Northwest Colorado Greater Sage-Grouse

Proposed Land Use Plan Amendment and Final Environmental Impact Statement

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The Bureau of Land Management's multiple-use mission is to sustain the health and productivity of the public lands for the use and enjoyment of present and future generations. The Bureau accomplishes this by managing such activities as outdoor recreation, livestock grazing, mineral development, and energy production, and by conserving natural, historical, cultural, and other resources on public lands.

The Forest Service mission is to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations.

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TABLE OF CONTENTS

Chapter Page

VOLUME I

ABSTRACT

DEAR READER LETTER

EXECUTIVE SUMMARY

1 INTRODUCTION 1-1

1.1 Introduction 1-1
1.1.1 Overview 1-1
1.1.2 Partner Agency Involvement 1-7
1.2 Purpose of and Need for the Land Use Plan Amendments 1-10
1.3 Description of the Greater Sage-Grouse Planning Area 1-11
1.3.1 Overview 1-11
1.3.2 Land Uses 1-20
1.4 Planning Processes 1-21
1.4.1 BLM Planning Process 1-21
1.4.2 Forest Service Planning Process 1-25
1.4.3 National Greater Sage-Grouse Planning Strategy 1-27
1.5 Scoping and Identification of Issues For Development of Draft Alternatives 1-28
1.5.1 The Scoping Process 1-28
1.5.2 Issues Identified for Consideration in the Northwest Colorado Greater Sage-Grouse Land Use Plan Amendments 1-29
1.6 Planning Criteria 1-30
1.7 Laws and Regulations that Apply to the LUPA 1-33
1.8 Relationship to Other Policies, Plans, and Programs 1-33
1.8.1 Programmatic National-Level Environmental Impact Statement Documents 1-33
1.8.2 State Plans (Developed by Local Working Groups) 1-34
1.8.3 County Land Use Plans 1-34
1.8.4 Other Federal Plans 1-35
1.8.5 Endangered Species Recovery Plans 1-35
1.8.6 Memoranda of Understanding 1-35
1.8.7 Activity Plans and Amendments 1-36
1.8.8 Habitat Management Plans 1-36
1.8.9 Other Greater Sage-grouse-Specific Policies 1-36
1.9 Description of the Public Comment Process 1-37
1.9.1 Distribution of the Draft Land Use Plan Amendment/Environmental Impact Statement 1-37
1.9.2 Comment Period and Open House Meetings 1-37
1.9.3 Comment Collection and Analysis 1-38
1.10 Changes Between the Draft Land Use Plan Amendment/Environmental Impact Statement and the Proposed Land Use Plan Amendment/Final Environmental Impact Statement 1-38

1.10.1 Changes to Geographic Information Systems Information....1-39
1.10.2 Changes to the Alternatives (Chapter 2) 1-39
1.10.3 Changes to Other Chapters and Appendices....1-41

2. PROPOSED ACTION AND ALTERNATIVES 2-1

2.1 Introduction 2-1
2.2 Changes between the Draft Land Use Plan Amendment/ Environmental Impact Statement and the Proposed Land Use Plan Amendment/ Final Environmental Impact Statement....2-2
2.3 Introduction to Draft Alternatives 2-4
2.3.1 Components of Alternatives....2-4
2.3.2 Purpose of Alternatives Development 2-5
2.4 Alternative Development Process for the Northwest Colorado Greater Sage-Grouse Land Use Plan Amendment 2-5
2.4.1 Develop a Range of Reasonable Alternatives 2-6
2.4.2 Resulting Range of Alternatives in Draft Land Use Plan Amendments/ Environmental Impact Statement....2-7
2.4.3 Selection of and Rationale for Identifying the Preferred Alternative 2-7
2.5 BLM/Forest Service Resource Programs for Addressing GRSG Threats 2-12
2.6 Proposed Plan Amendment....2-13
2.6.1 Development of Proposed Land Use Plan Amendments....2-13
2.6.2 BLM Proposed Land Use Plan Amendment 2-14
2.6.3 Forest Service Proposed Land Use Plan Amendment 2-32
2.7 Adaptive Management, Monitoring, and Mitigation 2-42
2.7.1 Adaptive Management Plan....2-42
2.7.2 Monitoring of the Greater Sage-Grouse Planning Strategy....2-48
2.7.3 Regional Mitigation 2-50
2.8 Draft LUPA/EIS Alternatives 2-52
2.8.1 Alternative A (No Action)....2-52
2.8.2 Management Common to Action Alternatives 2-53
2.8.3 Alternative B 2-54
2.8.4 Alternative C 2-54
2.8.5 Alternative D 2-54
2.9 Summary Comparison of Proposed Plan Amendment and Draft Alternatives 2-55
2.10 Detailed Description of Alternatives 2-57
2.10.1 How to Read Table 2-7 and 2-8 2-57
2.11 Alternatives Eliminated from Detailed Analysis 2-224
2.11.1 Area of Critical Environmental Concern Proposals Applied to All Designated Habitat.... 2-224
2.11.2 Garfield County Alternative.... 2-224

3. AFFECTED ENVIRONMENT 3-1

3.1 Introduction 3-1
3.1.1 Organization of Chapter 3 3-2
3.2 Fish and Wildlife....3-4
3.2.1 Indicators 3-9
3.2.2 Existing Conditions....3-9
3.2.3 Trends 3-22
3.2.4 References....3-30

3.3 Special Status Species 3-33
3.3.1 Existing Conditions 3-36
3.3.2 Trends 3-68
3.3.3 References 3-77
3.4 Lands and Realty 3-81
3.4.1 Existing Conditions 3-81
3.4.2 Trends 3-90
3.4.3 References 3-92
3.5 Vegetation (Forest, Rangelands, Riparian and Wetlands, and Noxious Weeds) 3-92
3.5.1 Existing Conditions 3-93
3.5.2 Trends 3-104
3.5.3 References 3-107
3.6 Wildland Fire Ecology and Management 3-109
3.6.1 Existing Conditions 3-109
3.6.2 Trends 3-114
3.6.3 References 3-116
3.7 Minerals (Leasable) 3-116
3.7.1 Existing Conditions 3-120
3.7.2 Trends 3-130
3.7.3 References 3-132
3.8 Minerals (Locatable) 3-134
3.8.1 Existing Conditions 3-134
3.8.2 Trends 3-137
3.8.3 References 3-137
3.9 Minerals (Salable) 3-138
3.9.1 Existing Conditions 3-138
3.9.2 Trends 3-140
3.9.3 References 3-141
3.10 Travel Management 3-141
3.10.1 Existing Conditions 3-142
3.10.2 Trends 3-148
3.10.3 References 3-149
3.11 Recreation 3-149
3.11.1 Existing Conditions 3-151
3.11.2 Trends 3-156
3.11.3 References 3-158
3.12 Range Management 3-159
3.12.1 Existing Conditions 3-161
3.12.2 Trends 3-166
3.12.3 References 3-167
3.13 Wild Horse Management 3-167
3.13.1 Existing Conditions 3-168
3.13.2 Trends 3-170
3.13.3 References 3-170
3.14 Special Designations 3-170
3.14.1 Existing Conditions 3-173
3.14.2 Trends 3-184
3.14.3 References 3-185
3.15 Water Resources 3-186
3.15.1 Existing Conditions 3-187

3.15.2 Trends ... 3-194
3.15.3 References ... 3-196
3.16 Soil Resources ... 3-196
3.16.1 Existing Conditions ... 3-197
3.16.2 Trends ... 3-202
3.16.3 References ... 3-202
3.17 Air Quality ... 3-203
3.17.1 Existing Conditions ... 3-204
3.17.2 Trends ... 3-213
3.17.3 References ... 3-214
3.18 Climate Change ... 3-214
3.18.1 Existing Conditions ... 3-214
3.18.2 Trends ... 3-215
3.18.3 References ... 3-216
3.19 Visual Resources ... 3-217
3.19.1 Existing Conditions ... 3-219
3.19.2 Trends ... 3-225
3.19.3 References ... 3-225
3.20 Lands with Wilderness Characteristics ... 3-226
3.20.1 Existing Conditions ... 3-227
3.20.2 Trends ... 3-228
3.20.3 References ... 3-229
3.21 Soundscapes ... 3-229
3.21.1 Existing Conditions ... 3-230
3.21.2 Trends ... 3-233
3.21.3 References ... 3-234
3.22 Cultural Resources and Native American Religious Concerns ... 3-234
3.22.1 Existing Conditions ... 3-236
3.22.2 Trends ... 3-241
3.22.3 References ... 3-241
3.23 Paleontological Resources ... 3-243
3.23.1 Existing Conditions ... 3-245
3.23.2 Trends ... 3-246
3.23.3 References ... 3-247
3.24 Social and Economic Conditions (Including Environmental Justice) ... 3-247
3.24.1 Existing Conditions ... 3-250
3.24.2 References ... 3-278

TABLES

Page

1.1 Colorado GRSG Management Zones ... 1-3
1.2 Planning Area Land Ownership and GRSG Habitat (in Acres) ... 1-12
1.3 Decision Area Subsurface Federal Mineral Estate and GRSG Habitat (in Acres) ... 1-13
1.4 Total Priority Habitat and General Habitat in the Planning Area ... 1-14
1.5 Management Areas on the Routt National Forest with GRSG Habitat ... 1-20
1.6 Public Comment Open House Information ... 1-37
2.1 USFWS-Identified Threats to GRSG and Its Habitat and Applicable BLM/Forest Service RMP/LUP Resource Programs for Addressing Threats ... 2-8
2.2 Description of BLM Proposed Land Use Plan Amendment ... 2-14

2.3 Seasonal Habitat Desired Conditions for Greater Sage-Grouse 2-29
2.4 Description of Forest Service Proposed LUPA....2-33
2.5 Grazing Guidelines for GRSG Seasonal Habitat....2-36
2.6 Comparative Summary of Allocation Decisions of the Proposed Land Use Plan Amendment and Draft Alternatives (Acres)....2-55
2.7 Description of Alternative A....2-58
2.8 Description of Alternatives B, C, D, and BLM and Forest Service Proposed LUPAs.... 2-137
3.1 Fish and Wildlife Species of Primary Interest in the Planning Area....3-4
3.2 Routt National Forest Management Indicator Species in the Decision Area 3-9
3.3 Big Game Ranges in PH and GH on BLM-Administered Lands....3-13
3.4 Acres of Mule Deer Winter Range on Federal Mineral Estate 3-13
3.5 Big Game Ranges on PHPH and GH on the Routt National Forest....3-20
3.6 Special Status Animal Species in the Planning Area....3-37
3.7 Special Status Plant Species in the Planning Area....3-46
3.8 Acres of Land Ownership and ADH within Colorado Management Zones....3-57
3.9 Acres of Federal Mineral Estate by PH and GH....3-58
3.10 GH and PH by Land Ownership on the Routt National Forest....3-67
3.11 High Count of Male GRSG from 2008–2012 in the GJFO and WRFO 3-73
3.12 GRSG Population Data within Colorado Management Zones....3-76
3.13 Acres of GRSG Habitat within City Limits in the Planning Area 3-82
3.14 Miles of Transmission Lines within GRSG Habitat in the Planning Area 3-82
3.15 Number of Communication Towers within GRSG Habitat in the Planning Area 3-82
3.16 Utility Corridors within GRSG Habitat in the Planning Area....3-83
3.17 Acres of Vertical Obstructions within GRSG Habitat in the Planning Area 3-83
3.18 Acres of BLM Land Use Authorizations within the Decision Area....3-86
3.19 Number of Special Use Permits on the Routt National Forest 3-89
3.20 Vegetation Communities in GRSG Habitat in the Planning Area 3-94
3.21 Acres of Sagebrush and Pinyon-Juniper Interface within GRSG Habitat in the Planning Area....3-95
3.22 Acres of Cheatgrass Potential within GRSG Habitat in the Planning Area 3-100
3.23 Vegetation Communities on BLM-Administered Lands in GRSG Habitat.... 3-101
3.24 Vegetation Communities on National Forest System Lands in GRSG Habitat 3-103
3.25 Fire Regime Condition Classes 3-110
3.26 Acres of Wildland Fire within GRSG Habitat in the Planning Area 3-111
3.27 Acres with High Probability for Wildland Fire within GRSG Habitat in the Planning Area 3-111
3.28 Acres by Fire Regime Condition Class within GRSG Habitat on BLM-Administered Lands 3-112
3.29 Fire Occurrence within GRSG Habitat on BLM-Administered Lands (1992–2011) 3-112
3.30 Fire Occurrence within PH on BLM-Administered Lands (1992–2011) 3-113
3.31 Acres of Harvest Activity and Fuels Reduction in GRSG Habitat on the Routt National Forest 3-113
3.32 Fire Starts in GRSG Habitat on the Routt National Forest (1970–2012) 3-114
3.33 Causes of Fire in Planning Area GRSG Habitat.... 3-115
3.34 Acres of Oil and Gas Potential on Planning Area GRSG Habitat 3-121
3.35 Acres Open and Closed to Oil and Gas Leasing within GRSG Habitat in the Planning Area 3-121
3.36 Acres of Oil and Gas Leases within GRSG Habitat in the Planning Area 3-122
3.37 Active Coal Mines on BLM-Administered Lands 3-123
3.38 Mineral Status in the Planning Area.... 3-124

3.39 Acres of Federal Mineral Estate by PH and GH—Fluid Leasable Minerals 3-124
3.40 Acres of Leased and Unleased Federal Mineral Estate in GRSG Habitat—Fluid Leasable Minerals 3-125
3.41 Acres of Oil and Gas Leasing Categories in Decision Area PH and GH 3-126
3.42 Coal Potential within GRSG Habitat in the Planning Area 3-129
3.43 Acres of Federal Mineral Estate in GRSG Habitat—Coal 3-129
3.44 Acres of Locatable Mineral Claims within GRSG Habitat in the Planning Area 3-135
3.45 Locatable Minerals in the Planning Area 3-135
3.46 Acres of Mineral Material Disposal Sites within GRSG Habitat in the Planning Area 3-138
3.47 Mineral Materials in the Planning Area 3-139
3.48 Roads within GRSG Habitat in the Decision Area 3-142
3.49 Railroads within GRSG Habitat in the Decision Area 3-142
3.50 Travel Area Designations on BLM-Administered Lands within the Decision Area 3-144
3.51 Special Recreation Management Areas on BLM-Administered Lands within GRSG Habitat 3-153
3.52 Extensive Recreation Management Areas on BLM-Administered Lands within GRSG Habitat 3-154
3.53 BLM Grazing Allotments Not Meeting Land Health Standards within GRSG Habitat 3-161
3.54 Cropland within GRSG Habitat in the Planning Area 3-162
3.55 Fences within GRSG Habitat in the Planning Area 3-162
3.56 BLM-Administered Grazing Allotments within GRSG Habitat 3-163
3.57 National Forest System Grazing Allotments within GRSG Habitat 3-165
3.58 Acres of Wild Horse Areas within GRSG Habitat in the Planning Area 3-168
3.59 Herd Areas within GRSG Habitat on BLM-administered Lands 3-168
3.60 Herd Management Areas within GRSG Habitat on BLM-Administered Lands 3-169
3.61 Special Designations in ADH 3-173
3.62 ACECs within GRSG Habitat on BLM-Administered Lands 3-174
3.63 WSAs within GRSG Habitat on BLM-administered Lands 3-179
3.64 Eligible and Suitable Stream Segments within GRSG Habitat on BLM-Administered Lands 3-180
3.65 Special Interest Areas within GRSG Habitat on National Forest System Lands 3-181
3.66 Inventoried Roadless Areas within GRSG Habitat on National Forest System Lands 3-182
3.67 Hydrologic Basins in the Planning Area 3-187
3.68 Rivers in GRSG Habitat within the Planning Area 3-188
3.69 Streams on National Forest System Lands 3-191
3.70 Freshwater Ponds and Lacustrine on National Forest System Lands 3-192
3.71 Air Quality Monitoring Data and National Ambient Air Quality Standard Percent Comparison 3-205
3.72 Planning Area Emissions Inventory 3-207
3.73 Current Visibility Conditions (5-year average, 2006–2010) 3-208
3.74 BLM Visual Resource Management Class Descriptions 3-218
3.75 GRSG Habitat by Geographic Area, Visual Quality Objective, and Habitat Type on the Routt National Forest 3-224
3.76 BLM-Administered Lands with Wilderness Characteristics 3-228
3.77 Noise Levels for Oil and Gas Activities 3-232
3.78 Inventory Acreage, Sites, and Ratio of Known Cultural Resources Sites to Acres 3-237
3.79 BLM and Forest Service Management Units and Counties within the Socioeconomic Study Area 3-248
3.80 Commuter Patterns in the Socioeconomic Study Area, 2010 3-249
3.81 Population Growth, 1990–2010 3-250

3.82 Demographic Characteristics, Share in Total Population (percent), 2010 ... 3-251
3.83 Employment by Industry Sector within the Socioeconomic Study Area ... 3-258
3.84 Labor Income by Industry Sector and Non-Labor Income within the Socioeconomic Study Area (2010 dollars) ... 3-259
3.85 Annual Unemployment, 2007–2012 ... 3-263
3.86 Estimated Number of Annual Visits by Field Office and National Forest ... 3-265
3.87 Visitor Spending from Recreation on BLM-Administered and National Forest System Lands in Socioeconomic Study Area ... 3-265
3.88 Number of Farms and Land in Farms, 2007 ... 3-266
3.89 Number of Farms by Type, 2007 ... 3-267
3.90 Farm Earnings Detail, 2010 (2010 dollars) ... 3-267
3.91 Active and Billed Animal Unit Months, 2011 ... 3-268
3.92 Coal, Gas, and Oil: Sales Volume and Sales Value from BLM-Administered Resources, Fiscal Year 2011 ... 3-269
3.93 Other Mineral Production, 2010 (Tons) ... 3-270
3.94 Revenues Received in the Socioeconomic Study Area by County, Government Funds, 2010 (Thousands) ... 3-274
3.95 Tax Revenues Received in the Socioeconomic Study Area by County, 2010 (Thousands) ... 3-274
3.96 BLM and Forest Service Employment and Related Expenditures in the Socioeconomic Study Area ... 3-275
3.97 Population Race and Ethnicity, 2010 ... 3-277
3.98 Low-Income Populations, 2006-2010 Average ... 3-278

DIAGRAMS

Page

1-1 Nine-Step Planning Process ... 1-22
1-2 BLM/Forest Service GRSG Planning Strategy Sub-region/EIS Boundaries ... 1-28
3-1 Range-wide Change in the Population Index for GRSG in North America, 1965–2003 (Connelly et al. 2004) ... 3-69
3-2 Change in Lek Size for GRSG in Colorado, 1965–2003 (Connelly et al. 2004) ... 3-70
3-3 Change in the Population Index for GRSG in Colorado, 1965-2003 (Connelly et al. 2004) ... 3-70
3-4 Historic Annual Male High Counts for the Northern Eagle/Southern Routt GRSG Population ... 3-71
3-5 Recent High Count and 3-year Running Average Data for Northern Eagle/Southern Routt GRSG Population ... 3-72
3-6 Annual Male High Count for the North Park GRSG Population ... 3-75
3-7 Annual Male High Count for the Middle Park GRSG Population ... 3-75
3-8 Nonattainment Areas and Monitoring Locations Within or Near the Planning Area ... 3-205
3-9 Standard Visual Range Trends for Areas in Table 3.73, Current Visibility Conditions (5-year average, 2006–2010) ... 3-208
3-10 Wet Deposition Trends ... 3-210
3-11 Dry Deposition Trends ... 3-211
3-12 Total Deposition Trends ... 3-211
3-13 Typical Noise Levels Near Gas Field Operations ... 3-233
3-14 Employment Trends by Select Industry Sector within the Socioeconomic Study Area, 2001-2010 ... 3-260

3-15 Labor Earnings Trends by Select Industry Sector within the Socioeconomic Study Area, 2001-2010 3-262

FIGURES *(see Appendix A)*

1-1 Northwest Colorado BLM Greater Sage-Grouse EIS Planning Area Boundaries
1-2 Greater Sage-Grouse WAFWA Management Zones and Northwest Colorado Management Zones
1-3 Greater Sage-Grouse Current and Historic Distribution
1-4 Priority Habitat Management Areas, General Habitat Management Areas, and Linkage/Connectivity Habitat Management Areas
2-1 Ecological Sites Supporting Sagebrush in Priority Habitat Management Areas
2-2 Alternatives A, B, D, and E: Areas Closed to Livestock Grazing
2-3 Alternative C: Areas Closed to Livestock Grazing
2-4 Alternative A: Right-of-Way Avoidance and Exclusion Areas
2-5 Alternative B: Right-of-Way Avoidance and Exclusion Areas
2-6 Alternative C: Right-of-Way Avoidance and Exclusion Areas
2-7 Alternative D: Right-of-Way Avoidance and Exclusion Areas
2-8 Alternative D: Right-of-Way Avoidance and Exclusion Areas for Large Transmission Lines (>230 kilovolts)
2-9 Alternative E: Right-of-Way Avoidance and Exclusion Areas
2-10 Alternatives A and D: Areas Closed to Fluid Minerals Leasing
2-11 Alternative B: Areas Closed to Fluid Minerals Leasing
2-12 Alternative C: Areas Closed to Fluid Minerals Leasing
2-13 Alternative E: Areas Closed to Fluid Minerals Leasing
2-14 Alternatives A, B, and C: No Surface Occupancy (NSO)
2-15 Alternative D: No Surface Occupancy (NSO)
2-16 Alternative E: No Surface Occupancy (NSO)
2-17 Alternatives A and D: Areas Closed to Mineral Material Sales
2-18 Alternatives B, C, and E: Areas Closed to Mineral Material Sales
2-19 Alternatives A and D: Areas Closed to Nonenergy Mineral Leasing
2-20 Alternatives B, C, and E: Areas Closed to Nonenergy Mineral Leasing
2-21 Alternatives A, B, D, and E: Areas of Critical Environmental Concern
2-22 Alternative C: Areas of Critical Environmental Concern
3-1 Elk Winter Range
3-2 Mule Deer Winter Range
3-3 Special Status Species
3-4 Greater Sage-Grouse Habitat Types
3-5 Greater Sage-Grouse Breeding Bird Density
3-6 Existing Designated Utility Corridors
3-7 Oil and Gas Basins
3-8 Oil and Gas Leases
3-9 Sodium Potential and Sodium Leases
3-10 Wild Horse and Burro Herd Area and Herd Management Areas
3-11 Special Designations
3-12 Visual Resources Management Classes

3-13 Visual Quality Objectives for the Routt National Forest
3-14 Ambient Background Noise Model for Ridge Point During Summer
3-15 Ambient Background Noise Model for Ridge Point During Winter
3-16 Ambient Background Noise Model for Valley Point During Summer
3-17 Ambient Background Noise Model for Valley Point During Winter

