activities. Does not include the use of motorized vehicles, bicycles, or other mechanized means of travel.

Project units – Identified subdivisions of the North Steens Ecosystem Restoration Project Area.

Proper Functioning Condition (PFC) – PFC is both a qualitative method for assessing the physical function of riparian-wetland areas, and a defined condition of a riparian-wetland area.

Public lands – Any land or interest in land owned by the citizens of the United States and administered by the Secretary of the Interior through the BLM as defined in FLPMA.

Q

R

Rangeland – Land on which the potential natural vegetation is predominantly grasses, grass like plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range site – An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Record of Decision (ROD) – An official document in which a deciding official states the alternative that will be implemented from a prepared Final EIS.

Recreation site – An area where management actions are required to provide a specific recreation setting and activity opportunities, to protect resource values, provide public visitor safety and health, and/or to meet public recreational use demands and recreation partnership commitments. A site may or may not have permanent facilities.

Research Natural Area (RNA) – An area where natural processes predominate and which is preserved for research and education. Under current BLM policy, these areas must meet the relevance and importance criteria of ACECs and are designated as ACECs. An area of significant scientific interest that is designated to protect its resource values for scientific research and study.

Resource advisor – Resource specialist responsible to the incident commander for gathering and analyzing information concerning values-at-risk that may be impacted by fire or fire suppression activities.

Resource Area (RA) – The "on-the-ground" management unit of the BLM comprised of BLM-administered land within a specific geographic area.

Resource Management Plan (RMP) – Current generation of land use plans developed by the BLM under the Federal Land Policy and Management Act. Replaces the older generation Management Framework Plans. Provides long-term (up to 20 years) direction for the management of a particular area of land and its resources, usually corresponding to a BLM Resource Area.

Riparian area – Area with distinctive soil and vegetation between a stream or other body of water and the adjacent upland; includes wetlands and those portions of flood plains and valley bottoms that support riparian vegetation.

Risk assessment – Assessing the chance of fire starting, naturally- or human-caused, and its potential risk to life, resources and property.

Road - Constructed or evolved transportation route that is normally maintained for regular use (except during periods of closure) that can be reasonably and prudently driven by motorized or mechanized vehicles.

Route - A linear ground transportation feature such as a way or road.

S

Scenic river – A river, or section of a river, that is free of impoundments and whose shorelines are largely undeveloped but accessible in places by roads.

Scoping – The process of identifying the range of consideration, issues, management concerns, preliminary alternatives, and other components of an environmental impact statement or land-use planning document. It involves both internal and external, or public, involvement.

Section 202 lands – Lands being considered for wilderness designation under Section 202 of the Federal Land Policy and Management Act of 1976.

Sensitive species – Species identified by a Forest Service regional forester, or BLM state director, for which population viability is a concern either (a) because of significant current or predicted downward trends in population numbers or density, or (b) because of significant current or predicted downward trends in habitat capability that will reduce a species' existing distribution.

Seral – Refers to the sequence of transitional plant communities during succession. Early-seral refers to plants that are present soon after a disturbance or at the beginning of a new successional process (such as seedling or sapling growth stages in a forest); mid-seral in a forest will refer to pole or medium sawtimber growth stages; late- or old-seral refers to plants present during a later stage of plant community succession (such as mature and old forest stages).

Seral stage –The developmental phase of a forest stand or rangeland with characteristic structure and plant species composition. The rated departure of a plant community from a described PNC for a specific ecological site.

Low-seral stage is an existing plant community which is defined as 0.0 to 25.0 percent comparability to the defined PNC; Mid-seral stage is an existing plant community which has 26.0 to 50.0 percent comparability to the PNC; Late-seral stage is 51.0 to 75.0 percent comparable to the PNC; PNC is an existing plant community with 76.0 to 100.0 percent comparability to the defined PNC.

Slope – The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20.0 percent is a drop of 20 feet in 100 feet of horizontal distance.

Soil association – A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single soil map unit.

Soil classification – The systematic arrangement of soils into groups or categories on the basis of their characteristics.

Soil compaction – An increase in soil bulk density of 15.0 percent or more from the undisturbed level.

Soil complex – A map unit of two or more kinds of soils in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping.

Soil Horizon - A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes.

Soil profile – A vertical section of the soil extending through all its horizons and into the parent material.

Soil series - A nationally defined soil type set apart on distinct soil properties that affect use and management. In a soil survey, this includes a group of soils having profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Soil survey – A field investigation resulting in a soil map showing the geographic distribution of various kinds of soil and an accompanying report that describes the soil types and interprets the findings.

Soil texture – The relative proportions of sand, silt, and clay particles in a mass of soil.

Solitude (a primary wilderness value) – The state of being alone or remote from habitations; a lonely, unfrequented, or secluded place. The intent is to evaluate the opportunity for solitude in comparison to habitations of people.

Special Recreation Management Area (SRMA) – An area where recreation is the principal management objective, where intensive recreation management is needed, and where more than minimal recreation-related investments are required.

Special Status Species – Plant or animal species known or suspected to be limited in distribution, rare or uncommon within a specific area, and/or vulnerable to activities which may affect their survival. Lists of Special Status Species are prepared by knowledgeable specialists through the State of Oregon; the BLM prepares a list of State sensitive species predominantly based on the list prepared biennially by the Oregon Natural Heritage Program (ONHP).

Stand – A community of trees occupying a specific area and sufficiently uniform in species, age, spatial arrangement and condition as to be distinguishable from trees on surrounding lands.

State listed species – Any plant or animal species listed by the State of Oregon as threatened or endangered within the State under Oregon Revised Statue (ORS) 496.004, ORS 498.026, or ORS 564.040.