VOLUME II

4. ENVIRONMENTAL CONSEQUENCES 4-1

4.1 Introduction 4-1
4.2 Analytical Assumptions 4-2
4.2.1 General Method for Analyzing Impacts 4-4
4.2.2 Incomplete or Unavailable Information 4-5
4.3 Fish and Wildlife 4-6
4.3.1 General Description 4-6
4.3.2 Terrestrial Wildlife 4-6
4.4 Aquatic Wildlife, Including Special Status Fish and Aquatic Species 4-49
4.4.1 Methodology and Assumptions 4-49
4.4.2 Direct and Indirect Impacts on Aquatic Wildlife 4-55
4.4.3 Summary of Impacts on Aquatic Wildlife 4-74
4.5 Special Status Species 4-75
4.5.1 General Description 4-75
4.5.2 Greater Sage-Grouse 4-76
4.5.3 Other Special Status Species of Issue 4-109
4.6 Lands and Realty 4-179
4.6.1 General Description 4-179
4.6.2 Methodology and Assumptions 4-179
4.6.3 Direct and Indirect Impacts on Lands and Realty 4-181
4.6.4 Summary of Impacts on Lands and Realty 4-188
4.7 Vegetation (Forest, Rangelands, Riparian and Wetlands, and Noxious Weeds) 4-188
4.7.1 General Description 4-188
4.7.2 Methodology and Assumptions 4-189
4.7.3 Direct and Indirect Impacts on Vegetation 4-190
4.7.4 Summary of Impacts on Vegetation 4-210
4.8 Wildland Fire Ecology and Management 4-211
4.8.1 General Description 4-211
4.8.2 Methodology and Assumptions 4-211
4.8.3 Direct and Indirect Impacts on Wildland Fire Ecology and Management 4-214
4.8.4 Summary of Impacts on Wildland Fire Ecology and Management 4-231
4.9 Minerals (Leasable) 4-231
4.9.1 Fluid Leasable Minerals 4-231
4.9.2 Coal 4-266
4.10 Minerals (Locatable) 4-290
4.10.1 General Description 4-290
4.10.2 Methodology and Assumptions 4-290
4.10.3 Direct and Indirect Impacts on Locatable Minerals 4-292
4.10.4 Summary of Impacts on Locatable Minerals 4-298
4.11 Minerals (Salable) 4-299
4.11.1 General Description 4-299
4.11.2 Methodology and Assumptions 4-299
4.11.3 Direct and Indirect Impacts on Salable Minerals 4-301
4.11.4 Summary of Impacts on Salable Minerals 4-308
4.12 Travel Management 4-309
4.12.1 General Description 4-309
4.12.2 Methodology and Assumptions 4-309
4.12.3 Direct and Indirect Impacts on Travel Management 4-311

4.12.4 Summary of Impacts on Travel Management ... 4-315
4.13 Recreation ... 4-315
4.13.1 General Description ... 4-315
4.13.2 Methodology and Assumptions ... 4-316
4.13.3 Direct and Indirect Impacts on Recreation ... 4-318
4.13.4 Summary of Impacts on Recreation ... 4-334
4.14 Range Management ... 4-335
4.14.1 General Description ... 4-335
4.14.2 Methodology and Assumptions ... 4-335
4.14.3 Direct and Indirect Impacts on Range Management ... 4-338
4.14.4 Summary of Impacts on Range Management ... 4-353
4.15 Wild Horse Management ... 4-354
4.15.1 General Description ... 4-354
4.15.2 Methodology and Assumptions ... 4-354
4.15.3 Direct and Indirect Impacts on Wild Horse Management ... 4-356
4.15.4 Summary of Impacts on Wild Horse Management ... 4-374
4.16 Special Designations ... 4-375
4.16.1 Areas of Critical Environmental Concern ... 4-375
4.16.2 Wilderness Study Areas ... 4-393
4.16.3 Wild and Scenic Rivers ... 4-405
4.16.4 National Trails and Byways ... 4-414
4.17 Soil and Water Resources ... 4-431
4.17.1 General Description ... 4-431
4.17.2 Methodology and Assumptions ... 4-431
4.17.3 Direct and Indirect Impacts on Soil and Water Resources ... 4-433
4.17.4 Summary of Impacts on Soil and Water Resources ... 4-445
4.18 Air Quality ... 4-446
4.18.1 General Description ... 4-446
4.18.2 Methodology and Assumptions ... 4-447
4.18.3 Direct and Indirect Impacts on Air Quality ... 4-453
4.19 Climate Change ... 4-469
4.20 Visual Resources ... 4-469
4.20.1 General Description ... 4-469
4.20.2 Methodology and Assumptions ... 4-471
4.20.3 Direct and Indirect Impacts on Visual Resources ... 4-473
4.20.4 Summary of Impacts on Visual Resources ... 4-491
4.21 Lands with Wilderness Characteristics ... 4-491
4.21.1 General Description ... 4-491
4.21.2 Methodology and Assumptions ... 4-493
4.21.3 Direct and Indirect Impacts on Lands with Wilderness Characteristics ... 4-495
4.21.4 Summary of Impacts on Lands with Wilderness Characteristics ... 4-504
4.22 Soundscapes ... 4-504
4.22.1 General Description ... 4-504
4.22.2 Methodology and Assumptions ... 4-505
4.22.3 Impacts Common to all Management Actions on Soundscapes ... 4-505
4.22.4 Summary of Impacts on Soundscapes ... 4-506
4.23 Cultural Resources ... 4-506
4.23.1 General Description ... 4-506
4.23.2 Methodology and Assumptions ... 4-507
4.23.3 Direct and Indirect Impacts on Cultural Resources ... 4-510

4.23.4 Summary of Impacts on Cultural Resources 4-551
4.24 Paleontological Resources 4-553
4.24.1 General Description 4-553
4.24.2 Methodology and Assumptions 4-554
4.24.3 Direct and Indirect Impacts on Paleontological Resources 4-557
4.24.4 Summary of Impacts on Paleontological Resources 4-584
4.25 Social and Economic Impacts (Including Environmental Justice) 4-585
4.25.1 General Description 4-585
4.25.2 Methodology and Assumptions 4-585
4.25.3 Economic Impacts 4-589
4.25.4 Social Impacts 4-608
4.25.5 Environmental Justice Impacts 4-617
4.26 Irreversible and Irretrievable Commitment of Resources 4-620
4.27 Unavoidable Adverse Impacts 4-621
4.28 Relationship Between Local Short-Term Uses and Long-Term Productivity 4-623
4.29 References 4-625
4.29.1 Fish and Wildlife and Special Status Species 4-625
4.29.2 Vegetation (Forest, Rangelands, Riparian and Wetlands, and Noxious Weeds) 4-634
4.29.3 Wildland Fire Ecology and Management 4-635
4.29.4 Recreation 4-635
4.29.5 Range Management 4-635
4.29.6 Special Designations—Areas of Critical Environmental Concern/Zoological Areas 4-635
4.29.7 Special Designations—Wilderness Study Areas 4-635
4.29.8 Special Designations—Wild and Scenic Rivers 4-635
4.29.9 Special Designations—National Trails and Byways 4-636
4.29.10 Soil and Water Resources 4-636
4.29.11 Air Quality 4-637
4.29.12 Climate Change 4-637
4.29.13 Visual Resources 4-637
4.29.14 Cultural Resources 4-637
4.29.15 Social and Economic Impacts 4-637

TABLES

Page

4.1 Acres of Federal Mineral Estate in Mule Deer Habitat 4-26
4.2 Comparison of Alleviated Threats to GRSG in Northwest Colorado by Alternative 4-110
4.3 Known Threatened, Endangered, and Sensitive Plant Species Occurrences within GRSG PHMA, GHMA, and LCHMA, and within a 984-Foot Buffer of these GRSG Habitats 4-135
4.4 Habitats for Special Status Plant Species within the Planning Area, Grouped by Habitat Guilds 4-137
4.5 BLM Special Recreation Permits Authorized in PHMA, GHMA, and LCHMA in the Decision Area 4-321
4.6 Livestock Grazing Management—Alternative C 4-343
4.7 Acreage by Wild Horse Management Unit and Alternative Affected by GRSG Management 4-357

4.8 Documents Incorporated by Reference for Environmental Consequences—Air Resources ... 4-447
4.9 Baseline Pollutant Emissions ... 4-452
4.10 Alternative A GRSG RFD ... 4-455
4.11 Alternative B Field Office Colorado Management Zone Analysis of PHMA ... 4-457
4.12 Alternative B GRSG RFD Analysis ... 4-457
4.13 Alternative C Field Office Colorado Management Zone Analysis of All Designated Habitat ... 4-462
4.14 Alternative C GRSG RFD Analysis ... 4-462
4.15 Alternative D Field Office Management Zone Analysis of PHMA NSO ... 4-467
4.16 Alternative D GRSG RFD Analysis ... 4-467
4.17 The Proposed LUPA Field Office Management Zone Analysis of PHMA NSO with Lek Buffer ... 4-468
4.18 The Proposed LUPA GRSG RFD Analysis ... 4-468
4.19 One Year Impact of Management Actions Affecting Grazing on Output, Employment, and Earnings, Alternative C Relative to Alternative A ... 4-590
4.20 One Year Impact of Management Actions Affecting Grazing on Output, Employment, and Earnings by Alternative Relative to Alternative A, Midpoint Between Billed and Active AUMs ... 4-590
4.21 Average Annual Impact of Management Actions Affecting Recreation on Output, Employment, and Earnings by Alternative, Relative to Alternative A ... 4-595
4.22 Average Annual Impact of Management Actions Affecting Oil and Gas on Output, Employment, and Earnings by Alternative, Relative to Alternative A ... 4-599
4.23 Average Annual Federal Royalty and State Severance Taxes on Oil and Gas by Alternative, Relative to Alternative A, 2011$ thousands ... 4-606
4.24 Average Annual Impact on Employment and Earnings by Alternative, Relative to Alternative A, Primary Study Area ... 4-613
4.25 Average Annual Impact on Employment and Earnings by Alternative, Relative to Alternative A, Percent of 2010 Baseline ... 4-614
4.26 Social Impacts ... 4-615
4.27 Environmental Justice Impacts ... 4-620

VOLUME III

5. CUMULATIVE EFFECTS 5-1

5.1 Introduction 5-1
5.2 Cumulative Analysis Methodology 5-1
5.2.1 Past, Present, and Reasonably Foreseeable Future Actions 5-3
5.3 Fish and Wildlife 5-12
5.4 Special Status Species – Greater Sage-Grouse 5-12
5.4.1 Methods 5-14
5.4.2 Assumptions 5-17
5.4.3 Existing Conditions in WAFWA MZ II/VII and the Northwest Colorado Sub-region Planning Area 5-18
5.4.4 Regional Efforts to Manage Threats to GRSG 5-20
5.4.5 Relevant Cumulative Actions 5-28
5.4.6 Threats to GRSG in Management Zone II/VII 5-29
5.4.7 Conclusions 5-65
5.4.8 Reasonably Foreseeable Future Actions in MZ II/VII Likely to Impact GRSG Habitat 5-70
5.5 Special Status Species (Other Species of Issue) 5-78
5.6 Lands and Realty 5-79
5.7 Vegetation (Forest, Rangelands, Riparian and Wetlands, and Noxious Weeds) 5-80
5.8 Wildland Fire Ecology and Management 5-80
5.9 Minerals – Leasable, Locatable, Salable, and Nonenergy Leasable 5-82
5.10 Recreation and Travel Management 5-83
5.11 Range Management 5-85
5.12 Wild Horse Management 5-86
5.13 Special Designations 5-86
5.14 Soil and Water Resources 5-87
5.15 Air Quality 5-89
5.16 Climate Change 5-91
5.17 Visual Resources 5-92
5.18 Lands with Wilderness Characteristics 5-93
5.19 Soundscapes 5-94
5.20 Cultural Resources 5-95
5.21 Paleontological Resources 5-96
5.22 Social and Economic Conditions (Including Environmental Justice) 5-97
5.23 References 5-103
5.23.1 Special Status Species – Greater Sage-Grouse 5-103
5.23.2 All Other Sections 5-109

6. CONSULTATION AND COORDINATION 6-1

6.1 Introduction 6-1
6.2 Consultation and Coordination 6-1
6.2.1 Native American Tribal Consultation 6-2
6.2.2 Colorado State Historic Preservation Officer Consultation 6-2
6.2.3 US Fish and Wildlife Service Consultation 6-2
6.3 Cooperating Agencies 6-3
6.4 Coordination and Consistency 6-5
6.5 Public Involvement 6-6
6.5.1 Scoping Process 6-7

6.5.2 Project Website 6-8
6.5.3 Mailing List 6-8
6.5.4 Public Comment on the Draft Land Use Plan Amendment/ Environmental Impact Statement 6-8
6.5.5 Future Public Involvement 6-16
6.6 List of Preparers 6-17

7. REFERENCES 7-1

GLOSSARY GLOSSARY-1

INDEX INDEX-1

TABLES

Page

5.1 Past, Present, and Reasonably Foreseeable Projects, Plans, or Actions that Comprise the Cumulative Impact Scenario 5-4
5.2 Estimated Number of Wells and Pads in ADH 5-10
5.3 Management Jurisdiction in MZ II/VII by Acres of Priority and General Habitats 5-19
5.4 Acres Open and Closed to Fluid Mineral Leasing in GRSG Habitat in MZ II/VII 5-32
5.5 Acres with NSO and CSU/TL Stipulations in GRSG Habitat in MZ 11/VII 5-33
5.6 Acres Open and Closed to Mineral Material Disposal in GRSG Habitat in MZ II/VII 5-38
5.7 Acres Open and Recommended for Withdrawal from Mineral Entry in GRSG Habitat in MZ II/VII 5-40
5.8 Acres Open and Closed to Nonenergy Leasable Mineral Leasing in GRSG Habitat in MZ II/VII 5-41
5.9 Acres of Rights-of-Way/Special Use Authorization Management in GRSG Habitat in MZ II/VII 5-44
5.10 Acres of Wind Energy Management Areas in GRSG Habitat in MZ II/VII 5-47
5.11 Acres Available and Unavailable to Livestock Grazing in GRSG Habitat in MZ II/VII 5-52
5.12 Acres Identified for Retention and Disposal in GRSG Habitat in MZ II/VII 5-57
5.13 Acres of Travel Management Designations in GRSG Habitat in MZ II/VII 5-62
5.14 Reasonably Foreseeable Future Projects Occurring Within MZ II/VII 5-72
5.15 Projected Employment by Alternative for Eight-County Primary Socioeconomic Study Area 5-99
5.16 Projected Labor Income ($ millions) by Alternative for State of Colorado 5-100
6.1 Cooperating Agencies 6-3
6.2 Scoping Open House Information 6-7
6.3 Public Comment Open House Information 6-8
6.4 Number of Unique Submissions and Comments by Affiliation 6-12
6.5 Number of Comments on the Draft LUPA/EIS by Category 6-14
6.6 Overview of Comments by Category 6-15
6.7 Preparers 6-17

APPENDICES

A Figures
B Buffer Distances and Evaluation of Impacts on Leks
D Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations
E Methodology for Calculating Disturbance Caps
F Greater Sage-Grouse Monitoring Framework
G Greater Sage-Grouse Mitigation Strategy
H Guidelines for Implementation
I Required Design Features, Preferred Design Features, and Suggested Design Features
O Greater Sage-Grouse Wildfire and Invasive Species Habitat Assessment

VOLUME IV

APPENDICES

C Colorado Department of Natural Resources' Colorado Greater Sage-Grouse Conservation Plan: The Colorado Package
J Areas of Critical Environmental Concern Relevance and Importance Rationale
K BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado
L Biological Assessment Summary
M US Forest Service Biological Evaluation and Management Indicator Species Report
N Socioeconomics Data and Methodology
P Response to Comments on the Draft Land Use Plan Amendment/Environmental Impact Statement

ACRONYMS AND ABBREVIATIONS

	Full Phrase
ACEC	area of critical environmental concern
ADH	all designated habitat (includes PHMA, GHMA, and LCHMA)
AUM	animal unit month
BER	Baseline Environmental Report
BLM	United States Department of the Interior, Bureau of Land Management
BMP	best management practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
COA	condition of approval
CPW	Colorado Department of Natural Resources, Parks and Wildlife
CRVFO	Colorado River Valley Field Office
CSU	controlled surface use
decision area	public lands and mineral estate managed by the United States Department of the Interior, Bureau of Land Management, and public lands managed by the United States Department of Agriculture, Forest Service, Routt National Forest, that are within the planning area and are encompassed by all designated habitat (ADH)
EIS	environmental impact statement
ERMA	extensive recreation management area
ESA	Endangered Species Act
ESR	emergency stabilization and rehabilitation
federal mineral estate	subsurface mineral estate administered by the United States Department of the Interior, Bureau of Land Management
FLPMA	Federal Land Policy and Management Act of 1976
Forest Plan	United States Department of Agriculture, Forest Service, Land and Resource Management Plan
Forest Service	United States Department of Agriculture, Forest Service
FRCC	fire regime condition class
GH	general habitat
GHMA	general habitat management area
GIS	geographical information system
GJFO	Grand Junction Field Office
GRSG	Greater Sage-Grouse
HMA	herd management area
KFO	Kremmling Field Office
LCHMA	linkage/connectivity habitat management area
LSFO	Little Snake Field Office
LUP	land use plan

MIS	management indicator species
MOU	memorandum of understanding
MZ	management zone
NEPA	National Environmental Policy Act of 1969
NFMA	National Forest Management Act of 1976
NRHP	National Register of Historic Places
NSO	no surface occupancy
NTT	Sage-Grouse National Technical Team
OHV	off-highway vehicle
PDF	preferred design feature
PH	priority habitat
PHMA	priority habitat management area
planning area	Northwest Colorado District boundary, including all lands, regardless of land ownership
PM_{10}	particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
PPH	preliminary priority habitat
project area	the United States Department of the Interior, Bureau of Land Management Northwest Colorado District boundary, including all lands, regardless of ownership
RDF	required design feature
RFDS	reasonable foreseeable development scenario
RMP	resource management plan
RMPA	resource management plan amendment
ROD	record of decision
ROW	right-of-way
SDF	suggested design feature
SGI	Natural Resources Conservation Service's Sage-Grouse Initiative
SO_2	sulfur dioxide
SRMA	Special Recreation Management Area
SRP	special recreation permit
SUA	special use permit
TL	timing limitation
US	United States
USC	United States Code
US EPA	United States Environmental Protection Agency
USFWS	United States Department of the Interior, Fish and Wildlife Service
VRM	visual resource management
WAFWA	Western Association of Fish and Wildlife Agencies
WRFO	White River Field Office
WSA	Wilderness Study Area

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Chapter 4
Environmental Consequences

TABLE OF CONTENTS

Chapter Page

4. ENVIRONMENTAL CONSEQUENCES 4-1

4.1 Introduction 4-1
4.2 Analytical Assumptions 4-2
4.2.1 General Method for Analyzing Impacts 4-4
4.2.2 Incomplete or Unavailable Information 4-5
4.3 Fish and Wildlife 4-6
4.3.1 General Description 4-6
4.3.2 Terrestrial Wildlife 4-6
Methodology and Assumptions 4-6
Direct and Indirect Impacts on Terrestrial Wildlife 4-9
Summary of Impacts on Terrestrial Wildlife 4-48
4.4 Aquatic Wildlife, Including Special Status Fish and Aquatic Species 4-49
4.4.1 Methodology and Assumptions 4-49
General Impacts on Aquatic Wildlife 4-49
Assumptions 4-50
4.4.2 Direct and Indirect Impacts on Aquatic Wildlife 4-55
Impacts from Travel Management on Aquatic Wildlife 4-55
Impacts from Recreation Management on Aquatic Wildlife 4-55
Impacts from Lands and Realty Management on Aquatic Wildlife 4-56
Impacts from Wind Energy Development on Aquatic Wildlife 4-57
Impacts from Industrial Solar Energy Development on Aquatic Wildlife 4-58
Impacts from Range Management on Aquatic Wildlife 4-58
Impacts from Wild Horse Management on Aquatic Wildlife 4-62
Impacts from Fluid Minerals Management on Aquatic Wildlife 4-63
Impacts from Solid Minerals—Coal Management on Aquatic Wildlife 4-68
Impacts from Locatable Minerals Management on Aquatic Wildlife 4-68
Impacts from Nonenergy Leasable Minerals Management on Aquatic Wildlife 4-68
Impacts from Salable Mineral Management on Aquatic Wildlife 4-68
Impacts from Fuels Management on Aquatic Wildlife 4-68
Impacts from Habitat Restoration on Aquatic Wildlife 4-71
Impacts from ACEC and Zoological Area Management on Aquatic Wildlife 4-73
4.4.3 Summary of Impacts on Aquatic Wildlife 4-74
4.5 Special Status Species 4-75
4.5.1 General Description 4-75
4.5.2 Greater Sage-Grouse 4-76
Methodology and Assumptions 4-76
Direct and Indirect Impacts on Greater Sage-Grouse 4-77
Summary of Impacts on GRSG in PHMA, GHMA, and LCHMA 4-109
4.5.3 Other Special Status Species of Issue 4-109
Special Status Terrestrial Wildlife 4-109
Special Status Plant Species 4-131
4.6 Lands and Realty 4-179
4.6.1 General Description 4-179
4.6.2 Methodology and Assumptions 4-179

General Impacts on Lands and Realty 4-179
Assumptions 4-180
4.6.3 Direct and Indirect Impacts on Lands and Realty 4-181
Impacts from Travel Management on Lands and Realty 4-181
Impacts from Lands and Realty Management on Lands and Realty 4-182
Impacts from Fluid Minerals Management on Lands and Realty 4-185
Impacts from Solid Minerals (Coal, Locatable, Nonenergy, and Salable Minerals) Management on Lands and Realty 4-187
4.6.4 Summary of Impacts on Lands and Realty 4-188
4.7 Vegetation (Forest, Rangelands, Riparian and Wetlands, and Noxious Weeds) 4-188
4.7.1 General Description 4-188
4.7.2 Methodology and Assumptions 4-189
General Impacts on Vegetation 4-189
Assumptions 4-189
4.7.3 Direct and Indirect Impacts on Vegetation 4-190
Impacts from Travel Management on Vegetation 4-190
Impacts from Recreation Management on Vegetation 4-192
Impacts from Lands and Realty Management on Vegetation 4-193
Impacts from Wind Energy and Industrial Solar Development on Vegetation 4-196
Impacts from Range Management on Vegetation 4-197
Impacts of Wild Horse Management on Vegetation 4-199
Impacts from Fluid Minerals Management on Vegetation 4-200
Impacts from Solid Minerals–Coal Management on Vegetation 4-203
Impacts from Locatable Minerals, Nonenergy Leasable Minerals, and Salable Minerals Management on Vegetation 4-204
Impacts from Fuels Management on Vegetation 4-204
Impacts from Fire Operations on Vegetation 4-205
Impacts from Emergency Stabilization and Rehabilitation on Vegetation 4-207
Impacts on Vegetation from Habitat Restoration 4-208
4.7.4 Summary of Impacts on Vegetation 4-210
4.8 Wildland Fire Ecology and Management 4-211
4.8.1 General Description 4-211
4.8.2 Methodology and Assumptions 4-211
General Impacts on Wildland Fire Ecology and Management 4-211
Assumptions 4-213
4.8.3 Direct and Indirect Impacts on Wildland Fire Ecology and Management 4-214
Impacts from Travel Management on Wildland Fire Ecology and Management 4-214
Impacts from Recreation Management on Wildland Fire Ecology and Management 4-216
Impacts from Lands and Realty Management on Wildland Fire Ecology and Management 4-217
Impacts from Wind and Solar Energy Development on Wildland Fire Ecology and Management 4-219
Impacts from Solar Energy Development on Wildland Fire Ecology and Management 4-220
Impacts from Range Management on Wildland Fire Ecology and Management 4-220

Impacts from Fluid Minerals Management on Wildland Fire Ecology and Management ... 4-222
Impacts from Locatable Minerals, Nonenergy Leasable Minerals, and Salable Minerals Management on Wildland Fire Ecology and Management ... 4-224
Impacts from Fuels Management on Wildland Fire Ecology and Management ... 4-224
Impacts from Fire Operations on Wildland Fire Ecology and Management ... 4-226
Impacts from Emergency Stabilization and Rehabilitation on Wildland Fire Ecology and Management ... 4-228
Impacts from Habitat Restoration on Wildland Fire Ecology and Management ... 4-229
4.8.4 Summary of Impacts on Wildland Fire Ecology and Management ... 4-231
4.9 Minerals (Leasable) ... 4-231
4.9.1 Fluid Leasable Minerals ... 4-231
General Description ... 4-231
Methodology and Assumptions ... 4-232
Direct and Indirect Impacts on Fluid Minerals ... 4-234
Summary of Impacts on Fluid Leasable Minerals ... 4-263
4.9.2 Coal ... 4-266
General Description ... 4-266
Methodology and Assumptions ... 4-267
Direct and Indirect Impacts on Coal ... 4-269
Summary of Impacts on Coal ... 4-287
4.10 Minerals (Locatable) ... 4-290
4.10.1 General Description ... 4-290
4.10.2 Methodology and Assumptions ... 4-290
General Impacts on Locatable Minerals ... 4-290
Assumptions ... 4-291
4.10.3 Direct and Indirect Impacts on Locatable Minerals ... 4-292
Impacts from Travel Management on Locatable Minerals ... 4-292
Impacts from Lands and Realty Management on Locatable Minerals ... 4-294
4.10.4 Summary of Impacts on Locatable Minerals ... 4-298
4.11 Minerals (Salable) ... 4-299
4.11.1 General Description ... 4-299
4.11.2 Methodology and Assumptions ... 4-299
General Impacts on Salable Minerals ... 4-299
Assumptions ... 4-300
4.11.3 Direct and Indirect Impacts on Salable Minerals ... 4-301
Impacts from Travel Management on Salable Minerals ... 4-301
Impacts from Lands and Realty Management on Salable Minerals ... 4-302
Impacts from Fluid Minerals, Solid Minerals (Coal), Locatable Minerals, and Nonenergy Leasable Minerals Management on Salable Minerals ... 4-305
Impacts from Salable Minerals Management on Salable Minerals ... 4-306
Impacts from ACEC and Zoological Area Management on Salable Minerals ... 4-308
4.11.4 Summary of Impacts on Salable Minerals ... 4-308
4.12 Travel Management ... 4-309
4.12.1 General Description ... 4-309
4.12.2 Methodology and Assumptions ... 4-309

General Impacts on Travel Management 4-310
Assumptions 4-310
4.12.3 Direct and Indirect Impacts on Travel Management 4-311
Impacts from Travel Management on Travel Management 4-311
Impacts from Lands and Realty Management on Travel Management 4-312
Impacts from Wind Energy and Industrial Solar Development on Travel Management 4-313
Impacts from Fluid Minerals Management on Travel Management 4-314
Impacts from Solid Minerals, Locatable Minerals, Nonenergy Leasable Minerals, and Salable Minerals Management on Travel Management 4-315
4.12.4 Summary of Impacts on Travel Management 4-315
4.13 Recreation 4-315
4.13.1 General Description 4-315
4.13.2 Methodology and Assumptions 4-316
General Impacts on Recreation 4-316
Assumptions 4-317
4.13.3 Direct and Indirect Impacts on Recreation 4-318
Impacts from Travel Management on Recreation 4-318
Impacts from Recreation Management on Recreation 4-320
Impacts from Lands and Realty Management on Recreation 4-322
Impacts from Wind Energy and Solar Energy Development on Recreation 4-324
Impacts from Range Management on Recreation 4-326
Impacts from Wild Horse Management on Recreation 4-328
Impacts from Minerals (Fluid, Solid Coal, Locatable, Nonenergy Leasable, and Salable Minerals) Management on Recreation 4-329
Impacts from Wildfire Suppression, Fuels Management, and Fire Rehabilitation on Recreation 4-331
Impacts from Habitat Restoration on Recreation 4-332
Impacts from ACEC and Zoological Area Management on Recreation 4-333
4.13.4 Summary of Impacts on Recreation 4-334
4.14 Range Management 4-335
4.14.1 General Description 4-335
4.14.2 Methodology and Assumptions 4-335
Assumptions 4-336
4.14.3 Direct and Indirect Impacts on Range Management 4-338
Impacts from Travel Management on Range Management 4-338
Impacts from Lands and Realty Management, Wind Energy Development, and Industrial Solar Development on Range Management 4-339
Impacts from Range Management on Range Management 4-341
Impacts from Wild Horse Management on Range Management 4-346
Impacts from Fluid Minerals Management on Range Management 4-346
Impacts from Solid Minerals–Coal Management on Range Management 4-349
Impacts from Locatable Minerals Management on Range Management 4-349
Impacts from Nonenergy Leasable Minerals Management on Range Management 4-350
Impacts from Salable Minerals Management on Range Management 4-350
Impacts from Fuels Management on Range Management 4-350
Impacts from Fire Operations Management on Range Management 4-352

Impacts from Emergency Stabilization and Rehabilitation on Range Management ... 4-352
Impacts from Habitat Restoration on Range Management ... 4-353
4.14.4 Summary of Impacts on Range Management ... 4-353
4.15 Wild Horse Management ... 4-354
4.15.1 General Description ... 4-354
4.15.2 Methodology and Assumptions ... 4-354
General Impacts on Wild Horse Management ... 4-354
Assumptions ... 4-355
4.15.3 Direct and Indirect Impacts on Wild Horse Management ... 4-356
Impacts from Travel Management on Wild Horse Management ... 4-356
Impacts from Recreation Management on Wild Horse Management ... 4-359
Impacts from Lands and Realty Management on Wild Horse Management ... 4-361
Impacts from Wind Energy Development on Wild Horse Management ... 4-363
Impacts from Industrial Solar Development on Wild Horse Management ... 4-365
Impacts from Range Management on Wild Horse Management ... 4-365
Impacts from Fluid Minerals Management on Wild Horse Management ... 4-367
Impacts from Solid Minerals–Coal Management on Wild Horse Management ... 4-368
Impacts from Locatable Minerals Management on Wild Horse Management ... 4-370
Impacts from Nonenergy Leasable Materials Management on Wild Horse Management ... 4-370
Impacts from Salable Minerals Management on Wild Horse Management ... 4-370
Impacts from Fuels Management on Wild Horse Management ... 4-370
Impacts from Fire Operations on Wild Horse Management ... 4-372
Impacts from Emergency Stabilization and Response on Wild Horse Management ... 4-373
Impacts from Habitat Restoration on Wild Horse Management ... 4-374
4.15.4 Summary of Impacts on Wild Horse Management ... 4-374
4.16 Special Designations ... 4-375
4.16.1 Areas of Critical Environmental Concern ... 4-375
General Description ... 4-375
Methodology and Assumptions ... 4-376
Direct and Indirect Impacts on ACECs and Zoological Areas ... 4-377
Summary of Impacts on ACECs and Zoological Areas ... 4-391
4.16.2 Wilderness Study Areas ... 4-393
General Description ... 4-393
Methodology and Assumptions ... 4-394
Direct and Indirect Impacts on WSAs ... 4-396
Summary of Impacts on WSAs ... 4-404
4.16.3 Wild and Scenic Rivers ... 4-405
General Description ... 4-405
Methodology and Assumptions ... 4-405
Direct and Indirect Impacts on Wild and Scenic Rivers ... 4-406
Summary of Impacts on Wild and Scenic Rivers ... 4-413
4.16.4 National Trails and Byways ... 4-414

General Description 4-414
Methodology and Assumptions 4-416
Direct and Indirect Impacts on National Trails and Byways 4-417
Summary of Impacts on National Trails and Byways 4-430
4.17 Soil and Water Resources 4-431
4.17.1 General Description 4-431
4.17.2 Methodology and Assumptions 4-431
General Impacts on Soils and Water Resources 4-431
Assumptions 4-432
4.17.3 Direct and Indirect Impacts on Soil and Water Resources 4-433
General Impacts from Surface Disturbance on Soil and Water Resources 4-433
Impacts from Travel Management on Soil and Water Resources 4-434
Impacts from Recreation Management on Soil and Water Resources 4-434
Impacts from Lands and Realty Management on Soil and Water Resources 4-435
Impacts from Range Management on Soil and Water Resources 4-437
Impacts from Wild Horse Management on Soil and Water Resources 4-439
Impacts from Fluid Minerals Management on Soil and Water Resources 4-439
Impacts from Solid, Locatable, and Salable Minerals Management on Soil and Water Resources 4-443
Impacts from Mineral Split-Estate Management on Soil and Water Resources 4-444
Impacts from Wildfire Suppression on Soil and Water Resources 4-445
4.17.4 Summary of Impacts on Soil and Water Resources 4-445
4.18 Air Quality 4-446
4.18.1 General Description 4-446
4.18.2 Methodology and Assumptions 4-447
Methods of Analysis/Assumptions 4-449
Colorado Management Zone Analysis 4-451
4.18.3 Direct and Indirect Impacts on Air Quality 4-453
Impacts Common to All Alternatives 4-453
Alternative A 4-454
Alternative B 4-456
Alternative C 4-461
Alternative D 4-466
Proposed LUPA 4-466
Summary of Impacts on Air Quality 4-468
4.19 Climate Change 4-469
4.20 Visual Resources 4-469
4.20.1 General Description 4-469
4.20.2 Methodology and Assumptions 4-471
General Impacts on Visual Resources 4-471
Assumptions 4-472
4.20.3 Direct and Indirect Impacts on Visual Resources 4-473
Impacts from Travel Management on Visual Resources 4-473
Impacts from Lands and Realty Management on Visual Resources 4-477
Impacts from Wind Energy and Industrial Solar Development on Visual Resources 4-480
Impacts from Range Management on Visual Resources 4-481

Impacts from Wild Horse Management on Visual Resources 4-482
Impacts from Fluid Minerals Management on Visual Resources..... 4-483
Impacts from Solid Minerals–Coal and Locatable Minerals Management on Visual Resources 4-485
Impacts from Nonenergy Leasable Minerals Management on Visual Resources 4-486
Impacts from Salable Mineral Management on Visual Resources..... 4-486
Impacts from Fuels Management and Fire Operations on Visual Resources 4-487
Impacts from Emergency Stabilization and Rehabilitation on Visual Resources 4-488
Impacts from Habitat Restoration on Visual Resources 4-489
Impacts from ACEC/Zoological Area Management on Visual Resources .. 4-490
4.20.4 Summary of Impacts on Visual Resources 4-491
4.21 Lands with Wilderness Characteristics 4-491
4.21.1 General Description..... 4-491
4.21.2 Methodology and Assumptions 4-493
General Impacts on Lands with Wilderness Characteristics 4-493
Assumptions..... 4-494
4.21.3 Direct and Indirect Impacts on Lands with Wilderness Characteristics..... 4-495
Impacts from Travel Management on Lands with Wilderness Characteristics Not in Protected Status 4-495
Impacts from Lands and Realty Management on Lands with Wilderness Characteristics..... 4-495
Impacts from Range Management on Lands with Wilderness Characteristics..... 4-497
Impacts from Fluid Minerals Management on Lands with Wilderness Characteristics..... 4-499
Impacts from Solid Minerals, Locatable Minerals, Nonenergy Leasable Minerals, and Salable Minerals Management on Lands with Wilderness Characteristics..... 4-501
Impacts from Wildfire Suppression and Fire Rehabilitation on Lands with Wilderness Characteristics 4-502
Impacts from Habitat Restoration on Lands with Wilderness Characteristics..... 4-502
Impacts from ACEC/Zoological Area Management on Lands with Wilderness Characteristics 4-503
4.21.4 Summary of Impacts on Lands with Wilderness Characteristics..... 4-504
4.22 Soundscapes 4-504
4.22.1 General Description..... 4-504
4.22.2 Methodology and Assumptions 4-505
General Impacts on Soundscapes 4-505
Assumptions..... 4-505
4.22.3 Impacts Common to all Management Actions on Soundscapes..... 4-505
Activities That Produce Sound 4-505
4.22.4 Summary of Impacts on Soundscapes 4-506
4.23 Cultural Resources 4-506
4.23.1 General Description..... 4-506
4.23.2 Methodology and Assumptions 4-507
General Impacts on Cultural Resources 4-507

Assumptions 4-508
4.23.3 Direct and Indirect Impacts on Cultural Resources 4-510
Impacts from Travel Management on Cultural Resources 4-510
Impacts from Recreation Management on Cultural Resources 4-516
Impacts from Lands and Realty Management on Cultural Resources 4-520
Impacts from Wind and Solar Energy Development on Cultural Resources 4-530
Impacts from Range Management on Cultural Resources 4-530
Impacts from Wild Horse Management on Cultural Resources 4-535
Impacts from Fluid Minerals Management 4-537
Impacts from Solid Minerals, Locatable Minerals, Nonenergy Leasable Minerals, and Salable Minerals Management on Cultural Resources 4-541
Impacts from Fuels Management, Wildland Fire Management, and Emergency Stabilization and Response on Cultural Resources 4-541
Impacts from Habitat Restoration on Cultural Resources 4-544
Impacts from ACEC/Zoological Area Management on Cultural Resources 4-549
4.23.4 Summary of Impacts on Cultural Resources 4-551
Alternative A 4-551
Alternative B 4-551
Alternative C 4-552
Alternative D 4-553
Proposed LUPA 4-553
4.24 Paleontological Resources 4-553
4.24.1 General Description 4-553
4.24.2 Methodology and Assumptions 4-554
General Impacts on Paleontological Resources 4-554
Assumptions 4-555
4.24.3 Direct and Indirect Impacts on Paleontological Resources 4-557
Impacts from Travel Management on Paleontological Resources 4-557
Impacts from Recreation Management on Paleontological Resources 4-559
Impacts from Lands and Realty Management on Paleontological Resources 4-561
Impacts from Wind Energy Development on Paleontological Resources 4-563
Impacts from Industrial Solar Development on Paleontological Resources 4-565
Impacts from Range Management on Paleontological Resources 4-567
Impacts from Wild Horse Management on Paleontological Resources 4-569
Impacts from Fluid Minerals Management on Paleontological Resources 4-569
Impacts from Solid Minerals–Coal Management on Paleontological Resources 4-571
Impacts from Locatable Minerals Management on Paleontological Resources 4-573
Impacts from Nonenergy Leasable Minerals Management on Paleontological Resources 4-574
Impacts from Salable Minerals Management on Paleontological Resources 4-576
Impacts from Fuels Management, Wildland Fire Management, and Emergency Stabilization and Response on Paleontological Resources 4-577
Impacts from Habitat Restoration on Paleontological Resources 4-580

Impacts from ACEC/Zoological Area Management on Paleontological Resources ... 4-582
4.24.4 Summary of Impacts on Paleontological Resources ... 4-584
Alternative A ... 4-584
Alternative B ... 4-584
Alternative C ... 4-584
Alternative D ... 4-585
Proposed LUPA ... 4-585
4.25 Social and Economic Impacts (Including Environmental Justice) ... 4-585
4.25.1 General Description ... 4-585
4.25.2 Methodology and Assumptions ... 4-585
Assumptions ... 4-587
4.25.3 Economic Impacts ... 4-589
Impacts from Management Actions Affecting Grazing Allotments ... 4-589
Impacts from Management Actions Affecting Recreation ... 4-594
Impacts from Management of Oil and Gas Leases ... 4-598
Impacts from Management of Other Minerals ... 4-601
Impacts from Management Actions Affecting Land and Realty and Travel Management ... 4-603
Impacts from Management Actions Affecting Special Status Species ... 4-604
Impacts on Tax Revenues and Payments to States and Counties ... 4-606
4.25.4 Social Impacts ... 4-608
Impacts from Management Actions Affecting Migration ... 4-608
Impacts from Management Actions Affecting Specific Groups and Communities ... 4-610
4.25.5 Environmental Justice Impacts ... 4-617
Potential Impacts on Minority Populations ... 4-617
Potential Impacts on Low-Income Populations ... 4-619
4.26 Irreversible and Irretrievable Commitment of Resources ... 4-620
4.27 Unavoidable Adverse Impacts ... 4-621
4.28 Relationship Between Local Short-Term Uses and Long-Term Productivity ... 4-623
4.29 References ... 4-625
4.29.1 Fish and Wildlife and Special Status Species ... 4-625
4.29.2 Vegetation (Forest, Rangelands, Riparian and Wetlands, and Noxious Weeds) ... 4-639
4.29.3 Wildland Fire Ecology and Management ... 4-640
4.29.4 Recreation ... 4-640
4.29.5 Range Management ... 4-640
4.29.6 Special Designations—Areas of Critical Environmental Concern/ Zoological Areas ... 4-640
4.29.7 Special Designations—Wilderness Study Areas ... 4-640
4.29.8 Special Designations—Wild and Scenic Rivers ... 4-640
4.29.9 Special Designations—National Trails and Byways ... 4-641
4.29.10 Soil and Water Resources ... 4-641
4.29.11 Air Quality ... 4-642
4.29.12 Climate Change ... 4-642
4.29.13 Visual Resources ... 4-642
4.29.14 Cultural Resources ... 4-642
4.29.15 Social and Economic Impacts ... 4-642

TABLES

Page

4.1 Acres of Federal Mineral Estate in Mule Deer Habitat 4-26
4.2 Comparison of Alleviated Threats to GRSG in Northwest Colorado by Alternative 4-110
4.3 Known Threatened, Endangered, and Sensitive Plant Species Occurrences within GRSG PHMA, GHMA, and LCHMA, and within a 984-Foot Buffer of these GRSG Habitats 4-135
4.4 Habitats for Special Status Plant Species within the Planning Area, Grouped by Habitat Guilds 4-137
4.5 BLM Special Recreation Permits Authorized in PHMA, GHMA, and LCHMA in the Decision Area 4-321
4.6 Livestock Grazing Management—Alternative C 4-343
4.7 Acreage by Wild Horse Management Unit and Alternative Affected by GRSG Management 4-357
4.8 Documents Incorporated by Reference for Environmental Consequences—Air Resources 4-447
4.9 Baseline Pollutant Emissions 4-452
4.10 Alternative A GRSG RFD 4-454
4.11 Alternative B Field Office Colorado Management Zone Analysis of PHMA 4-457
4.12 Alternative B GRSG RFD Analysis 4-457
4.13 Alternative C Field Office Colorado Management Zone Analysis of All Designated Habitat 4-462
4.14 Alternative C GRSG RFD Analysis 4-462
4.15 Alternative D Field Office Management Zone Analysis of PHMA NSO 4-467
4.16 Alternative D GRSG RFD Analysis 4-467
4.17 The Proposed LUPA Field Office Management Zone Analysis of PHMA NSO with Lek Buffer 4-468
4.18 The Proposed LUPA GRSG RFD Analysis 4-468
4.19 One Year Impact of Management Actions Affecting Grazing on Output, Employment, and Earnings, Alternative C Relative to Alternative A 4-590
4.20 One Year Impact of Management Actions Affecting Grazing on Output, Employment, and Earnings by Alternative Relative to Alternative A, Midpoint Between Billed and Active AUMs 4-590
4.21 Average Annual Impact of Management Actions Affecting Recreation on Output, Employment, and Earnings by Alternative, Relative to Alternative A 4-595
4.22 Average Annual Impact of Management Actions Affecting Oil and Gas on Output, Employment, and Earnings by Alternative, Relative to Alternative A 4-598
4.23 Average Annual Federal Royalty and State Severance Taxes on Oil and Gas by Alternative, Relative to Alternative A, 2011$ thousands 4-606
4.24 Average Annual Impact on Employment and Earnings by Alternative, Relative to Alternative A, Primary Study Area 4-613
4.25 Average Annual Impact on Employment and Earnings by Alternative, Relative to Alternative A, Percent of 2010 Baseline 4-614
4.26 Social Impacts 4-615
4.27 Environmental Justice Impacts 4-620

CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter presents the direct and indirect impacts on the human and natural environment anticipated to occur from implementing the alternatives presented in **Chapter 2**, Alternatives. The purpose of this chapter is to describe to the decision-maker and the public how the environment could change if any of the alternatives in **Chapter 2** were to be implemented. It is meant to aid in the decision of which LUPA, if any, to adopt.

This chapter is organized by topic, similar to **Chapter 3**, Affected Environment. Each topic area includes the following:

- A method of analysis section that identifies indicators and assumptions
- An analysis of impacts for each of the four alternatives (in some sections, the analysis has been broken down by alternative; in other sections, if the impacts would be similar, the analyses have been combined)
- A summary comparison of the alternatives

Many management actions proposed in **Chapter 2** are planning-level decisions that do not result in direct on-the-ground changes. However, by planning for land use on surface estate and federal mineral estate administered by the BLM and Forest Service over the life of the plan, the analysis focuses on impacts that could eventually result in on-the-ground changes.

Some BLM and Forest Service management actions may affect only certain resources and alternatives. This impact analysis identifies impacts that may benefit, enhance, or improve a resource as a result of management actions, as well as those impacts that have the potential to impair a resource. If an activity

or action is not addressed in a given section, either no impacts are expected or the impact is negligible, based on professional judgment.

The BLM and Forest Service manage public lands for multiple uses, in accordance with the FLPMA and the NFMA. Land use decisions are made to protect the resources, while allowing for different uses of those resources, such as livestock grazing and oil and gas development. These decisions can result in trade-offs, which are disclosed in this chapter. The projected impacts on land use activities and the associated environmental impacts of land uses are characterized and evaluated for each of the alternatives.

Impact analysis is a cause-and-effect process. The detailed impact analyses and conclusions are based on the following:

- The BLM and Forest Service planning team's knowledge of resources and the project area
- Reviews of existing literature
- Information provided by experts in the BLM and Forest Service, other agencies, cooperating agencies, interest groups, and concerned citizens

The baseline used for the impact analysis is the current condition or situation, as described in **Chapter 3**. Impacts on resources and resource uses are analyzed and discussed in detail, commensurate with resource issues and concerns identified through the process. At times, impacts are described using ranges of potential impacts or in qualitative terms.

4.2 ANALYTICAL ASSUMPTIONS

Several overarching assumptions have been made in order to facilitate the analysis of the project impacts. These assumptions set guidelines and provide reasonably foreseeable projected levels of development that would occur in the planning area during the planning period. These assumptions should not be interpreted as constraining or redefining the management objectives and actions proposed for each alternative, as described in **Chapter 2**.

The following general assumptions apply to all resource categories. Any specific resource assumptions are provided in the methods of analysis section for that resource.

- Sufficient funding and personnel would be available for implementing the final decision.
- Implementing actions from any of the LUPA alternatives would be in compliance with all valid existing rights, federal regulations, BLM policies, and other requirements.