Stream channel – The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Subalpine – A terrestrial community that is generally found in harsher environments than the montane terrestrial community. Subalpine communities are generally colder than montane and support a unique clustering of wildlife species.

Subwatershed – A drainage area of approximately 20,000 acres, equivalent to a 6^{th}-field HUC. Hierarchically, subwatersheds (6^{th}-field HUC) are contained within a watershed (5^{th}-field HUC), which in turn is contained within a subbasin (4^{th}-field HUC).

Succession – A predictable process of changes in structure and composition of plant and animal communities over time. Conditions of the prior plant community or successional stage create conditions that are favorable for the establishment of the next stage. The different stages in succession are often referred to as "seral stages" (see Seral).

Successional Stage - A collection of plants and animals that occupy a site at a specific time under a specific set of conditions.

Sustainability – (1) meeting the needs of the present without compromising the abilities of future generations to meet their needs; emphasizing and maintaining the underlying ecological processes that ensure long-term productivity of goods, services, and values without impairing productivity of the land. (2) In commodity production, refers to the yield of a natural resource that can be produced continually at a given intensity of management.

Supplemental wilderness values – Includes ecological (e.g., vegetation, wildlife, and overall biological/botanical processes and values associated with the natural environment), geological, scientific, educational, scenic, and historic values. When present, they can enhance primary wilderness values, but are not mandated by Congress.

T

Threatened species – Any plant or animal species defined under the ESA as likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Listings are published in the *Federal Register*.

Trend – The direction of change in ecological status observed over time. Trend is described as toward or away from the PNC, or as not apparent.

U

Upland (geology) – Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Utilization – The proportion or degree of the current year's forage production that is consumed or destroyed by animals (including insects). Utilization may refer either to a single plant species, a group of species, or to the vegetation as a whole. Utilization is synonymous with use.

V

Visual Resource Management (VRM) Objectives

> Class I - The objective of this classification is to preserve the existing character of the landscape. This class provides for natural ecological changes and limited management activity. The level of change should be very low and must not attract attention. Class I is assigned to those areas where a management decision has been made to preserve a natural landscape.
>
> Class II - The objective of this classification is to retain the existing character of the landscape. The level of change to landscape characteristics should be low. Management activities may be seen but should not attract the attention of a casual observer. Any changes must conform to the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape. This class represents the minimum level of VRM for WSAs.
>
> Class III - The objective of Class III is to partially retain the existing character of the landscape. Moderate levels of change are acceptable. Management activities may attract attention but should not dominate the view of a casual observer. Changes should conform to the basic elements of the predominant natural features of the characteristic landscape.
>
> Class IV - The objective of Class IV is to provide for management activities that require major modification of the landscape. These management activities may dominate the view and become the focus of viewer attention; however, every effort should be made to minimize the impact of these projects by carefully locating activities, minimizing disturbance, and designing the projects to conform to the characteristic landscape.

W

Way - A travel route in a WSA maintained solely by the passage of vehicles which has not been improved and/or maintained by mechanical means to ensure relatively regular and continuous use.

Wild river - A river or section of a river that is free of impoundments and generally inaccessible except by trail, with watersheds and shorelines essentially primitive and waters unpolluted.

Wildfire – An unplanned, unwanted wildland fire, including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other wildland fires where the objective is to put the fire out.

Wildland fire – Any nonstructure fire that occurs in the wildland. Three distinct types of wildland fire have been defined and include wildfire, wildland fire use, and prescribed fire.

Wildland fire suppression – Extinguishment of a wildland fire utilizing the appropriate management response.

Wildland fire use – The application of the appropriate management response to naturally-ignited wildland fires to accomplish specific resource management objectives in predefined designated areas outlined in Fire Management Plans. Formally called Prescribed Natural Fire.

6.2 Bibliography

Agee, J.K. 1993. *Fire Ecology of Pacific Northwest Forests.* Island Press. 493p.

Antevs, Ernest Climatic Changes and Pre-Whiteman. 1948. In *The Great Basin with Emphasis on Postglacial Times*. University of Utah Bulletin Biological Series 38 (20):167-191. Salt Lake City.

Bartos, D.L. and R.B. Campbell. 1998. *Decline of Quaking Aspen in the Interior West – Examples from Utah.* Rangelands, 20:17-25.

Bates, J.D., R.F. Miller, and T.S. Svejcar. 2002. *Effects of Juniper Cutting on Nitrogen Mineralization.* Journal of Arid Environments 51:221-234.

Beck, Charlotte and George T. Jones. 1996. *The Terminal Pleistocene/Early Holocene Archaeology of the Great Basin*. Journal of World Prehistory 11(2): 161-236.

Bedwell, Steven F. 1970. *Prehistory and Environment of the Pluvial Fort Rock Lake Area of Southcentral Oregon*. Ph D. Dissertation, Department of Anthropology, University of Oregon, Eugene.

Bedwell, Stephen and Luther Cressman. 1973. *Fort Rock Basin Prehistory and Environment, Forward by Luther S. Cressman*. University of Oregon Books, Eugene.

Betancourt, J.L. 1987. *Paleoecology of Pinyon-juniper Woodlands: Summary.* Pages 129-139 *in* R. L. Everett (compiler). Proceedings: Pinyon-juniper Conference. General Technical Report, INT-215, U.S. Department of Agriculture, Forest Service, Intermountian Forest and Range Experiment Station, Ogden, UT.

Binns, Archie. 1967. *Peter Skene Ogden: Fur Trader (1st ed.),* Portland: Binfords and Mort., Publishing.

Bisson, P.A., B.E. Rieman, C. Luce, P.F. Hessburg, D.C. Lee, J.L. Kershner, G.H. Reeves, and R. Gresswell. *Fire and Aquatic Ecosystems of the Western USA: Current knowledge and key questions.* Forest Ecology and Management. 178(1-2): 213-229.