- Implementation-level actions necessary to execute the LUP-level decisions in this LUPA would be subject to further environmental review, including that under NEPA.
- Direct and indirect impacts of implementing the LUPA would primarily occur on the public lands administered by the BLM and the Forest Service in the planning area.
- Local climate patterns of historic record and related conditions for plant growth may change with warmer, drier conditions likely to occur over the life of this plan.
- In the future, as tools for predicting climate changes in a management area improve and changes in climate affect resources and necessitate changes in how resources are managed, the BLM or Forest Service may be required to reevaluate decisions made as part of this planning process and to adjust management accordingly.
- The BLM and Forest Service would carry out appropriate maintenance for the functional capability of all developments.
- The discussion of impacts is based on best available data. Knowledge of the planning area and decision area and professional judgment, based on observation and analysis of conditions and responses in similar areas, are used for environmental impacts where data are limited.
- Restrictions (such as siting, design, and mitigation measures) would apply, where appropriate, to surface-disturbing activities associated with land use authorizations and permits issued on BLM-administered and National Forest System lands and federal mineral estate.
- When authorizing third-party actions that result in habitat loss and degradation, the BLM and Forest Service in their management actions would require mitigation that provides a net conservation gain to the species, which is consistent with valid rights and applicable law. This includes accounting for any uncertainty associated with the effectiveness of such mitigation. This would be achieved by avoiding, minimizing, and compensating for impacts by applying beneficial mitigation actions.

  In addition, to help implement this LUPA, a WAFWA Management Zone Regional Mitigation Strategy (see **Appendix G**) would be developed within 1 year of the issuance of the ROD. The strategy would elaborate on the components identified in Chapter 2 (avoidance, minimization, compensation, "additionality" [the conservation benefits of compensatory mitigation are demonstrably new and additional and would not have resulted without the compensatory mitigation project; see Glossary], timeliness, and

durability). The BLM and Forest Service would consider the strategy for their management actions and third-party actions that result in habitat loss and degradation. Implementing a regional mitigation strategy would benefit GRSG, the public, and land users by reducing threats, increasing public transparency and confidence, and creating a predictable permit process for land use authorization applicants.

- Data from GIS have been used in developing acreage calculations and to generate the figures in **Appendix A**, Figures. Calculations depend on the quality and availability of data. Acreage figures and other numbers are approximate projections for comparison and analysis only; readers should not infer that they reflect exact measurements or precise calculations. In the absence of quantitative data, best professional judgment was used. Impacts were sometimes described using ranges of potential impacts or qualitatively, when appropriate.

4.2.1 General Method for Analyzing Impacts

Potential impacts are described in terms of type, context, duration and intensity, which are generally defined below. RDFs have been incorporated into the Forest Service's Proposed LUPA as planning-level guidelines, which would be implemented during site-specific project analysis.

Type of impact—Impacts are characterized using the indicators described at the beginning of each resource impact section. The presentation of impacts for key planning issues is intended to provide the BLM and Forest Service decision-maker and reader with an understanding of the multiple use trade-offs associated with each alternative.

Context—This describes the area or location (site-specific, local, planning area-wide, or regional) in which the impact would occur. Site-specific impacts would occur at the location of the action; local impacts would occur within the general vicinity of the action area; planning area-wide impacts would affect a greater portion of decision area lands in northwest Colorado; and regional impacts would extend beyond the planning area boundaries.

Duration—This describes the duration of an effect, either short term or long term. Unless otherwise noted, short-term is defined as anticipated to begin and end within the first 5 years after the action is implemented; long-term is defined as lasting beyond 5 years to the end of or beyond the life of this LUPA.

Intensity—Rather than categorize impacts by intensity (e.g., major, moderate, or minor), this analysis discusses impacts using quantitative data wherever possible.

Direct and indirect impacts—Direct impacts are caused by an action or implementation of an alternative and occur at the same time and place; indirect impacts result from implementing an action or alternative but usually occur later in time or are removed in distance and are reasonably certain to occur.

For ease of reading, the impacts of the management actions for a particular alternative on a specific resource are generally compared to the status quo or baseline for that resource. However, in order to properly and meaningfully evaluate the impacts under each alternative, the impacts expected under that alternative should be measured against the impacts projected to occur under Alternative A. This alternative is the baseline for comparing the alternatives to one another, as it represents what is anticipated to occur should the LUPAs not take place.

Irreversible and irretrievable commitment of resources is discussed in **Section 4.25**, Irreversible and Irretrievable Commitment of Resources. Irreversible commitments of resources result from actions in which resources are considered permanently changed; irretrievable commitments of resources result from actions in which resources are considered permanently lost.

4.2.2 Incomplete or Unavailable Information

The CEQ established implementing regulations for NEPA, requiring that a federal agency identify relevant information that may be incomplete or unavailable for evaluating reasonably foreseeable significant adverse impacts in an EIS (40 CFR, Part 1502.22). If the information is essential to a reasoned choice among alternatives, it must be included or addressed in an EIS, unless the cost of obtaining such information is exorbitant. Knowledge and information is, and would always be, incomplete, particularly with infinitely complex ecosystems considered at various scales.

The best available information pertinent to the decisions to be made was used in developing the LUPA. The BLM and Forest Service have made a considerable effort to acquire and convert resource data into digital format for use in the LUPA, both from the BLM and Forest Service themselves and from outside sources.

Under the FLPMA, the inventory of public land resources is ongoing and continuously updated. However, certain information was unavailable for use in developing the LUPA because inventories either have not been conducted or are not complete. Some of the major types of data that are incomplete or unavailable are the following:

- Comprehensive planning area-wide inventory of wildlife and special status species occurrence and condition
- GIS data used for disturbance calculations on private lands

- Site-specific surveys of cultural and paleontological resources

For these resources, estimates were made concerning the number, type, and significance of these resources based on previous surveys and existing knowledge. In addition, some impacts cannot be quantified, given the proposed management actions. Where this gap occurs, impacts are projected in qualitative terms or, in some instances, are described as unknown. Subsequent site-specific project-level analysis would provide the opportunity to collect and examine site-specific inventory data to determine appropriate application of LUP-level guidance. In addition, the BLM and other agencies in the planning area continue to update and refine information used to implement this plan.

4.3 FISH AND WILDLIFE

4.3.1 General Description

This section discusses impacts on fish and wildlife from proposed management actions. Habitat types are described in **Section 3.5**, Vegetation (Forest, Rangelands, Riparian and Wetlands, and Noxious Weeds); existing conditions concerning fish and wildlife and descriptions of habitat requirements for various species are described in **Section 3.2**, Fish and Wildlife. Impacts on GRSG are found in **Section 4.5.2**, Greater Sage-Grouse.

4.3.2 Terrestrial Wildlife

Methodology and Assumptions

General Impacts on Terrestrial Wildlife

Indicators of impacts on terrestrial wildlife and the measurements used to describe the impacts (where available or appropriate) are as follows:

- Direct habitat loss
  - Acres of habitat lost. Direct habitat loss results when habitat is destroyed or converted to a form that is unsuitable for the impacted species. Direct habitat loss can be a short-term or long-term impact.
- Habitat fragmentation
  - Habitat fragmentation occurs when contiguous habitat is broken into smaller blocks by surface-disturbing activities. Habitat fragmentation could lead to the following:
  - Likelihood of reduced habitat quality and interference with movement patterns, leading to a decreased ability to breed or overwinter successfully to a degree that would lead, in turn, to substantial population declines
  - Likelihood that individual habitat blocks would be reduced

  - Likelihood of increased percentage of "edge" habitat (juxtaposition or placing side by side of contrasting environments on an ecosystem or a place were two different vegetation types come together) on smaller blocks, when compared to larger blocks

- Disruption to species
  - Direct mortality of species, including predation, collisions with structures (fences, towers, vehicles), and disease; interference with movement patterns due to fragmented landscapes; short- or long-term displacement and physiological or behavioral influences (avoidance of otherwise functional habitats).
- Habitat degradation
  - Weed infestation and understory and overstory reductions indicators (reductions in herbaceous ground cover, lack of residual cover, change in understory plant composition).
  - Miles/acres disturbed. (The assumption is that habitat next to roads that are impacted by dust and dust suppression activities would have some lower level of understory next to the impacted habitat.)
- Habitat restoration and improvement
  - The likelihood of improving or enhancing habitat quality (e.g., increased species diversity, increased habitat connectivity, and decreased weeds).
- Habitat protection
  - Acres protected through stipulations, closures, and special designations (e.g., ACECs). Also, the likelihood of reduced or prohibited surface disturbance.

Assumptions

The following list presents basic assumptions about terrestrial wildlife that apply to the impacts assessment for Alternatives A through D in this LUPA/EIS:

- The BLM and the Forest Service are primarily responsible for managing habitat, whereas state agencies such as CPW primarily manage terrestrial and aquatic wildlife species.
- Sufficient habitat exists to maintain current CPW data analysis unit objectives.
- Disruptive activities would displace wildlife, although some wildlife would adapt. In general, direct impacts result from activities authorized by the BLM and Forest Service and generally occur at

the same time and place as the management activity or action causing the impact.

- Disturbance of any component of a species' habitat would be detrimental, with the degree of detriment depending on the importance of the habitat component to the maintenance of the population.
- Impacts on populations would not be considered significant if they exceed the current carrying capacity and would not reduce those populations below the carrying capacity.
- The exact locations of future surface-disturbing activities cannot be predicted at the LUPA/EIS level.
- The BLM and Forest Service will use best available information, management and conservation plans, and other research and related directives to guide wildlife habitat management on BLM-administered or National Forest System lands.
- NSOs, TL, CSUs, COAs, and siting conditions would be applied to important wildlife habitats (big game ranges, migratory bird nesting habitat, raptor nest sites and nesting habitat) to mitigate impacts from surface-disturbing activities.
- Raptor nest surveys are required before project implementation in those areas potentially influenced by development or other activities.
- If management actions (grazing, energy development, ROWs) are excluded from PHMA and GHMA, development would occur in non-sagebrush habitats (e.g., pinyon-juniper, mountain shrub, and spruce/fir), with potential adverse impacts on species that inhabit these ranges.
- Under all of the alternatives, proposed actions would comply with BLM Colorado Public Land Health Standard #3 (BLM 1997). Healthy, productive, and diverse plant communities support terrestrial wildlife communities that are productive, resilient, diverse, and vigorous and that are able to reproduce and sustain natural fluctuations and ecological processes; therefore, implementing management actions that contribute to maintaining the condition and quality of wildlife habitat would ensure that BLM Colorado Public Land Health Standard #3 (BLM 1997) would be met throughout the life of the LUPA.
- Federal oil and gas regulations prevent the BLM and Forest Service from being able to apply new or additional lease stipulations to existing leases. However, federal regulations do allow the BLM and Forest Service to apply other protection measures, in conjunction with planning and implementing oil and gas projects. These include

applying stipulations consistent with the most recent LUP as terms and conditions for discretionary approvals (e.g., ROW actions) and applying COAs to augment protections related to lease activities.

Direct and Indirect Impacts on Terrestrial Wildlife

Impacts from Travel Management on Terrestrial Wildlife

Direct Habitat Loss/Habitat Fragmentation/Disruption to Species

Impacts from designating roads and trails for recreation are not expected, but these designations would influence the amount and type of casual use impacts and could influence road construction impacts in an area. Casual use and road and trail building impacts are described under Recreation Management.

In general, the more acres of routes that are designated in the area, the greater the likelihood of habitat fragmentation and disturbance to species and habitats as high concentrations of human use typically occur on or next to motorized routes. Areas designated as open have no restrictions on cross-country travel and therefore have the highest potential for increased route density and associated disturbance. Managing on-site recreation and motorized activity, limiting travel to designated routes, and closing travel routes could prevent or reduce impacts. For example, seasonal closure of routes would prevent impacts on species during sensitive or critical times of the year, such as during winter or birthing. Impacts are more likely to occur in easily accessible areas where visitation would be highest.

Alternative A—Under this alternative the fewest acres would have seasonal restrictions on casual use; some of the areas within GRSG habitat would remain open to cross-country travel. This alternative has the highest potential for impacts on terrestrial wildlife due to the lack of restrictions on activities that cause these impacts.

Alternative B—Under this alternative no areas within PHMA would be designated as open; instead, the field offices and ranger districts would determine where closures and seasonal restrictions are necessary within PHMA to limit impacts on GRSG. This alternative would provide greater protection than Alternative A by reducing the likelihood of impacts from recreation on terrestrial wildlife species using the area. This would be the case particularly if the critical areas and seasons of use for these species were to coincide with the closures and seasonal limitations imposed for GRSG.

Alternative C—Same as Alternative B.

Alternative D—This alternative would implement the most restrictions by including the potential for seasonal limitations as necessary in ADH. It also would prohibit seasonal camping and other nonmotorized recreation within 4

miles of a lek. In this case, associated benefits for other terrestrial wildlife species could be expanded to ADH and all habitat within 4 miles of a lek.

Proposed LUPA—See *Habitat Restoration/Improvement*, below.

Habitat Degradation

Habitat degradation impacts from designating roads and trails for recreation are not expected, but these designations would influence the amount and type of casual use impacts and could influence road construction impacts in an area. Casual use and road and trail building impacts are described under Recreation Management.

Alternative A—Under this alternative some of the areas within GRSG habitat would remain open to cross-country travel. This alternative has the highest potential to see impacts on terrestrial wildlife through habitat degradation.

Under all the action alternatives, all areas within PHMA would be limited to designated routes; no PHMA would be open to cross-country travel. The action alternatives are similar and provide the most protection for terrestrial wildlife when compared to Alternative A.

Habitat Restoration/Improvement

Designating an area as closed is expected to result in the eventual revegetation of roads after a closure.

Alternative A—Under this alternative, the fewest acres would be closed to cross-country travel. This alternative includes the fewest acres of habitat restoration as a result of natural revegetation.

Alternatives B, C, and D—Under these alternatives, no areas within PHMA would be designated as open, and the field offices and ranger districts would determine where closures are necessary within PHMA to limit impacts on GRSG. These alternatives would provide the potential for more habitat restoration than Alternative A.

Proposed LUPA—Impacts on terrestrial wildlife from travel management would be similar to those described above for Alternative D for all indicators. Under the Proposed LUPA, however, the Wolford Mountain OHV area would continue to be managed as open to OHVs; this includes 1 acre of PHMA. Under the Proposed Plan/Final EIS for the KFO, there would be an additional 13 acres of PHMA that would be managed as open to OHVs.

Impacts from Recreation Management on Terrestrial Wildlife

Direct Habitat Loss/Habitat Fragmentation/Disruption to Species

Areas Open for Casual Use. Impacts from recreational use would include impacts from casual use such as nonmotorized recreation or dispersed camping. Such

activities are not subject to site-specific environmental review and vegetation impacts would not be apparent until after damage has occurred. Examples of direct impacts on terrestrial wildlife from casual use include habitat loss, fragmentation, and direct mortality from collisions with vehicles.

Some species may adapt to disturbances over time and could recolonize disturbed habitats. Impacts are more likely to occur in easily accessible areas where visitation would be high, and in areas open to intensive motorized use, as cross-country travel facilitates weed spread as well as increasing habitat fragmentation. In general, the more acres of routes in the area, the greater the likelihood of habitat fragmentation and disturbance to species and habitats as high concentrations of human use typically occur on or next to motorized routes.

Indirect impacts on terrestrial wildlife through habitat would include avoidance or displacement (Knight and Cole 1995 in Joslin and Youmans 1999) and subsequent changes in species movement patterns, and impacts on survival or reproduction (Gutzwiller et al. 1998). Both short-term, loud noise (such as from vehicles or construction) and long-term, low-level noise (such as from oil and gas development) have been documented to cause physiological effects, including increased heart rate, increased energy expenditure, altered metabolism, and a change in hormone balance (Radle 2007).

Determining the effect of noise is complicated because different species and individuals have varying responses, and certain species rely more heavily on acoustical cues than others (Radle 2007; Barber et al. 2009). Impacts would be both short term and long term, depending on the type and source of noise.

Human disturbance near raptor nests can result in the abandonment of the nest, high nestling mortality from overheating, chilling, or dehydration when adults are flushed from the nest, premature fledging, and reduced access to resources (Gutzwiller et al. 1998). Some species may adapt to disturbances over time and could recolonize disturbed habitats. On-site management of recreation and motorized activity and designation or closure of travel routes could prevent or reduce impacts. For example, seasonal closure of routes would prevent impacts on species during sensitive or critical times of the year, such as during winter or birthing. Impacts are more likely to occur in easily accessible areas, where visitation would be high and concentrated.

Alternative A—Under this alternative, there would be no special requirements for SRPs or casual use in GRSG habitat. This alternative has the highest potential for impacts on terrestrial wildlife due to the lack of restrictions on activities that may cause these effects.

Alternatives B and C—Under Alternatives B, C, and D, only Special Recreation Permits (SRPs) would be issued, which do not adversely affect GRSG. Under Alternative C, camping and other nonmotorized recreation would be prohibited

within 4 miles of a lek. Alternative C would be the most restrictive and would have the greatest potential reduction in impacts from recreation on terrestrial wildlife species associated with GRSG habitat. Alternatives B and D have similar restrictions.

Alternative D—Under Alternative D, the field offices and ranger districts would determine where closures and seasonal restrictions are necessary within PHMA to limit impacts on GRSG. In this case associated benefits for other terrestrial wildlife species could be expanded to ADH and all habitat within 4 miles of a lek.

Impacts from recreation (areas open for casual use) on terrestrial wildlife would be similar to those described under Alternatives B and C.

Constructing Roads and Trails. Impacts from constructing, realigning, and upgrading roads and trails as a result of recreation would include habitat loss, fragmentation, or degradation, direct mortality from construction, sedimentation of waterways, increased turbidity, and decreased water quality. In general, the more miles of routes that are constructed in the decision, the greater the likelihood of habitat fragmentation and disturbance to species and habitats. Impacts would be intensified during the construction phase; after construction, impacts would be the same as those discussed under C*asual Use*.

Realigning routes could be beneficial to wildlife species using the area if the existing route were impacting habitat critical for these species; rerouting the route would reduce impacts. An example of this is if a route were impacting a spring used by wildlife and rerouting the route would reduce impacts on the spring. Generally, limiting construction and realigning and upgrading roads is beneficial to terrestrial wildlife species using the habitat.

Indirect impacts would be similar to those discussed under C*asual Use* but would be intensified during the construction phase; after construction, impacts would be the same as those discussed under C*asual Use*.

Alternative A—Under this alternative, restrictions on constructing roads and trails would be implemented on a case-by-case basis throughout the decision area. This alternative has the highest potential to see impacts on terrestrial wildlife using GRSG habitat, due to the lack of restrictions on activities that cause these effects.

Alternative B—Under this alternative constructing and realigning roads and trails would be highly limited in PHMA, as would upgrading existing roads and trails. This alternative also limits new construction in PHMA to access valid existing rights; this is so that any new construction that would cause the area to exceed 3 percent disturbance would require mitigation to offset the disturbance. This alternative provides more protection than Alternatives A and D but less than Alternative C.

Alternative C—This alternative is similar to Alternative B but expands the restrictions on constructing, realigning, and upgrading to ADH. In addition, this alternative would expand the 3 percent disturbance cap to the entire area within 4 miles of a lek. Generally this alternative would be the most restrictive for constructing, realigning, and upgrading roads and trails. This alternative provides the most protection to terrestrial wildlife associated with GRSG.

Alternative D—Alternative D applies restrictions to PHMA that are more flexible than those outlined in the NTT report. Other than Alternative A this alternative is the least restrictive for constructing, realigning, and upgrading roads and trails.

Proposed LUPA—See *Habitat Restoration/Improvement*, below.

Disruption to Species. Disruption to species from permitted uses include SRPs and Forest Service SUAs. These are for activities typically for larger organized recreation, such as competitive and noncompetitive events, and commercial outfitting services. Allowing competitive events is expected to result in impacts similar to those described under casual use; however, because these events typically involve a much larger concentration of people than casual use, the impacts would be magnified, and displacement of terrestrial wildlife as a result of noise disturbance is intensified. Impacts from commercial outfitting services would be the same as those described under casual use. This is because these activities typically do not involve large concentrations of people at any one time.

Alternative A—Under Alternative A, the BLM and Forest Service would continue issuing SRPs and SUAs on a case-by-case basis and would continue to provide opportunities for competitive and noncompetitive events and commercial outfitting services.

Alternatives B and C—SRPs and SUAs would be authorized only where impacts on PHMA would be neutral or beneficial. Other terrestrial wildlife species within PHMA or sagebrush habitats would also benefit from these restrictions.

Alternative D and the Proposed LUPA—These alternatives limit impacts on disrupting the species as well as PHMA, thus they would also benefit terrestrial wildlife species whose critical use periods coincide with these seasonal restrictions.

<u>Habitat Degradation</u>

Casual Use. Impacts from recreational use would include impacts from casual use such as nonmotorized recreation or dispersed camping. Such activities are not subject to site-specific environmental review, and vegetation impacts would not be apparent until after damage has occurred. Examples of terrestrial wildlife habitat degradation from casual use are increased soils and vegetation disturbance leading to an increase in the likelihood of weed invasion and spread in recreation areas. Impacts from casual use are more likely to occur in easily

accessible areas, where visitation would be high, and in areas open to intensive motorized use. This is because cross-country travel facilitates weed spread and increases habitat fragmentation.

Alternative A—Under this alternative some of the areas within GRSG habitat would remain open to cross-country travel. This alternative has the highest potential to see impacts on terrestrial wildlife through habitat degradation.

Alternatives B, C, and D and the Proposed LUPA—Under the action alternatives, all areas within PHMA would be limited to designated routes; no PHMA would be open to cross-country travel. The action alternatives provide the greatest protection for terrestrial wildlife habitat.

Constructing Roads and Trails. In general, the more miles of routes that are constructed in the decision area, the greater the likelihood of habitat degradation associated with these routes. Direct impacts from construction would be intensified during the construction phase and after construction would be the same as those discussed under casual use. Realignment of routes could be beneficial to wildlife species using the area if the existing route were impacting habitat critical and rerouting would reduce impacts (e.g., if a route were impacting a spring used by wildlife and rerouting it would reduce impacts on the spring). In general, limiting construction and realigning and upgrading roads is beneficial to terrestrial wildlife species.

Alternative A—Under this alternative restrictions on constructing roads and trails would be implemented on a case-by-case basis throughout the decision area. This alternative has the highest potential to have impacts on terrestrial wildlife using GRSG habitat due to the lack of restrictions on activities.

Alternative B—Constructing and realigning roads and trails would be highly limited in PHMA, as would upgrades to existing roads and trails. This alternative would also limit new construction in PHMA to access valid existing rights so that any new construction that would cause the area to exceed 3 percent disturbance would require mitigation to offset the disturbance. This alternative provides more habitat protection than Alternatives A and D, but not as much as Alternative C.

Alternative C—This alternative is similar to Alternative B but expands the restrictions on construction, realignment and upgrading to ADH. In addition, this alternative would expand the 3 percent disturbance cap to the entire area within 4 miles of a lek. Generally this alternative would be the most restrictive for new construction, realignment and upgrading of roads and trails, and therefore is expected to provide the greatest benefit to terrestrial wildlife.

Alternative D—This alternative applies restrictions to PHMA that are more flexible than those outlined in the NTT report. Other than Alternative A, this

alternative is the least restrictive for constructing, realigning, and upgrading roads and trails.

Habitat Restoration/Improvement

Reclamation of Roads and Trails. Reclamation of roads and trails is expected to have beneficial impacts on terrestrial wildlife species through reduction of the direct and indirect impacts discussed under casual use above.

None of the proposed alternatives require restoration except as a possible mitigation for the disturbance cap (as described above under construction of roads and trails).

Alternative A—Alternative A provides the least direction on habitat restoration for GRSG thus it would result in the least habitat restoration for this habitat type.

Alternatives B and D—Alternatives B and D require consideration of use of transplanted sagebrush in PHMA. Alternatives B and D would have fewer beneficial impacts than Alternative C, but would have more beneficial impacts than Alternative A.

Alternative C—Alternative C requires use of transplanted sagebrush in ADH. As a result it Alternative C could result in the most rapid habitat recovery for GRSG because transplanted sagebrush may provide GRSG-required habitat features faster.

Proposed LUPA—Impacts for the indicators described above (direct habitat loss, habitat fragmentation, and disruption) from recreation on terrestrial wildlife, are similar to those under Alternative D for constructing roads and trails and disrupting and degrading habitat.

Impacts from Lands and Realty Management on Terrestrial Wildlife

Direct Habitat Loss/Habitat Fragmentation/Habitat Degradation

In areas where ROWs are permitted, there would be more impacts on terrestrial wildlife species and wildlife habitats than in areas where ROWs are excluded or avoided.

Constructing and operating ROW facilities (such as transmission lines, roads, and pipelines) may result in habitat loss, fragmentation, and degradation. Surface disturbance during construction removes vegetation, reducing important hiding cover and forage for wildlife species. ROWs, such as roads and industrial facilities, may lead to permanent loss of wildlife habitat. Other ROWs, such as pipelines or buried power lines, may lead to a more short-term loss of habitat if the area were reclaimed after construction. In addition to vegetation removal, long-term occupancy of structures (e.g., wind turbines and transmission lines) and facilities leads to direct habitat loss.

ROWs may also lead to habitat fragmentation and degradation. ROW projects can reduce patch size and increase edge habitats. These impacts would be more severe on species that require large blocks of intact habitat, but species that require edge habitat could benefit from this disturbance. Surface disturbance can also lead to new weed infestations and spread weeds where infestations already occur. Noxious and invasive weeds are often of lower value to wildlife species and degrade wildlife habitat by reducing optimal cover or food. Fragmentation and habitat degradation may lead to a lower carrying capacity and reduce wildlife populations.

Excluding, limiting, or collocating ROWs in GRSG habitats would benefit wildlife species that occupy sagebrush habitats. In addition, disturbance caps and TLs can protect wildlife species from disturbances. However, if disturbances are moved from GRSG habitat into other habitat types, such as pinyon-juniper woodlands, species that occupy these habitats may experience greater impacts from ROW projects.

Disruption to Species

Both the construction and operation phases of ROW projects can lead to disruption impacts. Noise and an increase in human presence during construction may displace wildlife into lower quality habitat and may disrupt breeding, nesting, wintering, and migration. Although construction impacts are generally short term, many impacts would continue during routine maintenance and operation of the ROWs. Some wildlife species may avoid habitat in the vicinity of infrastructure, resulting in indirect habitat loss. In addition, noise and an increase in traffic during ROW operation and maintenance would disturb and likely displace wildlife. Predation and harassment of prey species can increase when tall structures (power lines and towers) provide additional perch locations for raptors and corvids (Avian Power Line Interaction Committee 2006) or when ROW roads increase mammalian predator densities.

Constructing and operating ROW facilities may also lead to direct mortality of wildlife. This impact would be more pronounced for burrowing animals or wildlife with limited mobility. Direct mortality may occur when such species as bats or birds collide with turbines, power lines, and meteorological towers or their supporting infrastructure, such as guy wires (Erickson et al. 2005). In addition, increased traffic on roads from ROW maintenance and operations can lead to direct mortality through vehicle/wildlife collisions.

Excluding, limiting, or collocating ROWs in GRSG habitats would benefit wildlife species that occupy sagebrush habitats. In addition, disturbance caps, NSOs, and TLs can protect wildlife species from disruptions. However, if disturbances are moved into other habitat types, such as pinyon-juniper woodlands, species that occupy these habitats may experience greater impacts from ROW projects.

Habitat Protection

Managing important GRSG habitat as exclusion or avoidance areas would eliminate or reduce the impacts discussed above. Protections afforded to GRSG under the various alternatives would benefit those wildlife species whose ranges are coincident with PHMA or GHMA.

Withdrawals. Withdrawing PHMA from mineral entry and other authorized activities would be beneficial to wildlife habitats. Prohibiting surface-disturbing and surface-disrupting activities would benefit terrestrial wildlife by precluding activities that would have direct and indirect impacts on terrestrial wildlife.

Land Tenure. In general, proponents of land acquisition or disposal actions would consider land tenure adjustment criteria with the goal that the exchange, acquisition, or disposal would increase public benefits, including wildlife resources. Any acquisition of land that includes high-value GRSG habitat can result in beneficial impacts on wildlife whose ranges are coincident with GRSG. Any disposal of BLM-administered or National Forest System land with high-value habitat is typically avoided; such disposals could increase the risk of habitat loss through development because there would not be any BLM and Forest Service-required mitigation. Lands no longer administered by the BLM and Forest Service could also experience increased human presence that can increase disturbance to wildlife in the area. Consolidating landownership through land tenure adjustments increases the manageability of lands and results in more contiguous blocks of habitat; this would beneficially impact wildlife.

Summary of Impacts by Alternative

Alternative A would have the most areas available for ROWs and would have the most potential to impact wildlife species and their habitat. The impacts described above would be the greatest under this alternative.

Alternative B would have fewer areas available for ROWs through restrictions to protect GRSG habitat. Under this alternative, PHMA would be managed as an exclusion area, and GHMA would be managed as an avoidance area for new ROW projects (see **Figures 2-4** through **2-7**, **Appendix A**). In addition, Alternative B would encourage consolidation of GRSG habitat, facilitating habitat conservation. These conservation measures would be more protective than conservation measures under Alternatives A and D but would be less protective than Alternative C; therefore, potential impacts on wildlife whose ranges overlap GHMA and PHMA would be less than Alternatives A and D but would be greater than Alternative C.

Alternative C would have the most protective measures for GRSG. Under this alternative, ADH would be managed as an exclusion area for new ROW projects. In addition, Alternative C would encourage consolidation of GRSG habitats, facilitating habitat conservation and management. This alternative is expected to have the fewest impacts on wildlife species whose ranges overlap GHMA and PHMA.

Under Alternative D, PHMA would be managed as an avoidance area. ROW projects would be allowed in PHMA if the project would not adversely affect GRSG populations. This alternative would be more protective than Alternative A but less protective than Alternatives B and C.

Under the Proposed LUPA, impacts would be similar to those described above for Alternative D. However, additional protections would be greater under the Proposed LUPA for those species that overlap all GRSG habitat. This is because GHMA would also be managed as avoidance for ROWs. Additionally, under the Proposed LUPA, no aboveground structures would be authorized within 1 mile of active leks in occupied habitat. This would provide additional protection for those species vulnerable to avian predation.

Under the Proposed LUPA, both PHMA and GHMA would be managed as exclusion for large transmission lines, with the exception of several ongoing projects. For the description of impacts from proposed large transmission lines in northwest Colorado, see Cumulative Impacts (**Chapter 5**),

Impacts from Wind Energy Development on Terrestrial Wildlife

Direct Habitat Loss/Habitat Fragmentation/Habitat Degradation

In areas where wind energy facilities are permitted, there would be more impacts on wildlife species than in areas where wind energy facilities are excluded.

Wind energy facilities would be authorized through ROWs. Impacts on wildlife habitats from constructing and operating wind energy facilities would be similar to the impact for ROWs. These impacts are direct habitat loss, fragmentation, and degradation (see *Impacts from Land and Realty Management on Terrestrial Wildlife*). The potential for wind energy development in northwest Colorado is very limited.

Disruption to Species

In areas where wind energy facilities are permitted, there would be more impacts on wildlife species than in areas where wind energy facilities are excluded.

Impacts on wildlife habitats from constructing and operating wind energy facilities would be similar to the impact for ROWs. These impacts are direct habitat loss, fragmentation, and degradation. Impacts on species could also include mortality, stress, and avoidance of turbines. (See *Impacts from Land and Realty Management on Terrestrial Wildlife.*)

Summary of Impacts by Alternative

Alternative A does not exclude wind energy developments specifically from GRSG habitat. In addition, this alternative would have the most areas available

for ROWs and would have more potential to impact wildlife than Alternatives B, C, and D.

Although Alternative B does not exclude wind energy developments specifically from GRSG habitat, this alternative would have fewer areas available for ROWs. Conservation measures would be more protective under Alternative B than under Alternatives A and D but would be less protective than Alternative C; therefore, potential impacts on wildlife whose ranges overlap GHMA and PHMA would be less than Alternatives A and D but would be greater than Alternative C.

Alternative C would have the most protective measures for GRSG by precluding wind developments from ADH; therefore, it would have the fewest impacts on wildlife species whose ranges overlap GHMA and PHMA.

Although Alternative D does not address wind energy specifically, Alternative D would be more protective in respect to all ROWs than Alternative A, but it would be less protective than Alternatives B and C.

Under the Proposed LUPA, wind energy development would be excluded from PHMA; impacts on terrestrial wildlife would therefore be similar to those under Alternative C for those species whose ranges overlap PHMA. However, the impact on terrestrial wildlife from restrictions on wind energy development is not expected to vary between alternatives because the potential for industrial wind energy in northwest Colorado is very limited.

Impacts from Solar Energy Development on Terrestrial Wildlife

Direct Habitat Loss/Habitat Fragmentation/Habitat Degradation

In areas where solar energy facilities are permitted, there would be more impacts on wildlife species than in areas where solar energy facilities are excluded. All solar energy projects 20 megawatts and greater are excluded in all LUPs in the planning area, as described in the Solar Energy Development Programmatic EIS Record of Decision (BLM 2012). There is limited potential for industrial solar development in the planning area.

Impacts on wildlife habitats from constructing and operating solar energy facilities would be similar to the impact for ROWs. These impacts are direct habitat loss, fragmentation, and degradation (see *Impacts from Land and Realty Management on Terrestrial Wildlife*).

Disruption to Species

In areas where solar energy facilities are permitted, there would be more impacts on wildlife species than in areas where solar energy facilities are excluded.

Impacts on wildlife habitats from constructing and operating solar energy facilities would be similar to the impact for ROWs. These impacts include direct habitat loss, fragmentation, and degradation (see *Impacts from Land and Realty Management on Terrestrial Wildlife*).

Summary of Impacts by Alternative

Alternative A does not exclude solar facilities specifically from GRSG habitat. In addition, this alternative would have the most areas available for ROWs and would have more potential to impact wildlife than Alternatives B, C, and D.

Although Alternative B does not exclude solar facilities specifically from GRSG habitat, it would preclude siting a solar facility in PHMA. Conservation measures would be more protective under Alternative B than Alternatives A and D but would be less protective than Alternative C; therefore, impacts on wildlife whose ranges overlap GHMA and PHMA would be less than Alternatives A and D but would be greater than Alternative C.

Alternative C would have the most protective measures for GRSG by precluding solar facilities from ADH and therefore would have the fewest impacts on wildlife species whose ranges overlap GHMA and PHMA.

Although Alternative D does not address solar facilities specifically, it would be more protective in respect to all ROWs than Alternative A but would be less protective than Alternatives B and C.

Impacts from Range Management on Terrestrial Wildlife

Direct Habitat Loss/Habitat Fragmentation/Disruption to Species

In areas that are available for livestock grazing, there could be more impacts on terrestrial wildlife from vegetation management than in areas where livestock grazing is excluded.

The noise from heavy equipment used for treatments and fence construction could temporarily disperse bird species from breeding and nesting habitat and wildlife from occupied habitat. Prescribed burning could also disturb nesting bird species from smoke inadvertently drifting into occupied habitat (see also *Impacts from Wildfire suppression, Fuels Management, and Fire Rehabilitation*). These activities have the potential to remove or alter terrestrial wildlife habitat and could result in disrupted foraging and nesting behavior.

Disturbances from heavy equipment and prescribed burning would be localized and short term. Most wildlife species would move into adjacent untreated areas; however, direct mortality during the vegetation treatments is possible. Direct mortality can also result from fence collisions and entanglement. TLs (such as those for big game birthing areas, raptor nesting, and big game winter habitat), as well as site-specific COAs (such as TLs for migratory bird nesting), could mitigate the short-term impacts resulting from the treatments.

Habitat treatments would be beneficial for species that depend on younger seral stages. However, there would also be adverse direct and indirect impacts on species that depend on large blocks of older seral stage habitats until vegetation communities reestablish themselves. Adverse impacts on these species are direct habitat loss, habitat modification, habitat fragmentation, and reduced habitat effectiveness. The timing of rangeland habitat projects could adversely impact nesting birds and young broods by direct mortality; however, most projects occur in the fall, after the nesting season.

A concern of resetting vegetation seral stage through vegetation treatments is the invasion of undesirable plant species. Noxious and invasive weeds are often of lower value to wildlife and degrade wildlife habitat by reducing optimal cover or food. Sagebrush-steppe communities are among the ecosystems most vulnerable to invasion and degradation by invasive weeds.

Cheatgrass invasion is also a threat to some treatment areas. Invasive nonnative plants with little or no forage value for big game species are increasing in some areas. The greatest impacts have occurred on big game winter range areas with low precipitation rates. Not only can invasive species outcompete most native plants when moisture is limited, they can also change site-specific fire ecology and result in the loss of critical shrub communities. Cheatgrass would provide some short-term forage benefits to big game species while in the early stages of growth; however, cheatgrass lacks the ability to provide high quality forage during most of the year.

Noxious and invasive weed management includes herbicide use, biological controls, and mechanical treatments in weed-infested areas. Short-term habitat and forage loss for some wildlife could result from treatments; adverse direct impacts could result from accidental chemical drift caused by herbicide use in nearby areas. For example, accidental chemical drift could poison individual bird species or result in mortality of prey. All weed treatments would result in long-term beneficial impacts on terrestrial wildlife species and to their habitats, as native vegetation is, or would be, restored.

Implementation-level grazing decisions would comply with BLM Colorado Public Land Health Standard #3 (BLM 1997). Where the standards are being met, rangeland management is expected to result in minimal impacts on terrestrial wildlife. Healthy, productive, and diverse plant communities support terrestrial wildlife communities that are productive, resilient, diverse, and vigorous and those that are able to reproduce and sustain natural fluctuations and ecological processes; therefore, implementing management actions that contribute to maintaining the condition and quality of wildlife habitat would ensure that BLM Colorado Public Land Health Standard #3 (BLM 1997) would be met throughout the life of the LUPA.

Alternative A would allow livestock grazing and has the most potential for vegetation disturbance and range improvements with the fewest restrictions; therefore, Alternative A would have the greatest impact on terrestrial wildlife.

The potential for vegetation disturbance and range improvements would be the same under Alternative B as under Alternative A; however, more restrictions would be in place to protect GRSG habitat, so it would have fewer impacts on terrestrial wildlife.

Removing livestock under Alternative C would lead to substantial improvements in herbaceous understories, which would likely benefit terrestrial wildlife species in general; however, in all practicality, the only way to keep livestock out of these areas would be through fencing. An estimated 5,000 miles of fence would need to be constructed under this alternative (see, **Table 4.6** in **Section 4.13**, Range Management). Increased fence densities may have an impact on terrestrial wildlife species, particularly big game species. Potential impacts would depend on fence design and location (coincident with GRSG habitats).Conversely, if livestock were removed from public lands, there would be no need to maintain existing fences, particularly in areas with large, continuous tracts of publicly owned land.

Alternative D would have the same areas available for livestock grazing as Alternatives A and B. Impacts on terrestrial wildlife would be the same under Alternative D as they would be under Alternative B.

Under the Proposed LUPA, the same areas would be available for livestock grazing as under Alternatives A, B, and D, and the impacts on terrestrial wildlife would be the same.

Habitat Degradation

In areas that are available for livestock grazing, there could be more impacts on terrestrial wildlife than in areas where livestock grazing is excluded.

The impacts resulting from livestock grazing on wildlife habitat are competition for forage and water and habitat use. Grazing invariably reduces the height and ground cover of plants, at least temporarily. This would reduce the cover wildlife species need for protection, escape, feeding (including the availability of prey populations), roosting, breeding, and nesting. Inappropriate grazing, or overgrazing, could change habitat effectiveness and the connectivity of wildlife habitats by changing the structure, composition, or diversity of vegetation. The placement of salt and mineral supplements could lead to cattle concentration in terrestrial wildlife species habitats. This could displace species, cause nests to be trampled, and reduce habitat quality. Impacts could be both short term and long term and could range from minor to major, depending on the grazing intensity, duration, season of use, and local climate.

Managing the timing and intensity of livestock grazing is critical to maintaining habitat conditions preferable to wildlife. For example, cattle grazing during the early season could improve the quality of winter forage for elk; however, cattle must be removed early enough in the fall to allow plants to regrow.

Implementation-level grazing decisions would comply with BLM Colorado Public Land Health Standards (BLM1997a). If livestock grazing were the cause for lands not meeting BLM Colorado Public Land Health Standards, changes would be made in order to address the kind, numbers, and class of livestock, as well as the season, duration, distribution, frequency, and intensity of grazing.

Alternative A would allow livestock grazing, with no restrictions in place to protect GRSG habitat specifically and therefore would have the greatest impact on terrestrial wildlife.

Alternative B would have the same areas available for livestock grazing as Alternative A; however, more restrictions would be in place to protect GRSG habitat, so it would have fewer impacts on terrestrial wildlife.

Alternative C would have no areas available for livestock grazing within ADH and therefore would have the fewest impacts on terrestrial wildlife.

Alternative D is similar to Alternative B but would be slightly more restrictive. This is because GRSG habitat objectives within grazing allotments would be applied to ADH and not just PHMA. This alternative would have fewer impacts than Alternative A and would have greater impacts than Alternative C.

Under the Proposed LUPA, livestock grazing would be managed the same as described for Alternative D, and impacts on terrestrial wildlife would be the same.

Habitat Restoration/Improvement

In areas that are available for livestock grazing, there is more opportunity to improve habitat quality for terrestrial wildlife using grazing and vegetation management as tools than in areas where livestock grazing is excluded.

In the long term, wildlife would benefit from most vegetation treatments and grazing. This would be due to decreases in noxious and invasive weeds, increases in vegetation productivity, and increases in plant diversity and age classes. This would, in turn, provide additional forage, cover, and prey base. Mimicking natural periodic disturbance is often necessary to stimulate plant productivity and to increase diversity and nutritional value.

Removing residual cover could hasten spring green-up of the herbaceous understory, thereby providing quality forage for wildlife coming out of stressful winter conditions. Improving vegetation in upland areas would provide more forage to big game species and other herbivorous species that occur in these

areas. This would result in direct beneficial impacts. Livestock grazing can also enhance forage and brood-rearing conditions for wildlife species.

Well-designed water developments (e.g., reservoirs) and the associated riparian vegetation create nesting, feeding, and brood-rearing habitat for waterfowl and other migratory birds. The development of water sources in dry regions would allow wildlife use to expand into habitats that previously were used only seasonally. Range improvements for livestock would disperse the impact of livestock on the land, which, in turn, would prevent disturbance, weed spread, and soil compaction in any one area.

Vegetation treatments in upland areas often divert livestock and wildlife use from riparian and wetland areas, thereby increasing the vigor and structural diversity of these plant communities. In addition, benefits resulting from habitat restoration (such as road reclamation, weed spraying, fertilization, and seeding) include increased habitat connectivity, improved pollinator habitat for plants, weed control, soil stability, and a more natural fire regime.

Alternative A would allow livestock grazing, with the most potential for vegetation management and the fewest restrictions; therefore, Alternative A would allow the most flexibility to use these tools to benefit terrestrial wildlife.

The potential for livestock grazing and vegetation management would be more restrictive under Alternative B than under Alternative A. Vegetation treatments would be allowed only if they conserve, enhance, or restore GRSG habitat in PHMA. Thus, there would be less flexibility to use grazing and vegetation management tools to benefit terrestrial wildlife.

Alternative C would not allow livestock grazing in ADH for GRSG, and only treatments that would benefit GRSG would be allowed; therefore, Alternative C would allow the least flexibility to use grazing and vegetation management tools to benefit terrestrial wildlife.

Alternative D would have the same areas available for livestock grazing as Alternatives A and B. The potential to use grazing and vegetation management tools to benefit terrestrial wildlife would be less restrictive under Alternative D, compared to Alternatives B and C, and more restrictive than Alternative A.

Impacts on terrestrial wildlife under the Proposed LUPA are the same as those described under Alternative D above.

Impacts from Wild Horse Management on Terrestrial Wildlife

<u>Disruption to Species</u>

Wild horse gathers would create short-term localized disturbance to wildlife from human activity. Vehicle traffic, helicopter use, wranglers on horseback, and the movements of the wild horses during gathers would contribute to wildlife

stress and displacement. Managing wild horses may result in range improvement projects, such as fences and water developments. Disturbance from construction and maintenance of range projects are similar to impacts described in the livestock grazing section (see *Impacts from Range Management on Terrestrial Wildlife*).

Habitat Degradation

Grazing by wild horses would be similar to permitted livestock grazing (see above) and may result in competition for forage, water, and available habitat. Season-long grazing by wild horses may impact habitat quality by changing structure, composition, or diversity of vegetation. Since horse diets consist primarily of grass, and horses can clip vegetation close to the ground, year-round grazing by wild horses can remove important cover for nest and concealment. Decreased cover and diversity of grasses and shrubs as well as decreased mammal burrow density have been documented at water sources used by wild horses (Beever and Brussard 2000; Ganskopp and Vavra 1986). Small mammals are a prey base for many species, so less prey can negatively affect raptors and carnivores that may inhabit the area. Grazing by wild horses can also facilitate new weed infestations or spread weeds where infestations already occur.

Wild horses also contribute to riparian-wetland habitat degradation, which reduces the quality or suitability of these habitats for wildlife species. Wild horses that tend to dominate water sources can force wildlife to find alternative water sources. This can displace wildlife into lower-quality habitat or force wildlife to travel farther to find water. Under all alternatives, the BLM has the ability to adjust the appropriate management level of wild horses if resources are being damaged. However, only Alternatives B, C, and D provide management guidelines specific to GRSG habitat.

Summary of Impacts by Alternative

Alternative A would place the fewest restrictions on wild horse management and therefore would have the most potential for impacts on terrestrial wildlife.

Alternative B would place some restrictions on the management of wild horses. Under this alternative, gathers would be prioritized in ADH, and GRSG habitat objectives and management considerations would be incorporated into HMA plans. These management strategies would benefit wildlife species whose ranges overlap PHMA or GHMA. Overall, impacts on terrestrial wildlife are less than Alternative A and D but similar to Alternative C.

Alternative C would have the same impacts on terrestrial wildlife species as Alternative B.

Alternative D would be similar to Alternatives B and C but would consider all resource values in conjunction with GRSG when managing wild horses. For

terrestrial wildlife, impacts from this alternative would be similar to Alternatives B and C but more protective than Alternative A.

For the Proposed LUPA, wild horse management would be the same as under Alternative D; impacts are therefore the same.

Impacts from Fluid Minerals Management on Terrestrial Wildlife

Impacts on fish and wildlife species would be most pronounced in certain Colorado MZs. These are the zones that currently are strongly influenced by energy development or would experience increases in energy development in the near future. However, all lands with existing lease rights have the potential to be influenced by development activities. See **Table 3.34**, Acres of Oil and Gas Potential on Planning Area GRSG Habitat, in **Section 3.7**.