Bright, Ruth M. 1979. H*arney Area Cultural Resources Class I Inventory: A Cultural Resources Overview.* Bureau of Land Management, Burns District, Oregon.

Burns Paiute Tribe. 1997. *Wadatika Ma-Ni-Pu-Neen*. Burns Paiute Tribe. Burns, Oregon.

Coahran, Elizabeth. 2001. Unpublished field notes, Burns Paiute Tribe, Burns, Oregon.

Coahran, Elizabeth. 2003. Unpublished field notes, Burns Paiute Tribe, Burns, Oregon.

Connelly, J.W., S.T. Knick, M.A. Schroeder, and S.J. Stiver. 2004. *Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats*. Western Association of Fish and Wildlife Agencies. Unpublished Report. Cheyenne, Wyoming.

Couture, Marilyn Dunlap. 1978. *Recent and contemporary foraging practices of the Harney Valley Paiute*. Thesis, Department of Anthropology, Portland State University, Portland.

Crawford, J.A., T.H. Bliss, and M.K. D. McDowell. 2000. *Habitat Use by Sage Grouse at South Steens BLM Allotment*. Final Report. Unpublished report. Game Bird Research Program, Dept. of Fisheries and Wildlife, Oregon State University, Corvallis.

Crespin, Bruce. 1990 (1995 rev.), *The Riddle Brothers Ranch Historic District Cultural Reosurces Management Plan*: EA OR-020-5-019, Burns District, Andrews Resource Area, Bureau of Land Management.

Draper, John A., and Kenneth Reid. 1989. *Archaeology of Chokecherry Cave, 35GR500, Grant County, Oregon.* Center for Northwest Anthropology, Washington State University, Pullman.

Duckfoot Survey Company. 2003. *Steens Mountain Aspen Assessment and Monitoring – Final Report.* N. Otting and D. Lytjen, Eugene, Oregon.

Dugas, Daniel P., Robert G. Elston, James A. Carter, Kathryn Atamin, and Margaret Bullock. 1993. *An Archaeological and Stratigraphic Assessment of the Stubblefield Lookout Tower (35HA53)*, Malheur National Wildlife Refuge, Prepared for the U.S. Fish and Wildlife Service.

Dunham, J.B., Young, M.K., Gresswell, R., Rieman, B.E. 2003. *Effects of Fire on Fish Populations: Landscape Perspectives on Persistence of Native Fishes and Non-native Fish Invasions.* Forest Ecology and Management. 178(1-2): 183-196.

Dwire, K.A., and J.B. Kauffman. 2003. *Fire and Riparian Ecosystems in Landscapes of The Western USA*. Forest Ecology and Management. 178(1-2): 61-74.

Fagan, John. 1974. *Altithermal Occupation of Spring Sites in the Northern Great Basin*. University of Oregon Anthropological Papers 6., Eugene, Oregon.

Graumlich, L.J. 1987. *Precipitation Variation in The Pacific Northwest (1675-1975) As Reconstructed from Tree Rings.* Annals of the Association of American Geographers 77:19-29.

Gresswell, R.E. 1999. *Fire and Aquatic Ecosystems in Forested Biomes of North America*. Trans. Am. Fish. Soc. 128 (2), 193-221.

Griffiths, D. 1902. *Forage Condition on the Northern Border of the Great Basin.* Bureau of Plant Industry. USDA Bulletin 15.

Hall, F.C. 2001. Ground-based photographic monitoring. General Technical Report. PNW-GTR-503. Portland, OR; U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 340p.

Hann, W.J. and D.L. Bunnell. 2001. *Fire and Land Management Planning and Implementation across Multiple Scales.* Journal of Wildland Fire Science. 10:389-403.

Hann, W.J. and D.J. Strohm. 2003. *Fire regime condition class and associated data for fire and fuels planning: methods and applications*. p 337-443. In: Omi, Philip N.; Joyce, Linda A., technical editors. *Fire, fuel treatments, and ecological restoration*: Conference proceedings; 2002 16-18 April; Fort Collins, CO. Proceedings RMRS-P-29. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 475 p.

Hibbs, D.E. and S. Chan. 2001. *Developing Management Strategies For Riparian Areas.* Forest Vegetation Management Conference. Twenty-second Meeting. Jan 16-18 2001.

Hilty, J.H., D.J. Eldridge, R. Rosentreter, M.C. Wicklow-howard, and M. Pellant. 2004. *Recovery of Biological Soil Crusts Following Wildfire in Idaho.* Society for Range Management. Volume 57:89-96.

Holmes, R.L., R.K. Adams, and H.C. Fritts. 1986. *Tree ring chronologies of western North America: California, eastern Oregon and northern Great Basin.* Chronology Series VI. Laboratory of Tree Ring Research, University of Arizona, Tucson, Arizona.

House Report 101-405 (Arizona Desert Wilderness Act of 1990). Appendix B. Wildlife Management Guidelines.

Jenkins, Dennis and Tom Connolly. 1990. *Archaeology of Indian Grade Spring: A Special Function Site on Stinkingwater Mountain, Harney County, Oregon.* University of Oregon Anthropological Papers, No. 42, Eugene, Oregon.

Jenkins, Dennis L. 1993. *Settlement-Subsistence Patterns in the Fort Rock Basin: A Cultural Ecological Perspective on Human Responses to Fluctuating Wetland Resources of the Last 5000 Years*. Archaeological Researches in the Northern Great Basin: Fort Rock Archaeology Since Cressman, edited by C. Melvin Aikens and Dennis L. Jenkins. University of Oregon Anthropological Papers 50, Eugene.