Table 4.1 shows the aces of leased and unleased mule deer habitat where it overlaps GRSG habitat. Although multiple big game species occupy sagebrush habitats, mule deer range most closely approximates GRSG habitat.

Table 4.1
Acres of Federal Mineral Estate in Mule Deer Habitat

Field Office	Leased		Unleased	
	Severe Winter Range	Summer Range	Severe Winter Range	Summer Range
	PHMA	ADH	PHMA	ADH
CRVFO	0	80	16,600	26,600
GJFO	0	3,000	0	1,400
KFO	14,100	14,100	45,600	55,900
LSFO	115,400	187,900	232,800	473,400
WRFO	17,500	98,900	3,000	59,800
Roan Plateau	0	0	0	0
Routt National Forest	10	10	500	500

Source: BLM 2013a

Direct Habitat Loss and Modification

Shrubland and woodland clearing and facility occupation would result in long-term modification or loss of woody vegetation as a source of wildlife forage or cover. This condition would persist from about 20 years in mountain big sagebrush sites to 150 to 200 years in pinyon-juniper woodlands. Interim (pad) and final (pipeline) reclamation applied to surface disturbances would not generally regain useful shrubland character for one to two decades; however, it could serve as a source of herbaceous forage and cover in the short term.

In every seasonal range, the presence of early seral (interim/final reclaimed) sites that provide greater horizontal and vertical ground cover or more diverse structural or flowering forms may serve important functional roles to all animal groups. This includes overwinter cover for non-hibernating small mammals,

substrate for invertebrate prey of migratory birds and GRSG, and supplemental sources of nutritious herbaceous forage for big game. In the long term, reclamation practices are expected, in varying degrees, to establish herbaceous communities that complement successional advance to former shrubland or woodland character.

The potential to influence big game both positively and negatively would vary by alternative. Big game would benefit (to varying degrees) by conservation measures designed to reduce or eliminate sagebrush loss or alteration. This would be the case where important seasonal ranges are coincident with PHMA or ADH, such as severe winter range (which supports up 90 percent of a herd's population during the most severe winters), summer range, or calving/production areas.

Similarly, reclamation practices designed to promote reestablishment of perennial grass and forb species would benefit big game species in the short term. Excluding or limiting disturbance in sagebrush habitat may increase the removal or modification of other community types that big game rely on (such as pinyon-juniper and mountain shrub) or lead to the occupation of important big game seasonal ranges (such as severe winter ranges and elk production). This could have negative impacts.

The most prevalent habitat-related risk from fluid minerals development in and potentially outside the planning area would extend primarily to woodland nesting raptors (that is, accipiters and owls). This would be the case where the clearing of pinyon-juniper woodlands can alter nest stand conformation or the character of the surrounding habitat for centuries. Because redevelopment of canopy structure suitable for raptor nesting is prolonged (e.g., 150 years or more), reductions in the suitable habitat base can accumulate rapidly at the landscape level. Avoidance of sagebrush habitats associated with each alternative could shift development into other community types, including pinyon-juniper, resulting in long-term habitat loss for many raptor species.

Development would most likely occur in three major vegetation complexes: pinyon-juniper, upland big sagebrush, and mountain shrub. The level of habitat loss in each respective community would vary by alternative. Excluding or limiting development in big sagebrush habitats (associated with PHMA and ADH) would benefit those nongame bird and small mammal species that are closely associated with sagebrush communities.

Additionally, the reestablishment of perennial herbaceous forms capable of providing more effective ground cover from reclamation requirements of the various alternatives would benefit ground or low shrub nesting birds and most small mammals in the short term. Relocation of development into communities that are incapable of supporting GRSG (pinyon-juniper, aspen/spruce/fir, and mountain shrub) could negatively influence those nongame species that rely more on these communities for cover, nesting, and forage.

Indirect Habitat Loss and Avoidance (Disruption to Species)

The avoidance of otherwise functional habitats due to human activity adds substantially to overall loss of habitat. Impacts on terrestrial wildlife from constructing and operating well pads and ancillary facilities (including maintenance activities) would be similar to those discussed above under *Impacts from Lands and Realty Management on Terrestrial Wildlife*. Impacts would vary depending on species.

Research has shown that big game have the tendency to avoid human disturbance, most commonly access roads and trails (Rost and Bailey 1979; Preisler et al. 2006). Increased traffic volumes could also increase the frequency of vehicle strikes, resulting in injury or direct mortality.

Raptors as a group and eagles in particular are birds afforded protection under the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act. Raptors traditionally receive pronounced management attention due to their relatively low abundance (high trophic level) and reproduction potential.

Raptors are considered to be among those birds most susceptible to reproduction failure caused by human activities. As indicated above under *Direct Habitat Loss*, conservation measures designed to avoid or reduce disturbance in sagebrush habitats may result in more concentrated development in other vegetation types, including woodland communities; however, a combination of COAs (nest surveys), NSO, and TL stipulations designed to prevent disrupting ongoing nesting would be applied regardless of alternative. An example of this disruption is development-induced absences of the adult birds sufficient to jeopardize egg or nestling survival from malnourishment, exposure, or predation. Clearing shrubland and woodland canopies would increase foraging habitat available primarily for buteo hawks, falcons, and eagles.

Although the response is species specific, migratory birds tend to avoid siting nests near disturbance. Inglefinger and Anderson (2004) found the nesting density of sagebrush-associated birds was reduced by 40 to 60 percent within 330 feet of roads accessing natural gas fields in Wyoming, with as few as 10 vehicle trips per day. Recent work from Wyoming gas fields (Gilbert and Chalfoun 2011) documents 10 to 20 percent declines in the abundance of sage sparrow and Brewer's sparrow in developed natural gas fields.

Conservation measures under each alternative and designed to reduce or eliminated impacts on GRSG and sagebrush habitat in each Colorado MZ would undoubtedly reduce the indirect influences of fluid minerals development on bird species closely associated with sagebrush communities: Brewer's sparrow, sage thrasher, and vesper sparrow. Activity in woodland and deciduous shrubland communities may intensify as a result of these conservation measures, leading to avoidance-based declines in habitat capacity. COAs, NSO, and TL stipulations may moderate the influence of development on breeding bird activity. Intervening topography and taller shrubland forms (e.g., serviceberry

and oakbrush) and woodland vegetation also could moderate development influence.

Habitat Fragmentation and Habitat Degradation

Fluid minerals development (well pads, roads, and associated structures) would physically fragment habitat across the landscape. This would reduce intact expanses of habitat and would increase edge habitats within the habitat matrix. In terms of functional connectivity, development patterns (scale and distribution) could influence animal movement patterns and may, depending on species mobility and behavioral responses, create absolute barriers.

Surface-disturbing activities can alter plant community composition and decrease species diversity and may lead to the proliferation of noxious weeds and invasive plant species. All of these can reduce the habitat quality for resident wildlife species. Conservation measures outlined in each alternative would reduce the potential for fragmentation and degradation across sagebrush landscapes within each Colorado MZ. The potential for development to be relocated into non-sagebrush habitats, either within or next to Colorado MZs, could alter the conformation or character of woodland and shrubland types. This could reduce habitat quality and carrying capacity.

Habitat Restoration/Improvement and Habitat Protection

Protections afforded to GRSG under the various alternatives would benefit those wildlife species whose ranges are coincident with PHMA or ADH. Conservation measures associated with each alternative would reduce or eliminate impacts associated with oil and gas development (see below). These measures include excluding development, limiting surface disturbance (disturbance cap), and applying TL and NSO stipulations.

Depending on the vegetation communities involved, habitat improvement projects and off-site mitigation designed to reduce oil and gas-related impacts on GRSG and sagebrush habitat can both positively and negatively influence other wildlife species. Habitat restoration projects designed to benefit GRSG would ostensibly benefit other sagebrush obligate species, particularly nongame mammals and birds. Modification of other community types (pinyon-juniper and mountain shrub) to promote sagebrush may negatively influence those species that rely on those vegetation types for food, cover, or nesting material.

Impacts may vary depending on scale. Prompt and effective reclamation practices associated with interim (pad) and final (pipeline) reclamation would accelerate the restoration of lands disturbed by development. This would benefit wildlife species in general by improving forage and cover resources (increased forb and perennial grass expression, reductions in annual, invasive species, and noxious weeds).

Summary of Impacts by Alternative

Under Alternative A, protective measures would vary by MZ (for existing LUPs, see **Chapter 2**), but generally this alternative would restrict fluid minerals development less than Alternatives B, C, and D. This would result in a greater potential for habitat loss or modification. Additionally, design features would be preferred not required in most instances. This could result in more direct and indirect impacts on sagebrush habitat and those wildlife species inhabiting the area. Overall, this alternative would have the greatest impacts on terrestrial wildlife species.

Under Alternative B, unleased areas in PHMA would be closed to fluid minerals leasing (see exception criteria detailed in **Chapter 2**). No new surface occupancy would be allowed in PHMA for existing leases, with exceptions for those leases located entirely in PHMA or within the 4-mile lek perimeter (see **Chapter 2**). In both cases surface disturbance would be limited to one well, pad, and pipeline per section, with no greater than 3 percent total disturbance per section. Seasonal timing restrictions during the nesting and early brood-rearing periods would apply to exploratory wells only and would be limited to PHMA.

Alternative B would provide greater benefit to terrestrial wildlife species than Alternatives A and D but fewer than Alternative C. Conservation measures applied under this alternative would be limited to PHMA in nearly all instances and could influence 617,500 acres (25 percent) of all federally managed GRSG habitats (ADH).

The above protective measures would benefit those wildlife species whose ranges or habitat are coincident with PHMA. Limiting disturbance to one per section, with no more than 3 percent, would also reduce the extent of direct habitat loss for terrestrial wildlife species whose ranges overlap PHMA. However, scale of disturbance (both direct and indirect) would depend on lease size and configuration within each Colorado MZ. In instances where several small leases occur entirely within PHMA or the 4-mile lek perimeter, pad and road development may have substantial impacts on wildlife species, depending on timing.

Excluding or reducing surface-disturbing activities in PHMA would shift development into habitats outside of PHMA. This may influence those species that use non-sagebrush communities for nesting, cover, and forage. Of particular note would be woodland raptors and migratory birds that commonly nest in pinyon-juniper. Direct removal or modification that compromises nest stand character would reduce the habitat quality or carrying capacity for local raptor and migratory bird populations. This would depend largely on amount and distribution of development.

Under Alternative C ADH would be closed to fluid minerals leasing (see exception criteria outlined in **Chapter 2**). In general, conservation measures

addressed in Alternative C are similar to those described for Alternative B; however, protections offered under this alternative would be expanded to include ADH, in most cases. This alternative applies further protective measures by prohibiting the construction of evaporative or infiltration reservoirs (coal bed methane wastewater). This would require agencies to explore options to amend or cancel leases in ACECs and occupied habitats and would disallow waivers to be issued. See **Chapter 2** for a detailed description of conservation measures under this alternative.

Alternative C would provide the greatest protective measures for terrestrial wildlife species whose ranges or habitat are coincident with ADH. This could influence up to 1,094,000 acres (43 percent) of all federally managed GRSG habitat (ADH). Discussions in Alternative B regarding benefits and potential negative impacts on terrestrial wildlife are directly applicable to Alternative C.

Alternative D would make all unleased parcels in PHMA an NSO area. Exception criteria would allow leasing in Colorado MZs where GRSG populations are healthy and stable and where development would not adversely affect GRSG populations. Development may be authorized in excess of the 5 percent disturbance cap (see **Chapter 2**). For leased areas, surface occupancy or disturbance would be prohibited within 4 miles of a lek in PHMA during the lekking and early brood-rearing periods.

Surface disturbance would be limited to 5 percent in any MZ, where practical. In those MZs where surface disturbance exceeds 5 percent, effective mitigation would be required to offset loss of sagebrush habitat; however, the BLM Authorized Officer may approve disturbance in excess of 5 percent without requiring additional mitigation. Exceptions, waivers, and modifications may be granted at the discretion of the BLM Authorized Officer and only with concurrence from the CPW.

Seasonal restrictions identical to those in Alternative B would also be applied to exploratory wells. Design features intended to reduce impacts on GRSG and sagebrush habitat would be preferred rather than required (PDFs).

Similar to Alternative B, conservation measures under Alternative D would be limited to PHMA and could influence 617,500 acres (25 percent) of all federally managed GRSG habitats (ADH). However, the potential for direct habitat loss and indirect impacts would be greater under this alternative, compared with Alternatives B and C. This would be due largely to the 5 percent disturbance cap and allowance for development to occur in PHMA (open for development). As such, this alternative would provide fewer protective measures to those terrestrial wildlife species whose ranges or habitats are coincident with PHMA than Alternatives B and C; however, it would provide more protective measures than Alternative A. As addressed in Alternative B, relocating development into non-sagebrush types may negatively influence those species that use other vegetation communities.

Unleased Fluid Minerals

Under the Proposed LUPA, no new leasing would be permitted within 1 mile of active leks, and no new surface occupancy would be allowed in PHMA (see exception criteria below) and within 2 miles of active leks in GHMA (see **Appendix D**).

Modifications and waivers would not be permitted; the BLM Authorized Officer may grant an exception to this NSO stipulation only under the following circumstances:

1. Where the proposed action would have no direct, indirect, or cumulative effects on GRSG or its habitat
2. When it is proposed as an alternative to a similar action on a nearby parcel and would provide a clear conservation gain to GRSG

Exceptions based on conservation gain (2 above) may be considered only as follows:

- In PHMA of mixed ownership, where federal minerals underlie less than fifty percent of the total surface
- On public lands where the proposed exception is an alternative to an action occurring on a nearby parcel that is subject to a valid federal fluid mineral lease as of the date of this RMP (revision or amendment).

Exceptions based on conservation gain must also include such measures as enforceable institutional controls and buffers sufficient to allow the BLM to conclude that such benefits would last for the duration of the proposed action's impacts.

> *Any exceptions to this lease stipulation may be approved by the Authorized Officer only with the concurrence of the State Director. The Authorized Officer may not grant an exception unless the applicable state wildlife agency, the USFWS, and the BLM unanimously find that the proposed action satisfies* [1 or 2 above]. *Such finding shall initially be made by a team of one field biologist or other GRSG expert from each respective agency. In the event the initial finding is not unanimous, the finding may be elevated to the appropriate BLM State Director, USFWS State Ecological Services Director, and state wildlife agency head for final resolution. In the event their finding is not unanimous, the exception will not be granted. Approved exceptions will be made publically available at least quarterly.* (**Appendix D**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations)

Disturbances would be limited to 3 percent or 1 disturbance per 640 acres density of PHMA in each Colorado Management Zone. No new leasing would be allowed if the disturbance cap exceeds this amount. Seasonal restrictions

would apply to construction, drilling, and completion within 4 miles of active leks during the GRSG reproduction period of March 1 to July15.

Under the Proposed LUPA, no new leasing would be permitted within 1 mile of active leks, and no new surface occupancy would be allowed in PHMA (see exception criteria below) and within 2 miles of active leks in GHMA (see **Appendix D**).

The Proposed LUPA would provide protections similar to those under Alternatives B and C for wildlife species whose habitat or ranges are within 4 miles of active leks or that coincide with PHMA. Conservation measures applied under the Proposed LUPA could influence approximately 2,374,500 acres of federally managed GRSG habitats (ADH).

The potential for direct habitat loss and indirect impacts is similar to that described under Alternative B. This is because in addition to 1 mile around active leks managed as closed to leasing (224,200 acres), all of the PHMA would be managed as no surface occupancy, with very rare exceptions granted (1,315,500 acres). Additionally a 3 percent disturbance cap or 1 disturbance per 640 acres density would be allowed in each Colorado Management Zone in PHMA. This would increase the potential for direct and indirect impacts on other terrestrial wildlife species.

The Proposed LUPA would provide more protective measures than Alternatives A or D. This is because it would close to leasing areas within 1 mile of active leks (224,200 acres would be closed to leasing under the Proposed LUPA, and no acres would be closed to leasing under Alternatives A and D).

Furthermore, the potential for direct habitat loss and indirect impacts would be reduced under this alternative. This is because no new leasing would be allowed if the disturbance cap were to exceed 3 percent of any Colorado Management Zone, compared with 5 percent under Alternative D. NSO stipulations discussed above would further reduce the amount of direct habitat loss and indirect disturbance to terrestrial wildlife species compared with Alternative D. As addressed in Alternative B, relocating development into non-sagebrush types may negatively influence those species that use other vegetation communities.

Leased Fluid Minerals

Under the Proposed LUPA, surface disturbance, surface occupancy, and disruptive activities would be precluded within 1 mile of active leks. Under two scenarios, the criteria described in **Chapter 2, Table 2.8**, Line 47 and the mitigation outlined in **Appendix G** would be used to guide development that would result in the fewest impacts on GRSG and GRSG habitat. The scenarios are as follows:

- If it were determined that the restriction would render the recovery of fluid minerals infeasible or uneconomical (considering the lease as a whole)
- If development would exceed the disturbance density of 1 disturbance per 640 acres, or 3 percent of a Colorado Management Zone

These same criteria would be applied to proposed development in the remainder of PHMA (outside of a mile) or GHMA within 4 miles of active leks.

Seasonal restrictions would apply to construction, drilling, and completion within 4 miles of active leks during the GRSG reproduction period of March 1 to July15. The BLM Authorized Officer may adjust the dates of the timing limitation in consultation with the State of Colorado if criteria described in Table 2.4, Line 47 were met.

The Proposed LUPA would provide more protections than Alternatives A and D but fewer than Alternatives B and C to those wildlife species whose habitat or ranges are within 4 miles of active leks or coincide with PHMA.

Conservation measures applied under the Proposed LUPA could influence approximately 1,185,400 acres of all federally managed GRSG habitats. The potential for direct habitat loss and indirect impacts would be greater under this alternative, compared with Alternatives B and C. This is because surface occupancy/disturbance and disruptive activities would be precluded only within 1 mile of active leks, compared with all of PHMA and ADH (with exception criteria [see item 49, **Table 2.4**]), as outlined in Alternatives B and C, respectively. Additionally, a 3 percent or 1 disturbance per 640 acres density would be permitted.

The Proposed LUPA would provide more protective measures to those species whose habitat or ranges are coincident with PHMA than Alternatives A and D. This is because it would preclude surface occupancy/disturbance and disruptive activities within 1 mile of active leks and would limit disturbances to 3 percent or 1 disturbance per 640 acres (when feasible) density in any Colorado Management Zone.

In comparison, Alternative D would limit permitted disturbances to 5 percent of any Colorado Management Zone and would prohibit disturbances and surface occupancy only during the GRSG reproduction period. As addressed in Alternative B, relocating development into non-sagebrush types may negatively influence those species that use other vegetation communities.

Impacts from Solid Minerals—Coal Management on Terrestrial Wildlife

Surface Mines

Direct Habitat Loss/Habitat Fragmentation/Species Disruption/Habitat Degradation. Construction and occupation of surface mines result in a minimum of 30 years habitat loss of forage and cover resources for resident wildlife. These communities would not regain any functional utility for wildlife species for several decades and would greatly depend on reclamation effectiveness. In general, impacts on terrestrial wildlife species would be similar to those described above for fluid minerals but may vary in scale, duration, and intensity.

Habitat Restoration/Improvement. Benefits to local wildlife populations would be similar to those discussed above for subsurface mining.

Summary of Impacts by Alternative. Alternative A—Although impacts on terrestrial wildlife would be similar to those discussed under Alternative A, the scale of habitat loss is likely to be larger.

Alternative B—Under Alternative B, all coal surface mining would be found unsuitable under the criteria set forth in 43 CFR, Part 3461.5, in PHMA. Additionally, minimizing surface-disturbing or surface-disrupting activities would be applied at the planning level to ADH. Impacts on terrestrial wildlife species would be similar to those discussed under Alternative B, Subsurface Mining.

Alternative C—Impacts on terrestrial wildlife are identical to those discussed under Alternative B.

Alternative D—Under this alternative, the requirements of 43 CFR, Part 3461, would be applied to determine unsuitability (see **Chapter 2**). Impacts on terrestrial wildlife would be similar to those discussed under Alternative D, Subsurface Mining.

Proposed LUPA—No new surface coal mine leases would be allowed in PHMA. Impacts on terrestrial wildlife species would be similar to those under Alternatives B and C.

Subsurface Mining

Direct Habitat Loss/Disruption to Species/Habitat Degradation. The largest coal resources and active mining in the range-wide planning area are in the LSFO, followed by the WRFO and GJFO (see **Section 3.7.1**, Minerals—Leasable, Existing Conditions). Aboveground appurtenant facilities generally associated with subsurface coal mines would result in vegetation removal or alteration and longer-term occupation of a site. Impacts on wildlife populations from mining and daily operations and maintenance of aboveground facilities, including traffic, would be similar to those discussed under *Impacts from Fluid Minerals Management on Terrestrial Wildlife*, above; however, these impacts may vary in scale, duration, and intensity.

Habitat Restoration/Improvement. Benefits to local wildlife populations attributed to habitat improvement projects, off-site mitigation, and reclamation associated with aboveground facilities would be similar to those discussed under *Impacts from Fluid Minerals Management on Terrestrial Wildlife*, above. Protections outlined in each alternative below would benefit those species whose ranges are coincident with PHMA and ADH. These protections include siting new surface facilities outside of PHMA, collocating facilities where appropriate, minimizing/limiting surface disturbance (including operations and maintenance), and applying PDFs. (See detailed discussion under *Impacts from Fluid Minerals Management on Terrestrial Wildlife*.)

Summary of Impacts by Alternative. Alternative A—Impacts would vary by Colorado MZ (existing LUPs), with some federal lands being considered as unsuitable based on potential for resource impacts (see **Chapter 2**). Overall, this alternative would have the least restrictive measures on solid minerals leasing and development, and it would result in the greatest potential for habit loss and disruption; therefore, Alternative A would have the highest potential to impact terrestrial wildlife species.

Alternative B—Under this alternative, no new coal leases would be granted unless all appurtenant facilities are located outside of PHMA or priority areas. New facilities associated with an existing lease would be placed outside of PHMA when possible or in previously disturbed areas within PHMA. New facilities would be required to be built to the minimum standard necessary. Minimization of surface-disturbing or surface-disruptive activities would be applied at the planning level to ADH.

Alternative B would result in the least potential for loss of GRSG habitat and would reduce the indirect influences from solid minerals development. Conservation measures designed to exclude or minimize surface-disturbing activities would provide the greatest benefit to those terrestrial wildlife species whose ranges or habitats are coincident with PHMA. Conversely, relocating facilities into habitats outside of PHMA would result in the incremental loss of forage or cover resources and a greater potential for disruption for those wildlife species outside of PHMA.

Alternative C—Impacts on terrestrial wildlife are identical to those described under Alternative B.

Alternative D—No new coal leases would be granted unless all surface-disturbing activities were located outside of PHMA, with exception criteria outlined in **Chapter 2**. Surface-disturbing activities would be limited to 5 percent within each Colorado MZ. If disturbance were to exceed 5 percent, effective mitigation to offset loss of habitat would be required. For existing coal leases, lessees would be encouraged to voluntarily follow PDFs that reduce or mitigate adverse impacts on GRSG and ADH (see **Chapter 2**). Impacts on terrestrial wildlife would be similar to those described under Alternative B;

however, because Alternative D allows for greater flexibility in development potential (exception criteria, 5 percent disturbance cap, and voluntary commitment), it would result in greater potential for direct habitat loss and indirect impacts on terrestrial wildlife species than Alternatives B and C.

Impacts on terrestrial wildlife species under the Proposed LUPA would be similar to Alternative D for existing coal leases; however, under this alternative, expansions to existing coal leases may be considered if, after consultation with the State of Colorado, the proposed expansion would not have an adverse influence on GRSG and GRSG habitat based on the criteria outlined in **Table 2.4**, item 62. This alternative has the potential for greater direct and indirect impacts on terrestrial wildlife species, whose habitat or ranges are coincident with PHMA. This is because it may result in development in non-sagebrush communities.

This alternative could allow for mineral recovery without compromising the function and utility of habitats that support GRSG.

For new mining leases, no surface occupancy would be allowed within 2 miles of active leks, with no exceptions. An NSO stipulation would be placed on the remainder of PHMA, but exceptions may be granted. This could allow for surface occupancy within PHMA; however, based on criteria outlined in **Appendix D**, an exception would be granted only if, through consultation with the state, the proposed disturbance were shown to not have a negative influence on GRSG and GRSG habitat. Disturbances would be limited to 3 percent or 1 disturbance per 640 acres density of a Colorado Management Zone; no new leasing would be allowed in PHMA if the disturbance cap were to exceed 3 percent. The Proposed LUPA would allow for greater development potential than would Alternatives B and C.

The Proposed LUPA would have greater potential for direct and indirect impacts on terrestrial wildlife species and habitat than Alternatives B, C, and D, but it would have fewer than Alternative A. Conservation measures applied under Alternatives B, C, and D would effectively influence 1,396,300 acres of PHMA because no new surface occupancy or surface disturbance would be permitted for new mining leases. In comparison, conservation measures in the Proposed LUPA would be applied only within 2 miles of active leks (approximately 118,100 acres of PHMA), with the potential for surface occupancy/disturbance on the remainder of PHMA.

The Proposed LUPA would allow for potential development if, after consultation with the State of Colorado, the proposed surface-disturbing activity were shown to not have an adverse influence on GRSG or GRSG habitat. As such, this alternative would benefit those species that rely on sagebrush communities; however, it may result the incremental loss of forage over cover resources to non-sagebrush obligates (e.g., pinyon-juniper and mountain shrub types).

Impacts from Locatable Minerals Management on Terrestrial Wildlife

Direct Habitat Loss/Disruption to Species/Habitat Degradation

Impacts from locatable minerals development on terrestrial wildlife populations would be the same or similar to those discussed above under *Impacts from Fluid Minerals Management on Terrestrial Wildlife* but may vary in scale, duration and intensity.

Habitat Restoration/Improvement and Habitat Protection

Benefits to local wildlife populations attributed to restoration and reclamation would be similar to those discussed above under *Impacts from Fluid Minerals Management on Terrestrial Wildlife*. Protections outlined in each alternative below would benefit those species whose ranges are coincident with PHMA and ADH. These protections are limiting surface disturbance, clustering developments, placing infrastructure in previously disturbed areas, minimizing road development, avoiding priority sagebrush habitats, and applying PDFs. See detailed discussion in the *Impacts from Fluid Minerals Management on Terrestrial Wildlife* section above.

Summary of Impacts by Alternative

Alternative A—Impacts would vary depending on MZ (existing LUPs); however, overall most public lands would be available for mining claim location with certain exceptions, such as SRMAs, ACECs (LSFO), and WSAs (WRFO), if withdrawn. Seasonal restrictions would be applied if deemed necessary in some situations, with limited potential for additional mitigation requirements. In general, this alternative would have the fewest restrictive measures on locatable minerals development and reclamation provisions. This would result in greater potential for direct habitat loss and indirect influences to terrestrial wildlife species in general.

Alternative B—Alternative B would propose the withdrawal of mineral entry in PHMA, based on impacts on GRSG and associated habitats. See **Table 2.6**, Comparative Summary of Alternatives, for comparison of acres identified for withdrawal by alternative. Existing claims within the withdrawal area would be subject to validity exams. Additional effective mitigation and seasonal restrictions may be applied. RDFs outlined in **Chapter 2** would further reduce direct and indirect impacts in ADH.

Alternative B would provide the greatest protections to terrestrial wildlife species whose ranges or habitats are coincident with ADH, if areas proposed for withdrawal are withdrawn. Reclamation and restoration requirements would benefit those wildlife species as well in the short and long term. Surface-disturbing activities from locatable minerals development would be relocated to areas outside of PHMA. Avoidance of sagebrush communities could impact wildlife species that require non-sagebrush communities for forage, nesting, and cover. Impacts would depend on the level and distribution of development.

Alternative C—Impacts on terrestrial wildlife are identical to those described under Alternative B.

Alternative D—Appropriate effective mitigation would be included in plans of operation. Seasonal restrictions would be applied if deemed necessary. Design features outlined in **Chapter 2** would be applied to ADH but would not be required. Overall, Alternative D would offer fewer restrictive measures than Alternatives B and C; therefore, it would have a greater impact on terrestrial wildlife species whose ranges/habitats overlap PHMA and ADH.

The Proposed LUPA—Locatable minerals would be managed the same under this alternative as under Alternative D; impacts are the same as those described for Alternative D, above.

Impacts from Nonenergy Leasable Minerals Management on Terrestrial Wildlife

Direct Habitat Loss/Disruption to Species/Degradation

Impacts from nonenergy leasable minerals development on terrestrial wildlife populations would be the same or similar to those discussed under *Impacts from Fluid Minerals Management on Terrestrial Wildlife*, above, but they may vary in scale, duration, and intensity.

Habitat Restoration/Improvement and Habitat Protection

Benefits to local wildlife populations attributed to reclamation would be similar to those discussed under *Impacts from Fluid Minerals Management on Terrestrial Wildlife*, above. Protections outlined in each alternative below would benefit those species whose ranges are coincident with PHMA and GHMA. These protections include limiting surface disturbance, avoiding PHMA, collocating facilities where appropriate, minimizing/limiting surface disturbance (including operations and maintenance), and applying PDFs. See detailed discussion under *Impacts from Fluid Minerals Management on Terrestrial Wildlife*.

Summary of Impacts by Alternative

Alternative A—Impacts would vary depending on MZ (existing LUPs). Under this alternative, a small percentage of PHMA approximately 6 percent or 9,600 acres in MZ 17 would be closed to nonenergy leasable mineral leasing; the remainder of ADH would be open to leasing (including expansion of new leases), with no cap on surface-disturbing activities. As such, this alternative would allow for the greatest amount of direct habitat loss (and indirect influences) and would have the greatest impact on terrestrial wildlife species.

Alternative B—Under this alternative, all PHMA would be closed to nonenergy leasable mineral leasing (1,106,600 acres, or 44 percent of federally managed GRSG habitat [ADH]). Additionally, existing mines would not be permitted to expand. RDFs would be applied for solution mining wells in PHMA. By reducing the amount of direct habitat loss, Alternative B would provide the greatest

benefit to terrestrial wildlife species, whose ranges or habitats are coincident with PHMA.

RDFs would also reduce both direct and indirect impacts of nonenergy minerals development. Conversely, the potential for nonenergy leasable minerals development to be relocated outside of PHMA could result in direct habitat loss or modification in non-sagebrush communities (as well as indirect influences). This could have negative impacts on wildlife species inhabiting those areas.

Alternative C—Impacts on terrestrial wildlife species are identical to those described under Alternative B.

Alternative D—Under this alternative PHMA currently available for nonenergy minerals leasing would remain open. Alternative D would consider allowing expansion of existing nonenergy mineral leases. Surface-disturbing activities would be limited to 5 percent in any MZ. If disturbance exceeds 5 percent, additional mitigation would be required to offset the resulting loss of GRSG habitat. Direct habitat loss attributed to the development and expansion of nonenergy leasable minerals, as well as indirect influences, would be greater under this alternative than Alternatives B and C. This would result in greater impacts on terrestrial wildlife species.

Proposed LUPA—No new nonenergy mineral leasing would be allowed in PHMA. Impacts on terrestrial wildlife from managing nonenergy leasable minerals are similar to those described for Alternative B, above.

Impacts from Salable Mineral Management on Terrestrial Wildlife

Direct Habitat Loss/Disruption to Species/Habitat Degradation

Impacts from salable minerals development on terrestrial wildlife populations would be the same or similar to those discussed above under *Impacts from Fluid Minerals Management on Terrestrial Wildlife*; however, they may vary in scale, duration, and intensity.

Habitat Restoration/Improvement and Habitat Protection

Benefits to local wildlife populations attributed to habitat restoration and reclamation would be similar to those discussed under *Impacts from Fluid Minerals Management on Terrestrial Wildlife*. Protections outlined for each alternative below would benefit those species whose ranges are coincident with PHMA and GHMA. These protections include siting new surface facilities outside of PHMA, collocating facilities where appropriate, minimizing/limiting surface disturbance (including operations and maintenance), and applying PDFs. See detailed discussion under *Impacts from Fluid Minerals Management on Terrestrial Wildlife*.

Summary of Impacts by Alternative

Alternative A—Impacts on terrestrial wildlife species would vary by MZ (existing LUPs); however, in most cases this alternative would allow for the continued development of salable minerals, with certain exceptions (such as WSAs and cultural sites; see **Chapter 2**). Overall, this alternative would provide the fewest restrictive measures on salable minerals development and subsequent reclamation requirements; therefore, it could result in more habitat loss than Alternatives B, C, and D. As such, this alternative would have the most potential to impact terrestrial wildlife species.

Alternative B—Under this alternative, PHMA would be closed to mineral material sales (1,246,200 acres, or 50 percent of federally managed GRSG habitat [ADH]). All salable mineral pits located in PHMA that are no longer in use would be restored to meet GRSG habitat conservation objectives. As such, Alternative B would provide the greatest benefit to those wildlife species whose ranges and habitats are coincident with PHMA. Surface-disturbing activities from salable minerals development would be relocated outside of PHMA. This would result in habitat loss or modification of other vegetation types (mountain shrub and pinyon-juniper). This could have negative impacts on those wildlife species associated with non-sagebrush communities.

Alternative C—Impacts on terrestrial wildlife species would be similar to those described under Alternative B, with greater protections for those species whose ranges overlap ADH.

Alternative D—Under this alternative, PHMA currently available for mineral material sales would remain open. Alternative D would consider allowing existing mineral material sale sites to continue operations (including expansions). Surface-disturbing activities would be limited to 5 percent within each MZ. Where disturbance exceeds 5 percent, mitigation to offset habitat loss would be necessary.

Restoration of unused salable mineral pits would be required in ADH. Restoration and reclamation would be required as a long-term goal to improve GRSG habitat. In general, Alternative D could allow for more direct habitat loss by allowing salable minerals development to continue. This would have greater impacts on terrestrial wildlife species whose ranges and habitat are coincident with PHMA than Alternatives B and C. Conversely, restoration and reclamation of unused pits would extend to ADH (compared with PHMA under Alternatives B and C). This would allow for incremental gains in forage and cover resources for many wildlife species. This would greatly depend on reclamation success and effectiveness, but it would provide nominal benefit to most wildlife species in the short and long term.

Proposed LUPA—Locatable minerals management would be the same under this alternative as under Alternatives B and C; impacts are the same as described under those alternatives.

Impacts from Wildfire Suppression, Fuels Management, and Fire Rehabilitation on Terrestrial Wildlife

Direct Habitat Loss and Habitat Fragmentation

Depending on the extent, location, severity, and seral type affected, unplanned ignitions would have short-term impacts on terrestrial wildlife species by removing or degrading habitat for some species, injuring or killing slow-moving species, causing habitat avoidance and changes in species movement patterns, or reducing population viability and increasing the contribution to the need to list a species. In areas that are available for fuels treatments, changes in vegetation can result in negative impacts on terrestrial wildlife, such as direct habitat loss, habitat fragmentation, and disruption to species; however, it can also result in beneficial impacts, such as habitat restoration.

A concern of resetting vegetation seral stage through fuels management is the invasion of undesirable plant species. Noxious and invasive weeds are often of lower value to wildlife and degrade wildlife habitat by reducing optimal cover or food. Sagebrush-steppe communities are among the ecosystems most vulnerable to invasion and degradation by invasive weeds.

Cheatgrass invasion is also a threat to some treatment areas. Invasive nonnative plants with little or no forage value for big game species are increasing in some areas. The greatest impacts have occurred to big game winter range areas with low precipitation rates. Not only can invasive species outcompete most native plants when moisture is limited, they can also change site-specific fire ecology and result in the loss of critical shrub communities. Cheatgrass would provide some short-term forage benefits to big game species while in early stages of growth; however, it lacks the ability to provide high quality forage during most of the year.

Fire suppression removes vegetation and disturbs soil and can have both short- and long-term impacts on big game and other habitats. For example, using heavy equipment to construct fire lines can cause habitat loss, degradation, and fragmentation in the short term. Moreover, if not rehabilitated, these fire lines can cause erosion and provide opportunities for the spread of undesirable plant species, thereby resulting in long-term adverse impacts on wildlife habitat; therefore, timely rehabilitation following fire is important to maintaining the quality of wildlife habitats.

Although both planned and unplanned wildland fire adversely impacts wildlife habitats in the short term by removing vegetation and disturbing soil, the long-term benefits of wildland fire often outweigh the short-term adverse impacts. For example, prescribed fire can be used to restore conditions benefiting wildlife species favoring early plant succession stages and young age classes of woody plants (McAninch et al. 1984). Prolonged fire suppression has allowed

fuels to build up to the point that an unplanned wildfire is likely to be much larger in size and greater in intensity.

Some wildlife species thrive on the occurrence of fire. The herbaceous and woody plants that establish following a burn provide abundant leaves and seeds, which are used by small rodents and birds that in turn are important prey for a variety of avian and mammalian predators. Over the short term, the wildlife community is changed dramatically by a fire, as taller and denser vegetation is replaced by a more open habitat.

As the area gradually recovers, however, many of the pre-fire components become reestablished, and the area again supports a community associated with denser forests. This cycle may take decades or centuries, depending on the dominant plant species; or it might never occur if climatic conditions are no longer suitable for the former dominant species. Wallmo (1980) suggests that fire improves the palatability of forage and causes browse plants to resprout close to the ground, putting the current season's growth within reach of deer for several years.

Additionally, wildland fire can improve the quality of wildlife habitat by releasing soil nutrients, reducing fuel load, or setting back trees encroaching into shrubland or grassland habitats.

Fuels treatments could be beneficial for species that depend on younger seral stages. In the long term, wildlife would benefit from most wildfires and fuels management due to an increase in vegetation productivity and to increased plant diversity and age classes; this would, in turn, provide additional forage, cover, and prey base. Mimicking natural periodic disturbance is often necessary in order to stimulate plant productivity, increase diversity, and increase nutritional value.

Foraging opportunities for big game and other herbivores would increase as understory grasses, forbs, and shrubs become reestablished. The benefits for mule deer and elk are likely to be long term. Directly following application of fire there is generally more palatable browse available for wild ungulates.[1] Improving vegetation in upland areas would provide more forage to big game species and other herbivorous species that occur in these areas and would result in direct beneficial impacts. In addition, fuels treatments in upland areas often result in increased forage production, which diverts livestock and wildlife use from riparian and wetland areas. This would increase the vigor and structural diversity of these plant communities.

Following a wildfire, ESR is implemented to protect and conserve habitats that have sustained damage or degradation from catastrophic wildfire. Typically these

[1]Hooved grazing animals

activities are beneficial for terrestrial wildlife species and are designed to improve the overall condition of the area, which in turn improves habitat for wildlife. For example, weed seed-free seeding would stabilize soil and reduce the spread of noxious weeds. Additionally, replacing organic matter in disturbed areas would protect topsoil and provide a suitable bed for the restoration of a native vegetation community.

Disruption to Species

The noise from heavy equipment and chainsaws could temporarily disperse bird species from breeding and nesting habitat and wildlife from occupied habitat. Prescribed burning could also disturb nesting bird species from smoke inadvertently drifting into occupied habitat. These activities could remove suitable habitat or other desirable vegetation.

Disturbances from heavy equipment, chainsaws, and prescribed burning would be localized and short term. Most wildlife species would move into adjacent untreated areas; however, direct mortality during the vegetation treatments is possible. TLs (such as those for big game birthing areas, raptor nesting, and big game winter habitat), as well as site-specific COAs, could mitigate the short-term impacts resulting from the treatments.

ESR treatments following a wildfire are effective in restoring wildlife habitat. However, equipment is often noisy, and noise may alter animal behavior or cause wildlife to leave an area during the disturbance period. These impacts would be short term and not likely to have much effect on the long-term health and habitat use of wildlife in the treatment area.

Summary of Impacts by Alternative

Alternative A would have the fewest restrictions for fuels management actions, with the most potential for vegetation disturbance. Additionally, Alternative A would not prioritize fire operations beyond what has already been determined in the fire management plans for the area; therefore, Alternative A would have the greatest impact on terrestrial wildlife.

Alternative B is more restrictive than Alternative A, though all of the restrictions fall within PHMA; therefore, impacts from fuels management on terrestrial wildlife would be less than under Alternative A, but only within PHMA. Additionally, Alternative B would prioritize fire operations in PHMA and GHMA, immediately after life and property; therefore, the potential for disturbance to terrestrial wildlife within these habitats is lower under Alternative B than Alternative A.

Alternative C would prioritize fire operations in PHMA, immediately after life and property; therefore, the potential for disturbance to terrestrial wildlife within PHMA would be the same as Alternative B but less than Alternative B in GHMA. With regard to fuels management, Alternative C is more restrictive than Alternative B since all of the management actions fall within ADH;

therefore, impacts from fuels management on terrestrial wildlife would be less than Alternative B. Conversely, Alternative C does not offer as many protective management actions that could benefit terrestrial wildlife as Alternative B and D, so it has more potential for habitat degradation than the other alternatives.

Alternative D would give priority to fire operations in PHMA and GHMA, immediately after firefighter and public safety, unless site-specific conditions warrant an exception. With regard to fuels management, Alternative D is more restrictive than Alternative B since all of the management actions fall within ADH; therefore, impacts from fuels management on terrestrial wildlife are less than Alternative B. Concurrently, Alternative D offers the same protective measures as Alternative B but applies them to ADH; therefore, it has the potential for more benefits to terrestrial wildlife than Alternatives B and C.

Management of wildfire suppression, fuels management, and fire rehabilitation under the Proposed LUPA would be the same as that for Alternative D. Impacts from the Proposed LUPA, therefore, are the same as for Alternative D, above.

Impacts from Habitat Restoration on Terrestrial Wildlife

Direct Habitat Loss and Habitat Fragmentation

Depending on the extent, location, treatment, and seral type affected, habitat restoration would have short-term impacts on terrestrial wildlife species. The extent of these disturbances would vary by the extent and type of treatment, as discussed in the sections that follow.

Over the short term, fire and other vegetation treatments could make habitats less suitable for some wildlife species, requiring displaced wildlife to find suitable habitat elsewhere. If these habitats were already at or near capacity in the number of wildlife they could support, displaced animals might perish or suffer lower productivity. In many cases, the treatments would return all or a portion of the treated area to an early successional stage, favoring early successional wildlife species.

In areas where fire suppression has historically occurred, vegetation treatments could benefit native plant communities by mimicking a natural disturbance component that has been missing from these communities. Treatments would also restore native vegetation in areas where weeds and other invasive vegetation have displaced native plant species. Wildlife that occurred historically in these areas would likely increase in numbers, while species that have adapted to the disturbed conditions would decline.

A concern in habitat restoration is the invasion of undesirable plant species from soil disturbance. Noxious and invasive weeds are often of lower value to wildlife and degrade wildlife habitat by reducing optimal cover or food. Sagebrush-steppe communities are among the ecosystems most vulnerable to invasion and degradation by invasive weeds. Cheatgrass invasion is also a threat

to some treatment areas. Invasive nonnative plants with little or no forage value for big game species are increasing in some areas. Not only can invasive species outcompete most native plants when moisture is limited, they can also change site-specific fire ecology and result in the loss of critical shrub communities.

Treatments that remove large amounts of pinyon-juniper woodlands can adversely affect interior species of wildlife and species that feed on insects found on the plant surface and under the bark. Mule deer use pinyon-juniper woodlands, and much of mule deer winter habitat in northwest Colorado is pinyon-juniper. Removal of pinyon-juniper would reduce the amount of food and cover for these animals (Terrell and Spillet 1975). Additionally, pinyon-juniper woodlands support a greater diversity of bird species than many forest communities. Reptiles, rodents, rabbits, and other small and large mammals depend on these communities (Maser and Gashwiler 1978).

Disruption to Species

The noise from heavy equipment and chainsaws could temporarily disperse bird species from breeding and nesting habitat and wildlife from occupied habitat. Disturbances from heavy equipment, chainsaws, and prescribed burning would be localized and short term. Most wildlife species would move into adjacent untreated areas, but direct mortality during the vegetation treatments is possible. TLs (such as those for big game birthing areas, raptor nesting, and big game winter habitat), as well as site-specific COAs (such as TLs for migratory bird nesting), could mitigate the short-term impacts resulting from the treatments.

Habitat Protection

Removal of nonnative species and vegetation from habitats that support terrestrial wildlife populations would likely provide some degree of benefit to most terrestrial species that occur on public lands. It would do this by creating more native habitat conditions and reducing the likelihood of a future catastrophic wildfire. The degree of benefit to terrestrial wildlife would depend, in large part, on the habitat needs of the species and its ability to avoid mechanical equipment or a prescribed fire.

Nonnative plant species reduce the suitability of some habitats to support terrestrial wildlife species. Some species require, or at the very least prefer, certain plants as food sources. Encroachment of nonnative plant species and displacement of native plant species that serve as important sources of food reduce the suitability of the habitat for these wildlife species. For these species, vegetation treatments would likely provide a long-term benefit to habitat and could improve the suitability of other areas. This could create additional habitat into which the population could expand.

Opening dense stands of pinyon and juniper benefits edge species, ground-feeding and ground-nesting birds, and small mammals. Opening 250 acres or less by mechanical means benefits deer, small mammals, and turkeys and other birds.

Breeding bird densities differ in treated and untreated areas, with ground-nesting birds being more prevalent in chained versus unchained pinyon-juniper stands (Scott and Boeker 1977; Payne and Bryant 1998).

Leaving slash, debris, and downed trees provides microhabitat for rabbits and songbirds. If harvested material were windrowed or piled, it would provide hiding cover for small mammals and rotting vegetation that could be used by reptiles and amphibians for cover. These species could also forage on insects and other invertebrates found under this debris.

Restoring a variety of native plant species, possibly coupled with controlling noxious weeds and other invasive species, would maintain or improve migratory bird nesting habitat in the long term. Potential impacts on habitat of nongame mammals, native game birds, amphibians, and reptiles would be relatively minor and short term and would be offset in the long term by improved habitat. In general, habitat mitigation treatments would provide a mosaic of perennial grass stands and patches of big sagebrush.

Summary of Impacts by Alternative

Alternative A would have the fewest restrictions for habitat restoration, with the most potential for vegetation disturbance. Additionally, Alternative A would not prioritize habitat restoration and restoration guidelines beyond what has already been determined in the LUPs for the targeted areas; therefore, Alternative A would have the greatest impact on terrestrial wildlife species.