Jenkins, Dennis L., Thomas Connolly, and C. Melvin Aikens. 2004. *Early and Middle Holocene Archaeology in the Northern Great Basin: Dynamic, Natural, and Cultural Ecologies*. In *Early and Middle Holocene Archaeology of the Northern Great Basin*, University of Oregon Anthropological Papers No. 62, pp.1-20.

Jenkins, Dennis L., Michael Droz, and Thomas Connolly. 2004. *Geoarchaeology of Wetland Settings in the Fort Rock Basin, South-Central, Oregon*. Early and Middle Holocene Archaeology of the Northern Great Basin, University of Oregon Anthropological Papers No. 62, pp.31-52.

Kappler, Charles J. 1904. *Indian Affairs Laws and Treaties*: Vol. II Treaties, http://digital.library.okstate.edu/kappler/vol2/treaties/wal0694.htm, accessed on 3/24/2005.

Kauffman, J.B. 1990. *Ecological Relationships of Vegetation and Fire.* In Walstad, J.D., Radosevich, S.R., Sandberg, D.V. (Eds.), *Prescribed Fire in Pacific Northwest Forests.* Oregon State University Press, Corvallis, OR. Pp. 39-51.

Kay, Charles E. 1994. *Aboriginal Overkill and Native Burning: Implications for Modern Ecosystem Management*. Western Journal of Applied Forestry, Vol. 10 (4): 121-126.

Kelly, Isabel T. 1938. *Northern Paiute Tales.* Journal of American Folklore.

Kelly, R.L. 1997. *Late Holocene Great Basin Prehistory*. Journal of World Prehistory 11(1):1-50.

Knapp, P.A. and P.T. Soulé. 1996. *Vegetation Change and The Role of Atmospheric CO2 Enrichment on a Relict Site in Central Oregon: 1960-1994.* Annals of the Association of American Geographers. 86:387-411.

Lewis, C. 1973. P*atterns of Indian Burning in California: Ecology and Ethnohistory.* Lowell John Bean (ed.), Ballena Anthropological Papers Vol. 1, Ballena Press, Ramona, CA.

Maser, C. et al. 1984. *Wildlife Habitats in Managed Rangelands – The Great Basins of Southeastern Oregon.* Gen. Tech. Report PNW-172. Pacific Northwest Forest and Range Experiment Station. USDA Forest Service.

Miller, R.F. and P.E. Wigand. 1994. *Holocene Changes in Semiarid Pinyon-Juniper Woodlands: Response to Climate, Fire and Human Activities in the U.S.* Great Basin. BioScience 44:465-474.

Miller, R.F. and J.A. Rose. 1995. *Historical expansion of Juniperus occidentalis (western juniper) in Southeastern Oregon.* Great Basin Naturalist 55:37-45.

Miller, R.F. and J.A. Rose. 1999. *Fire History and Western Juniper Encroachment in Sagebrush Steppe*. Journal of Range Management 52:550-559.

Miller, R.F., T.J. Svejcar and J.A. Rose. 2000. I*mpacts of Western Juniper on Plant Community Composition and Structure.* Journal of Range Management 574-585.

Miller, R.F. 2001. *Managing Western Juniper Woodlands for Wildlife*. MISCO 286. Washington State University. Cooperative Extension Service.

Miller, R.F. and R.J. Tausch. 2001. *The role of Fire in Pinyon and Juniper Woodlands: A Descriptive Analysis.* Pages 15-30 *in* K.E.M. Galley and T.P. Wilson (eds). Proceedings of the Invasive Species Workshop: the Role of Fire in the Control and Spread of Invasive Species. Fire Conference 2000: the First National Congress on Fire Ecology, Prevention, and Management, Miscellaneous Publications No. 11, Tall Timbers Research Station, Tallahassee, FL.

Miller R.F., Bates, J.D., Svejcar, T.J., Pierson, F.B., and Eddleman, L.E. 2005. *Biology, Ecology, and Management of Western Juniper.* Technical Bulletin 152. Oregon State University, Agricultural Experiment Station. Corvallis, OR.

Minkley, Thomas A., Pat J. Bartlein, and J.J. Shinker. 2004. *Paleoecological response to Climate Change in the Great Basin Since the Last Glacial Maximum*. Early and Middle Holocene Archaeology of the Northern Great Basin. Dennis L. Jenkins, Thomas J. Connolly, C. Melvin Aikens eds., University of Oregon Papers 62, pp. 21-30, Eugene, Oregon.

Muracchioloi, Mark. 1996. *05020500480P, OPX II, Otley Proposed Land Exchange II*, Prepared for the Bureau of Land Management, Manuscript on File at the Burns Bureau of Land Management office.

Murphy, P., M. Jacober, C. Clancy, R. Pierce. 2000. *Fire Recharges Native Fishes*. USDA Forest Service, Region 1. Missoula MT.

Musil, Robert. 1995. *Adaptive transitions and environmental change in the northern Great Basin: a view from Diamond Swamp* by Robert R. Musil; with contributions by Ruth L. Greenspan, Brian E. Hemphill, Patricia F. McDowell, and Nancy A. Stenholm University of Oregon, Department of Anthropology, State Museum of Anthropology, Eugene, Oregon.

Oetting, Albert C. 1989. *Villages and wetlands adaptations in the northern Great Basin : chronology and land use in the Lake Abert-Chewaucan Marsh Basin, Lake County, Oregon* by Albert C. Oetting, Dept. of Anthropology, University of Oregon, Eugene.

Oregon Historical Society (1909-1910) 1910 *Peter Skene Ogden's Snake Country Journal, 1825-26.* The Quarterly of the Oregon Historical Society, Vol. X, No. 4 (December 1909). Accessed on-line at: http://roxwn.xmission.com/~drudy/mtman/html/ogdn2627.html, accessed on 3/28/2005.

Parsons, D.J., P.B. Landers, and C. Miller. 2003. *Wildland Fire Use: The Dilemma of Managing and Restoring Natural Fire and Fuels in United States Wilderness.* Pages 19-26 in K.E.M. Galley, R.C. Klinger, and N.G. Sugihara (eds). Proceedings of Fire Conference 2000: The First National Congress on Fire Ecology, Prevention, and Management. Miscellaneous Publication No. 13, Tall Timbers Research Station, Tallahassee, FL.

Ponzetti, J.M. and B.P. McCune. 2001. *Biotic Soil Crusts of Oregon's Shrub Steepe: Community of Composition in Relation to Soil Chemistry, Climate, and Livestock Activity.* The Bryologist 104(2):212-225.

Raven, Christopher, and Robert Elston. 1992. *Land and Life at Malheur Lake : preliminary geomorphological and archaeological investigations.* Christopher Raven and Robert G. Elston eds., Intermountain Research prepared for U.S. Fish and Wildlife Service Cultural resource series / U.S. Fish and Wildlife Service. Region 1 ; no. 8.

Reeves, G.H., Benda, L.E., Burnett, K.M., Bisson, P.A., Sedell, J.R., 1995. *A Disturbance-Based Ecosystem Approach to Maintaining and Restoring Freshwater Habitats of Evolutionarily Significant Units of Anadromous Salmonids in The Pacific Northwest.* In: Nielsen, J. (Ed.), Evolution and the Aquatic Ecosystem. Amer. Fisheries Soc. Symposium 17, Bethesda, MD, pp. 334-349.

Reid, Kenneth C., John A. Draper, and Peter E. Wigand. 1989. *Prehistory and Paleo-environments of the Silvies Plateau, Harney Basin, Southeastern Oregon*. Pullman, WA: Washington State University, Center for Northwest Anthropology.

Reid, K.D., B.P. Wilcox, D.D. Breshears, and L. MacDonald. 1999. *Runoff and Erosion in a Piñon-Juniper Woodland: Influence of Vegetation Patches.* Soil Sci. Soc. Am. J. 63:1869-1879.

Reynolds, R.T., E.C. Meslow, and H.M. Wight. 1982. *Nesting habitat of coexisting accipiter in Oregon*. J. Wildl. Manage. 46: 124-138.

Rieman, B.E., Gresswell, R.E., Young, M.K., Luce, C.L. Introduction to the Workshop: *The Effects of Wildland Fire on Aquatic Ecosystems in The Western USA*. Forest Ecology and Management. 178(1-2): 1-3.

Russell, Emily W.B. 1983. *Indian-Set Fires in Northeastern Forests*. Bio Science, Vol. 33, (7): 462.

Schmidt, K.M., Menakis, J.P., Hardy, C.C., Hann, W.J. and Bunnell, D.L. 2002. *Development of Coarse-scale Spatial Data for Wildland Fire and Fuel Management*. United States Department of Agriculture, Forest Service. General Technical Report RMRS-87. 83p.

Sigler, W.F. and J.W. Sigler. 1987. *Fishes of the Great Basin – A Natural History*. University of Nevada Press. Reno, Neveda. 425 pp.

Simms, Steven. 1987. *Behavioral ecology and hunter-gatherer foraging: an example from the Great Basin*, B.A.R., Oxford.

Steward, Julian. 1938. *Basin-Plateau Aboriginal Sociopolitical Groups.* Bureau of American Ethnology Bulletin Number 120.

Stewart, Omer. 1941. *Anthropological Records 4:3, Cultural Element Distributions: XIV, Northern Paiute*. University of California Press, Berkeley.

Tausch, R.J. 1999. *Transitions and Thresholds: Influences and Implications for Management in Pinyon and Utah Juniper Woodlands.* Pages 61-65 *in* S.B. Monson, R. Stevens, R. J. Tausch, R. Miller and S. Goodrich. Proceeding: *Ecology and Management of Pinyon-Juniper Communities within The Interior West.* Proceedings RMRS-P-9, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, UT.

U.S. Department of Agriculture/U.S. Department of Interior. 1986. U.S. Forest Service/Bureau of Land Management. *Wildlife Habitats in Managed Rangelands - The Great Basin of Southeastern Oregon*. J.W. Thomas and C. Maser eds. Pac. Northwest For. And Range Exp. Stn., Portland, Oregon.

___ 1997. *Interior Columbia Basin Ecosystem Management Project Eastside Draft Environmental Impact Statement.* Walla Walla, Washington.

___ 2005. *Wildland Fire Use: Implementation Procedures Reference Guide*. United States Department of Agriculture, Forsest Service and United States Department of Interior. 71p.

U.S. Department of Interior. Bureau of Land Management (BLM) Manual Handbook 8560. *Management of Designated Wilderness Areas.* Washington Office, Washington, D.C.

___ 1990. BLM. *The Juniper Resources of Eastern Oregon*. USDA, BLM Information Bulletin.

___ 1986. BLM. *Winter Bald Eagle Roosts Habitat Management Plan. Burns District, Oregon*. Burns District Office, Burns, Oregon.

___ 1991. BLM. *Wilderness Study Report.* Volume I. Oregon State Office, Portland, Oregon.

___ 1993. BLM Manual Handbook 8351. *Wild and Scenic Rivers - Policy and Program Direction for Identification, Evaluation, and Management.* Washington, D.C.

___ 1994. BLM. *The Riddle Brothers Ranch Historical Cultural Management Plan, Environmental Assessment.*

___ 1995. BLM. *Interim Management Policy for Lands under Wilderness Review H-8550-1*.

___ 2000. BLM, USFWS, USDA-USFS, Oregon Department of Fish and Wildlife, and Oregon Division of State Lands. *Greater Sage-Grouse and Sagebrush-Steppe Ecosystems Management Guidelines.* August 21, 2000. Oregon State Office, Portland, Oregon BLM. 27 pp.

___ 2001. BLM and USGS. Technical Reference 1730-2. *Biological Soil Crusts: Ecology and Management.*

___ 2001. BLM. *Final Decision Record for Projects for Implementation of the Steens Mountain Cooperative Management and Protection Act of 2000 Environmental Assessment*, EA-OR-027-01-27. Burns District Office, Hines, Oregon.

___ 2004. BLM. *Andrews Management Unit/Steens Mountain Cooperative Management and Protection Area Proposed Resource Management Plan and Final Environmental Impact Statement*. Burns District Office, Hines, Oregon.

___ 2005. BLM. *Andrews Management Unit Record of Decision and Resource Management Plan*. Burns District Office, Hines, Oregon.

___ 2005. BLM. *Steens Mountain Cooperative Management and Protection Area Record of Decision and Resource Management Plan*. Burns District Office, Hines, Oregon.

USDI - U.S. Fish and Wildlife Service. 1986. *Recovery Plan for the Pacific Bald Eagle*. U.S. Fish and Wildlife Service, Portland, Oregon. 160 pp.

Verts, B.J., L.N. Carraway. 1998. *Land Mammals of Oregon*. University of California Press, Berkeley and Los Angeles, California.

Waichler, W.S., Miller, R.F. and Doescher, P.S. 2001. *Community Characteristics of Old-growth Western Juniper Woodlands in the Pumice Zone of Central Oregon.* Journal of Range Management. 54:518-527.

Wall, T.G. 1999. *Juniper Encroachment into Quaking Aspen* (Populus tremulloides) *Communities in the Northern Great Basin.* Oregon State University M.S. Thesis, Corvallis. 72 pp.

Wall, T.G., R.F. Miller and T. Svejcar. 2001. *Western Juniper Encroachment into Aspen Communities in The Northwest Great Basin.* Journal of Range Management. 54:691-698.

Walters, C. 1997. *Challenges in Adaptive Management of Riparian and Coastal Ecosystems*. Conserv. Ecol. 1 (2), 1.

West, N.E. 1984. *Successional Patterns and Productivity Potentials of Pinyon-Juniper Ecosystems.* Pages 1301-1332. *in* Developing strategies for rangeland management: a report. Westview Press, Boulder CO.

Wheat, Margaret M. 1967. *Survival Arts of the Primitive Paiutes*, Reno: University of Nevada Press.

Whiting, Beatrice B. 1938. *Tribal Distribution in Oregon, Harney Valley Paiute* American Anthropologist, 40:402-405.

Whiting, Beatrice B. 1950. *Paiute Sorcery* Viking Fund Publications in Anthropology.

Wigand, Peter E. 1987. *Diamond Pond, Harney County, Oregon: Vegetation History and Water Table in the Eastern Oregon*. Great Basin Naturalist 47(3): 427-458.

Williams, K. 2000. *Early Fire Use in Oregon*. Fire Management Today, Vol. 60, 3:13-20.

Winnemucca-Hopkins, Sarah. 1883. *Life Among the Piutes: Their Wrongs and Claims*. Edited by Mrs. Horace Mann, Upham and Co., G.P. Putnam's Sons, New York.

Winward, A.H. 1980. *Taxonomy and Ecology of Sagebrush in Oregon*. Oregon State University, Corvallis, OR p43.

Yung, L. *Prescribed Fire in Wilderness.* Natural Resources 3495. University of Montana, Missoula, MT.

Zoellick, B.W. 1999. *Stream Temperatures and the Elevational Distribution of Redband Trout in Southwestern Idaho.* Great Basin Naturalist 59(2):136-143.

6.3 Index

ACEC, xv, xvi, 27, 56, 66, 84, 101, 114, 170
Air Quality, vii, viii, ix, x, xi, xii, xiii, 26, 27, 66, 81, 84, 101, 114, 130, 138, 143, 150, 156, 168
Allotment, xiv, xvi, 53, 54, 55, 170, 181
Allotment (grazing), 170
Allotment Management Plan, xvi, 54, 170
Allotment Management Plan (AMP), 170
AMU, xvi, 18, 19, 1, 9
Andrews Management Unit, xiv, xv, xvi, 18, 1, 16, 185
Andrews Management Unit (AMU), 18, 1
Andrews RA, 1, 4, 13, 25, 46, 47, 76, 94, 110, 121, 126, 128, 130, 135, 147, 168
Andrews Resource Area, iii, v, 18, 181
Animal unit, 170
Animal Unit Month, xvi, 54, 170
Animal Unit Month (AUM), 170
Areas of Critical Environmental Concern, vii, viii, ix, x, xi, xii, xiii, xiv, 27, 66, 81, 84, 101, 114, 130, 138, 143, 150, 156
AUM, xvi, 170
Back Country Byway, 56
Basin, xv, 4, 11, 25, 32, 45, 46, 47, 52, 61, 62, 72, 123, 124, 128, 137, 170, 180, 181, 182, 183, 184, 185, 186
Basin (river), 170

Best Management Practices, 47, 170
Best Management Practices (BMPs), 47, 170
BLM, iv, v, vi, xv, xvi, 18, 19, 1, 4, 6, 9, 13, 14, 15, 21, 22, 25, 26, 27, 28, 32, 33, 34, 35, 36, 37, 38, 40, 42, 43, 44, 45, 52, 65, 66, 68, 73, 78, 88, 91, 92, 102, 104, 108, 109, 126, 129, 140, 165, 166, 167, 168, 170, 171, 172, 174, 176, 177, 178, 181, 185
BLM assessment species, 171
BLM sensitive species, 33, 52, 171
BLM tracking specie, 32, 52, 171
BMPs, 47, 76, 94, 110, 121, 135, 147, 170
Bureau of Land Management, ii, iii, iv, v, vi, xiii, xvi, 18, 1, 86, 168, 170, 180, 181, 183, 185
Bureau of Land Management (BLM), v, 18, 1, 170, 185
Candidate Species, 171
CEQ, xvi, 6, 66, 165
CFR, xvi, 39, 66
Classification, 48, 64
Clean Air Act, 27
CMPA, v, xiv, xvi, 18, 19, 1, 3, 4, 7, 9, 10, 14, 16, 17, 18, 19, 21, 23, 25, 34, 47, 48, 55, 56, 65, 78, 97, 112, 122, 129
Code of Federal Regulations, xvi, 20, 39
Code of Federal Regulations (CFR), 39
Colluvium, 171
Commodities, 171
Community, 172, 183, 184, 185
Consultation, 171
Council on Environmental Quality, xvi, 20, 6, 165
Council on Environmental Quality (CEQ), 6, 165
Cultural Resources, 14, 26, 86, 180
Cumulative effects, 66, 133, 134, 137, 138, 139, 141, 142, 145, 146, 149, 151, 152, 153, 154, 155, 156, 158, 159, 160, 161, 162, 163, 164
DEQ, xvi, 6, 34, 35, 36, 37
Desired Range of Conditions, xvi, 4
Desired Range of Conditions (DRC), 4
Developed recreation, 171
Dispersed recreation, 171
EA, v, xvi, 6, 108, 168, 172, 181, 185
Ecological Site Inventory, 2, 129, 172
Ecological Site Inventory (ESI), 172
Ecological Status, 172
Ecosystem, i, iii, iv, v, xvi, 18, 1, 4, 129, 168, 172, 176, 182, 184, 185
Ecosystem Management, 4, 182, 185
EIS, iv, v, vi, xiii, xvi, 18, 1, 3, 6, 7, 9, 15, 16, 165, 168, 170, 172, 174, 176
Encroachment, 183, 186
Endangered Species Act, xvi, 52, 172
Endangered Species Act (ESA), 172
Environmental Assessment, v, xvi, 6, 172, 185
Environmental Assessment (EA), v, 6, 172
Environmental Impact Statement, i, iii, iv, v, xvi, 19, 1, 172, 185
Environmental Impact Statement (EIS), iv, v, 1, 172
Environmental Protection Agency, iv
ESA, xvi, 132, 139, 171, 172, 179
Exclusion Areas, xiv
FAR, xvi, 34, 35, 36, 37, 173
Federal Land Policy and Management Act of 1976, 5, 15, 172, 177
Federal Land Policy and Management Act of 1976 (FLPMA), 5, 172
Fire intensity, 70
Fire Management Plan, xvi, 19, 16, 18, 172, 180

Fire Management Plan (FMP), 16, 172
Fire regime, 48, 50, 173, 182
Fire return interval, 50, 51, 173
Fire suppression, 76, 85, 127
Fish and Wildlife, iv, v, xvi, xvii, 6, 169, 171, 175, 181, 184, 185
Flood plain, 173
FLPMA, xvi, 5, 53, 56, 166, 172, 173, 176
FMP, xvi, 16, 17, 21, 22, 41, 51, 172
Fuels, 19, 40, 68, 94, 128, 130, 184
Functional At Risk, xvi
GIS, xvi, 2, 29, 30, 33, 42, 55, 57, 58, 60, 79, 123, 126, 129, 131, 165, 168, 173
Grazing Management, viii, ix, x, xi, xii, xiii, 26, 53, 54, 78, 83, 96, 112, 121, 136, 141, 148, 155, 163, 168
Herd Management Areas, xiv, 64, 65
Herd Management Areas (HMAs), 65
HMA, 65, 170, 173
HMAs, 80, 100, 113, 123, 137
ICBEMP, 4
ID Team, 168
IMP, xvii, 14, 22, 24, 165, 166, 167, 173
Interim Management Policy, xiii, xvii, 42, 165, 166, 173, 185
Intermittent stream, 173
Lands and Realty, 26, 45
Management Direction, 21
Mechanical treatment, 84, 94, 111
Mechanized vehicle, 174
Mineral Estate, xv
Mitigation, 86, 174
Monitoring, 9, 11, 12, 92, 105, 174, 181
Monitoring and evaluation, 174
National Environmental Policy Act of 1969, 5, 174
National Environmental Policy Act of 1969 (NEPA), 5, 174
Naturalness, 38, 42, 43, 44, 45, 73, 74, 107, 110, 118, 120, 134, 153, 161, 175
NEPA, xvi, 20, 5, 16, 17, 81, 82, 84, 138, 165, 168, 172, 174, 175
Noxious weed, 68, 88, 175
NWR, xvi, 6, 31, 32, 175
Objectives (management), 175
ODFW, xvi, 6, 52, 96, 112, 122
OHV, xvi, 55, 56, 78, 85, 86, 88, 97, 112, 122, 143, 144, 148, 157, 158, 174, 175
Old-growth juniper, 175
Oregon Department of Agriculture, xvi, 1
Oregon Department of Agriculture (ODA), 1
Oregon Department of Environmental Quality, v, xvi, 6, 34, 169
Oregon Department of Environmental Quality (DEQ), 6, 34
Oregon Department of Fish and Wildlife, iv, v, xvi, 6, 169, 185
Oregon Department of Fish and Wildlife (ODFW), 6
ORV, xvi, 71, 72, 73, 105, 106, 107, 153, 160
Paleontological Resources, vii, viii, ix, x, xi, xii, xiii, 14, 30, 68, 82, 88, 102, 115, 132, 139, 144, 151, 158
PFC, xvi, 34, 35, 36, 37, 70, 91, 92, 94, 176
pH value, 175
Physiographic Province, 25
Planning Area, vii, xiv, 19, 4
Prescribed burning, 86, 93, 97, 101, 104, 108, 143, 147, 150, 156, 175
Prescribed Fire, 18, 20, 21, 23, 41, 105, 106, 107, 108, 109, 110, 116, 117, 118, 119, 125, 128, 182, 186
Prescription, 176
PRIA, xvi, 5, 53
Primary wilderness values, 176

Primitive and unconfined recreation, 39, 110, 120, 176
Protocol, 86
Range site, 176
Rangeland, 4, 54, 97, 176
Record of Decision, xvii, 18, 176, 185
Record of Decision (ROD), 176
Recreation, viii, ix, x, xi, xii, xiii, xiv, xvii, 26, 27, 39, 43, 44, 45, 55, 56, 74, 75, 78, 83, 96, 109, 110, 112, 119, 120, 122, 134, 136, 140, 142, 146, 148, 152, 153, 154, 155, 160, 161, 162, 163, 168, 171, 176, 178
Recreation site, 176
Research Natural Area, xiv, xvi, 27, 176
Research Natural Area (RNA), 27, 176
Resource advisor, 176
Resource Management Plan, v, xiv, xv, xvi, 18, 1, 173, 177, 185
Resource Management Plan (RMP), 177
Risk assessment, 177
RMP, xiii, xvi, 18, 19, 3, 4, 9, 10, 16, 24, 27, 28, 29, 30, 33, 34, 41, 53, 54, 56, 57, 60, 63, 64, 86, 168, 177
ROD, xvii, 18, 3, 9, 176
Saleable Minerals, xiv, xv
Scenic river, 177
Scoping, vii, 6, 177
Section 202 lands, 177
Sensitive species, 33, 177
Seral, 172, 177, 178
Seral stage, 172, 177
SMAC, xvii, 6, 168
Social and Economic Values, viii, ix, x, xi, xii, xiii, 26, 57, 78, 83, 97, 112, 122, 136, 142, 148, 155, 163, 168
Solitude, 39, 42, 43, 44, 45, 73, 75, 109, 110, 119, 120, 134, 153, 161, 178
Steens Act, v, xvii, 18, 1, 3, 4, 5, 6, 7, 9, 10, 14, 15, 18, 19, 21, 23, 32, 38, 52, 53, 54, 56, 111, 116, 121, 166, 168
Steens Loop Road, 44, 56, 60, 63
Steens Mountain Loop Road, 42, 96, 112, 122
Steens Mountain Wilderness, xv, 18, 1, 7, 18, 21, 27, 28, 36, 37, 38, 39, 43, 44, 54, 56, 63, 71, 73, 74, 84, 88, 94, 96, 99, 100, 108, 109, 111, 112, 113, 120, 121, 122, 123, 140, 164
Supplemental wilderness values, 179
Three Rivers RA, 1, 126, 128, 129
TMDL, xvii
United States Fish and Wildlife Service, iv, xvii
USDA, xvii, 1, 6, 40, 108, 181, 183, 185
USFS, 185
USFWS, xvii, 6, 32, 52, 185
USGS, 185
Utilization, 179
Vegetation, viii, ix, x, xi, xii, xiii, xv, 26, 49, 60, 62, 72, 74, 79, 83, 97, 99, 106, 107, 113, 117, 122, 129, 133, 137, 142, 149, 153, 156, 161, 164, 168, 182, 184, 186
Visual Resource Management, xiv, xvii, 63, 179
Visual Resource Management (VRM), 179
VRM, xvii, 14, 63, 64, 72, 79, 99, 100, 113, 123, 137, 149, 156, 164, 179
Water Resources, 168
Wild Horses and Burros, viii, ix, x, xi, xii, xiii, 64, 80, 84, 100, 113, 123, 137, 142, 149, 156, 164
Wilderness, iv, vii, viii, ix, x, xi, xii, xiii, xv, xvii, 18, 20, 1, 5, 7, 14, 15, 16, 18, 19, 21, 23, 24, 26, 27, 28, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 54, 56, 63, 71, 72, 73, 74, 82, 84, 88, 92, 94, 95, 96, 97, 99, 100, 107, 108, 109, 110, 111, 112, 113, 118, 119, 120, 121, 122, 123, 134, 140, 141, 146, 147, 152, 153, 154, 159, 161, 162, 164, 165, 168, 173, 176, 182, 184, 185, 186
Wilderness Study Areas, iv, vii, viii, ix, x, xi, xii, xiii, 18, 1, 14, 15, 41, 74, 82, 92, 110, 120, 134, 141, 146, 154, 162
Wilderness Study Areas (WSAs), iv, 18, 1
Wildfire, 20, 18, 68, 74, 86, 105, 106, 107, 108, 109, 112, 116, 117, 118, 119, 122, 124, 125, 126, 135, 180, 182
Wildland Fire, xiv, xv, 123, 175, 181, 184, 185

Wildland Fire Use, 175, 184, 185
WJMA, xvii, 59, 63, 64
WQRP, 34
WSA, xvii, 7, 14, 15, 18, 21, 22, 23, 24, 39, 41, 42, 43, 44, 45, 55, 66, 74, 90, 91, 92, 94, 95, 96, 102, 110, 120, 134, 146, 154, 162, 165, 166, 167, 173, 180
WSA IMP, xvii, 14, 22, 24, 165, 166, 167, 173
WSR, iv, xvii, 18, 19, 20, 1, 9, 15, 17, 18, 19, 20, 21, 22, 23, 24, 37, 38, 71, 72, 73, 91, 92, 105, 106, 107, 112, 116, 117, 118, 133, 134, 140, 145, 146, 152, 153, 159, 160, 161