Requirements for habitat restoration are more restrictive under Alternative B than Alternative A. For example, restoration projects would be prioritized in GRSG habitat so impacts on other species that have different or contrary habitat requirements would be greater under this alternative.

Alternative C is more restrictive than Alternative B, so impacts from habitat restoration on terrestrial wildlife species would be less than Alternative B. Additionally, Alternative C provides guidelines that are specific to the restoration of sagebrush for GRSG, so it would have more impacts on those terrestrial species that have different or contrary habitat requirements.

Alternative D is more restrictive than Alternative A but less than Alternatives B and C. Alternative D offers habitat restoration guidelines but also offers exemptions for other resources valued by the BLM and Forest Service; therefore, there is potential for less impact on terrestrial species under Alternative D from the habitat restoration guidelines than under Alternatives B and C. Management of habitat restoration under the Proposed LUPA would be the same as Alternative D; impacts on terrestrial wildlife from habitat restoration would be the same as described for the Proposed LUPA.

Impacts from ACEC and Zoological Area Management on Terrestrial Wildlife

Habitat Protection

Areas that are designated as ACECs would be more beneficial to terrestrial wildlife than areas that are not designated as ACECs. Prohibiting surface-disturbing activities and other authorized activities would benefit terrestrial wildlife by precluding activities that would have direct and indirect impacts on terrestrial wildlife.

Alternative A recognizes all of the existing ACEC designations. This would have fewer beneficial impacts on terrestrial wildlife than Alternative C, which would make all PHMA an ACEC.

Alternative B would also recognize only the existing ACEC designations. Impacts under Alternative B would be the same as impacts under Alternative A.

Alternative C would recognize all of the existing ACECs and would also make all PHMA an ACEC for protection of sagebrush habitat. Impacts on terrestrial wildlife under Alternative C would be the same as for Alternatives A, B, and D. ACEC designations would provide no additional protections beyond what is included in the management actions for those alternatives for the protection of GRSG habitat.

Alternative D would recognize all of the existing ACECs but would not designate any new ACECs. Impacts from Alternative D would be the same as for Alternatives A and B.

No new ACECs would be designated under the Proposed LUPA; impacts from designation of ACECs on terrestrial wildlife would be the same as described under Alternative D.

Summary of Impacts on Terrestrial Wildlife

Alternative A provides the least amount of protection for terrestrial wildlife in the planning area. Alternative A puts very few restrictions on development, which could result in the most modification of the landscape, and consequently, the most impacts on terrestrial wildlife. Alternative A would have the least potential to result in concentration of development in other habitats that do not support GRSG.

Alternative B provides a greater level of protection for terrestrial wildlife than Alternative A, but it would provide a lower level of protection than Alternative C. Alternative B also has a greater potential for development to occur outside of PHMA which would have a greater impact on terrestrial wildlife in those areas.

Alternative C would provide the most protection for terrestrial wildlife. However, Alternative C would have a greater potential for development to

occur outside of ADH, which would have a greater impact on terrestrial wildlife in those areas. The most restrictions would be placed on development under Alternative C, which would afford the most protection for terrestrial wildlife.

Alternative D would provide more protection for terrestrial wildlife than Alternative A, but it would provide less protection overall than Alternatives B and C. More flexibility for development is built into Alternative D, which could result in higher levels of development than Alternatives B and C.

The Proposed LUPA would provide slightly greater protections for terrestrial wildlife to those described under Alternative D, due to less flexibility for development and greater restrictions on development in GRSG PHMA and GHMA.

4.4 AQUATIC WILDLIFE, INCLUDING SPECIAL STATUS FISH AND AQUATIC SPECIES

Aquatic organisms include fish and amphibians that reside in streams and water bodies as well as those in wetlands and riparian areas.

4.4.1 Methodology and Assumptions

General Impacts on Aquatic Wildlife

Indicators of impacts on aquatic wildlife and the measurements used to describe the impacts (where available or appropriate) are as follows:

- Loss or reduction of streamside vegetation and cover—Acres of riparian streamside habitat lost or depleted
- Habitat alteration—Changes in habitat that makes it nonfunctional for select species or more conducive to competitive species
- Increased sediment and turbidity—Likelihood of increased sediment loading in waters containing sediment-intolerant fish species; loss of recruitment, stress, habitat alteration, and habitat loss
- Water depletions—Amount of water use
- Decreased water quality—Likelihood of actions altering important water quality parameters, including pH, dissolved oxygen, temperature, and alkalinity
- Disruption to species—Direct mortality of species, obstructions in movement patterns (human-made barriers), reductions in survival and recruitment, displacement (short- and long-term), and behavioral and physiological influences
- Habitat protection—The number of acres protected via withdrawals, closures, NSO, and ACECs; additionally, the likelihood of reduced surface disturbance
- Habitat restoration—The likelihood of an increase or an improvement in habitat and water quality; the likelihood of reduced

surface disturbance; the likelihood of increased species diversity in streamside vegetation and the likelihood of decrease in weeds

Assumptions

The following list presents basic assumptions related to aquatic wildlife that apply to the impacts assessment for Alternatives A through D in this EIS:

- Impacts on fish and other aquatic wildlife populations and habitat are not discrete; some actions may benefit one species, while at the same time may result in adverse or beneficial impacts on another.
- Maintaining high-quality habitat conditions would have some influence on reducing the severity of outbreaks of, and subsequent losses from, diseases; however, the prevalence in the environment of various diseases cannot be fully controlled, especially at chronic levels of occurrence.
- The health of fish and other aquatic wildlife populations is directly related to the overall health and functional capabilities of aquatic, riparian, and wetland resources, which, in turn, is a reflection of overall watershed health.
- Fish populations fluctuate, sometimes widely, in response to natural factors, such as the abundance of prey or extremes in weather (such as flooding or drought).
- The analysis of roads and road density in a given watershed provides an approximation of the potential for impacts on fish and other aquatic wildlife. It is a measure of lands available for accelerated water transport and potential erosion and off-site sediment transport. However, the actual impacts and the degree of impacts resulting from roads depend on additional variables, including road class (dirt, gravel, or paved), road condition (rutted, bar ditched, or with proper and adequate drainage features), topography, upland and riparian vegetation condition, soil characteristics, climate, and proximity of roads to fish-bearing streams.
- Impacts on fish and other aquatic wildlife are based on exposure/stressor/response
  - Exposure—the likelihood that a given stressor would affect a given species
  - Stressor—the portion(s) of an action that may cause some sort of a reaction by the species
  - Response—the response (adverse, positive, neutral) of the species to the stressor
- Variation of identified impacts by alternative are determined based on

  - Risk—the likelihood or probability of an action resulting in the identified impact
  - Magnitude—the intensity and severity of the identified impact
  - Duration—the length of time in which the identified impact would occur
  - Scope—the spatial extent or size over which the identified impact would occur, as related to the proximity of the action to the species or habitat

- Unless otherwise noted, short-term impacts are defined as those expected to last 2 years or less.
- Unless otherwise noted, long-term impacts are defined as those expected to last longer than 2 years.
- Impacts analysis focuses on PHMA and habitat that would be designated in an alternative, where actions are reasonably certain to result in an impact, be it direct, indirect, or cumulative, to a particular species or to its habitat. In general, aquatic habitats next to, downstream, or downslope of proposed actions are considered in the impacts analysis.
- Impacts analysis is grouped by species, where appropriate (sediment-intolerant aquatic species, for example, are grouped).
- Sediment-intolerant aquatic species include all trout species (brown, rainbow, brook, and cutthroat), mottled and Paiute sculpin, mountain whitefish, and most all amphibian species. Unless otherwise noted, impacts analysis focuses on these species.
- Unless otherwise noted, sediment-tolerant species (speckled dace, carp, white sucker, channel catfish, and fathead minnow) would be impacted in a similar fashion to sediment-intolerant species; however, any actions that would increase sediment and turbidity in the short term would result in negligible to minimal impacts on these species. Given their biology, feeding habits, habitat needs, and niche in the ecosystem, these species, generally, have a higher tolerance for increased sediments and turbidity to streams and rivers. Habitat alteration and water quality alteration, however, can impact these species in ways similar to sediment-intolerant species addressed above.
- Special status aquatic species that are sediment intolerant include Colorado River cutthroat trout, greenback cutthroat trout, boreal toad, and northern leopard frog. Sediment tolerant species include the Colorado pikeminnow, razorback sucker, bonytail, humpback chub, roundtail chub, pallid sturgeon, flannelmouth sucker, and bluehead sucker. The analysis groups these species as appropriate

with regard to addressing impacts, especially those resulting from actions that could increase sediment to occupied habitats.

- Under all of the alternatives, proposed actions would comply with BLM Colorado Public Land Health Standard #3 (BLM 1997). Healthy, productive, and diverse plant communities support aquatic wildlife communities that are productive, resilient, diverse, and vigorous and that are able to reproduce and sustain natural fluctuations and ecological processes; therefore, implementing management actions that contribute to maintaining the condition and quality of wildlife habitat would ensure that BLM Colorado Public Land Health Standard #3 (BLM 1997) would be met throughout the life of the LUPA.

Water Depletions

Certain management actions (e.g., fluid minerals development) or activities (e.g., water developments) may reduce water flows, which can impact fish and aquatic wildlife in several ways. Reduced water directly correlates to a loss of wetted habitat, and reduced flows can result in reduced habitat complexity and diversity. Important microhabitats (such us spawning bars, backwaters, and side channels) can be lost. These impacts occur when sediments cannot be efficiently or effectively moved and, therefore, settle out into occupied habitats. Generally, flows are climate dependent; however, water diversions also play a large role with regard to localized flow regimes in a stream or river. Habitats for many fish and aquatic wildlife have been impacted by the alteration of the natural hydrograph of several rivers in northwest Colorado, which, in turn, has reduced seasonal peak flows. This has caused sediment buildup, loss of habitat complexity and diversity, and reduced spawning habitat.

USFWS has determined that any water depletion within the North Platte River, Laramie River, and Upper Colorado River basins jeopardizes the continued existence of one or more federally listed threatened or endangered species and adversely modifies or destroys designated and proposed critical habitat. Depletions within the North Platte River and Laramie River basins may affect and are likely to adversely affect the whooping crane, the interior least tern, the piping plover, the western prairie fringed orchid, and the pallid sturgeon. Depletions within the Upper Colorado River basin may affect and are likely to adversely affect the Colorado pikeminnow, bonytail chub, humpback chub, and razorback sucker.

Colorado River Basin

In 2008, the BLM prepared a programmatic biological assessment that addresses water depleting activities in the Colorado River basin. In response to the BLM's programmatic biological assessment, USFWS issued a programmatic biological opinion (#ES/GJ-6-Colorado-08-F-0010) on February 25, 2009.

The USFWS determined that water depletions from the Colorado River basin resulting from BLM actions described in the programmatic biological opinion are not likely to jeopardize the continued existence of the Colorado pikeminnow, humpback chub, bonytail, and razorback sucker or to result in the destruction or adverse modification of their critical habitat. The programmatic biological opinion addresses internal and external BLM projects, including impoundments, diversions, water wells, pipelines, and spring developments.

The programmatic biological opinion instructed the BLM to make an annual payment to the National Fish and Wildlife Foundation to cover all BLM-authorized actions that result in water depletions. Depletions from internal and external BLM projects outside of the fluid minerals program would be covered by this programmatic biological opinion. Water use values would be entered into water depletion logs that are submitted to the Colorado State Office at the end of each fiscal year.

The USFWS determined that projects that fit under the umbrella of the programmatic biological assessment would avoid the likelihood of jeopardy or adverse modification of critical habitat for depletion impacts on the Upper Colorado River Basin. It determined that this would be the case if the projects were to deplete relatively small amounts of water (less than 125 acre-feet) and if the BLM were to make a one-time contribution to the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin, in an amount equal to the average annual acre-feet depleted by each project.

Platte River Basin

The BLM participates in the Platte River Recovery Implementation Program to address water depletions from BLM actions in the North Platte River Basin. The Platte River Recovery Implementation Program was established in 2006 and is designed to assist in the conservation and recovery of the target species and their associated habitats along the central and lower Platte River in Nebraska. The Platte River Recovery Implementation Program, signed by Colorado, Nebraska, and Wyoming, provides a streamlined ESA compliance mechanism for all historic and most new water-related activities in the Platte River basin. As part of the Platte River Recovery Implementation Program, each state and the US Department of the Interior developed "depletion plans," specifying how they would ensure that water development results in no new depletions in the central Platte River.

For federal actions and projects covered under the Platte River Recovery Implementation Program, its Final EIS and the June 16, 2006, programmatic biological opinion serve as the description of the environmental baseline and consequences for the impacts of the federal actions on the listed target species, whooping crane critical habitat, and other listed species in the central and lower Platte River addressed in the programmatic biological opinion. The primary

water-depleting activities that the BLM completes are spring developments, pipeline construction, pond construction, and well drilling.

The USFWS determined in the programmatic biological opinion that the continued operation of existing and certain new water-related activities may adversely affect but would not likely jeopardize the continued existence of the endangered whooping crane, interior least tern, and pallid sturgeon or the threatened northern Great Plains population of the piping plover.

Further, the USFWS found that the continued operation of existing and certain new water-related activities may adversely affect but would not likely jeopardize the threatened western prairie fringed orchid associated with the central and lower reaches of the Platte River in Nebraska. It also determined that the activities were not likely to destroy or adversely modify designated critical habitat for the whooping crane.

In 2010, the BLM entered into a memorandum of agreement with the USFWS to offset federal new depletions in the Platte River Basin of Colorado, which is consistent with the Platte River Recovery Implementation Program. Under the agreement, the BLM and USFWS will consult annually on proposed new and expanded water-related activities in the Laramie River Basin of Colorado. Based on that information, the BLM will have the option of offsetting the adverse impacts of depletions from those activities specified in a 2009 agreement, to the extent that adequate offsetting credit remains in the 87.5 acre-foot account provided under that agreement at the time of consultation. The BLM made this agreement—Concerning New Federal Water-Related Activities within the North Platte River Basin in Colorado—with the USFWS, the State of Colorado, the Jackson County Water Conservancy District, and the South Platte Water-Related Activities Program, Inc.

For new federal water-related activities in Jackson County, North Platte River Basin of Colorado, the BLM will consult annually with the USFWS also, providing a characterization of the depletion and its purpose (agricultural, recreational, and environmental). The BLM would have the option of offsetting the adverse impacts of depletions from those activities for the duration of the Platte River Recovery Implementation Program's first increment relative to the target species and designated critical habitat, by means of those activities specified in the 2009 Agreement, to the extent that adequate offsetting credit remains in the 87.5 acre-foot "account." This option would be provided under that agreement at the time of consultation, and to the extent that no more than 100 acre-feet of aggregate federal new depletions in Jackson County are being addressed under the agreement to benefit fish, wildlife, and the environmental.

The BLM made a one-time payment to the USFWS in 2010 to allow the BLM to seek ESA coverage for impacts on the target species of new depletions from new federal water-related activities in the Platte River Basin of Colorado. Federal depletions would be covered by this programmatic biological opinion,

and water use values would be noted in the KFO water depletion log, which is submitted to the Colorado State Office and USFWS before February 1 each year.

4.4.2 Direct and Indirect Impacts on Aquatic Wildlife

Impacts from Travel Management on Aquatic Wildlife

Direct Habitat Loss/Habitat Fragmentation/Disruption to Species
Impacts on resources would be similar to those discussed under *Impacts from Management of Travel and Transportation on Terrestrial Wildlife*.

Habitat Degradation
Impacts on aquatic resources would be similar to those discussed under *Impacts from Management of Travel and Transportation on Terrestrial Wildlife*.

Habitat Restoration and Improvement
In general, impacts on resources would be similar to those discussed under *Impacts from Management of Travel and Transportation on Terrestrial Wildlife*. Designating an area as closed is expected to result in the eventual revegetation of the area on its own over time. This would lessen impacts on aquatic resources, such as sediment flow and turbidity, from these routes.

Impacts from Recreation Management on Aquatic Wildlife

Permitted Use
Permitted uses include BLM SRPs and Forest Service SUAs. These are typically granted for larger organized recreation groups, including those in competitive and noncompetitive events, and commercial outfitting services. Allowing competitive events is expected to result in impacts similar to those described under casual use; however, because these events typically involve a much larger concentration of people than casual use, the impacts would be magnified. Displacement of terrestrial wildlife as a result of noise disturbance would be intensified. Impacts from commercial outfitting services typically do not involve large concentrations of people at any one time.

Alternative A—Under Alternative A, the BLM and Forest Service would continue issuing SRPs and SUAs on a case-by-case basis and would continue to provide opportunities for competitive and noncompetitive events and commercial outfitting services.

Alternative B—SRPs and SUAs would be authorized only where impacts on PHMA would be neutral or beneficial. It is expected that other aquatic wildlife species would also benefit from these restrictions.

Alternative C—Same as under Alternative B.

Alternative D—This alternative limits impacts on disruption of the species as well as PHMA, so it would also benefit aquatic wildlife species whose critical use periods coincide with these seasonal restrictions.

Management actions for recreation under the Proposed LUPA would be the same as those for Alternative D; therefore, impacts from the Proposed LUPA on aquatic wildlife would be the same as those described under Alternative D, above.

Impacts from Lands and Realty Management on Aquatic Wildlife

Habitat Alteration and Loss or Reduction of Streamside Vegetation or Cover and Water Quality Alteration and Increased Sediment Loading and Turbidity

In areas where ROWs are permitted, there would be more potential for impacts on aquatic wildlife than in areas where ROWs are excluded or avoided.

Constructing and operating ROW facilities would likely result in surface-disturbing activities. Potential impacts from surface disturbance include direct alteration of habitat or loss of individuals from equipment and vehicles. Habitat could also be affected by changes in water quality from increased sedimentation and potential fuel spills. Equipment and vehicle traffic within ROWs and access roads could lead to small stream crossings. Vehicle crossings would result in mortalities to macroinvertebrates and possibly early life stages of fish, it and would alter bottom substrates. Habitat alteration could affect various activities or values for fish, such as cover, feeding, or life stage functions for spawning or early life stage development.

Potential construction at stream crossings would also remove riparian vegetation. Vegetation cover along stream banks provides cover for fish, shading, bank stability, and increased food and nutrient supply as a result of deposition of insect and vegetation matter into the watercourse. Riparian vegetation contributes woody material to streams that are used for fish cover and can be part of forming habitat features, such as pools.

Vehicle and equipment disturbance within or near water bodies also would cause sedimentation. Sediment entering the water column would be redeposited in areas downstream of the disturbed area. The extent of the sedimentation effect would depend on the flow conditions, substrate composition, stream configuration, and types of aquatic communities within the affected areas.

The indirect impacts of sedimentation could range from potential detrimental impacts on species behavior, physiological functions, or spawning (Waters 1995). In general, trout species are more sensitive to increased turbidity than many of the warm water fish species. Sediment deposition in substrates used for spawning could detrimentally affect successful recruitment.

Vehicle and equipment use and pipelines that cross or parallel aquatic systems would pose increased risk to aquatic biota from accidental spills or leaks of toxic substances. Depending on the substance, if it were to reach a water body, aquatic species could be exposed to toxic conditions. Impacts could range from sub-lethal, including reducing feeding behavior, lethargy, habitat avoidance, and physical stress, to direct mortality.

The magnitude of impacts would depend on the substance and volume, flow conditions, channel configuration, and presence of aquatic species. Selecting BMPs would help to reduce potential risks.

Excluding, limiting, or collocating ROWs in GRSG habitats would benefit aquatic wildlife species whose ranges are coincident with GHMA or PHMA or are close downstream. In addition, disturbance caps, NSOs, and TLs can protect aquatic wildlife species from disturbances.

Alternative A would have the most areas available for ROWs and would have more potential to impact aquatic wildlife than Alternatives B, C, and D.

Alternative B would have fewer areas available for ROWs through restrictions to protect GRSG habitat. Conservation measures would be more protective under Alternative B than Alternatives A and D, but it would be less protective than Alternative C. In addition, Alternative B would encourage land exchanges that allow for consolidating federally managed lands in GRSG habitats, facilitating habitat conservation; therefore, impacts on aquatic wildlife whose ranges overlap GHMA and PHMA would be less than Alternatives A and D but greater than Alternative C.

Alternative C would have the most protective measures for GRSG and so would have the least impacts on aquatic wildlife species whose ranges overlap GHMA and PHMA. In addition, Alternative C would encourage land exchanges that allow for consolidating federally managed lands in GRSG habitats, facilitating habitat conservation and management.

Alternative D would be more protective than Alternative A but less protective than Alternatives B and C.

Under the Proposed LUPA, impacts would be similar to those described above for Alternative C because both PHMA and GHMA would be managed as avoidance areas for ROWs. Additional protection would be provided for those species that are vulnerable to avian predation because no aboveground structures would be authorized within 1 mile of active leks.

Impacts from Wind Energy Development on Aquatic Wildlife

Impacts from wind energy development on aquatic wildlife would be similar to those discussed under *Impacts from Lands and Realty Management on Aquatic Wildlife*.

Impacts from Industrial Solar Energy Development on Aquatic Wildlife

Impacts from solar energy development on aquatic wildlife would be similar to those discussed under *Impacts from Lands and Realty Management on Aquatic Wildlife*.

Impacts from Range Management on Aquatic Wildlife

Habitat Alteration and Loss or Reduction of Streamside Vegetation or Cover and Water Quality Alteration and Increased Sediment Loading and Turbidity

In areas that are available for livestock grazing, there could be more impacts on aquatic wildlife than in areas where livestock grazing is excluded.

The primary potential impacts on fish and other aquatic species from livestock grazing is habitat alteration, loss or reduction of streamside vegetation and cover, water quality alteration, and increased sediment loading and turbidity. Where livestock grazing is occurring in watersheds containing occupied habitats of sediment-intolerant species (e.g., trout, sculpin species, and mountain whitefish), there is an increased risk of the identified impacts to occur. This is because these species require cold, clear, well-oxygenated water in which to thrive. Impacts are most likely to occur in site-specific areas where improper grazing is occurring. Improper livestock grazing could result in direct adverse impacts at site-specific locations to select streams containing sediment-intolerant aquatic species.

Livestock grazing could lead to changes in vegetation plant species and functional group composition through vegetation removal, disturbance, and trampling and increased potential for weed introduction and spread. Livestock and wildlife grazing in riparian areas can prevent regeneration of woody and herbaceous riparian vegetation necessary to stabilize stream banks. Grazing can also reduce litter and fine fuel loading, which could alter fire size and severity.

Livestock often use riparian areas for water and shade, which may cause greater impacts on these areas by concentrating livestock use. Livestock could cause impacts by altering stream functionality and vegetation structural diversity. Livestock could also contribute to the spread of invasive species in riparian areas.

Livestock grazing can increase sediment load in streams from animal concentration areas, collapsing banks, stream-channel alteration, and vegetation removal in riparian areas. Increased sediment in streams, rivers, and reservoirs decreases the potential for wild fish to reproduce, fills in pools, leads to channel degradation, and increases stream temperatures. Changes in water temperature also would result from changes in the amount of vegetation cover. Changes in the aquatic habitat would lead fish to alter their uses of the stream, moving to different areas for feeding and spawning, depending on habitat conditions.

Livestock near aquatic systems could change cold-water aquatic habitat quality through nutrient inputs from manure (Larsen et al. 1994). In addition, livestock grazing could change aquatic habitat connectivity when they are allowed next to or within aquatic systems; grazing could alter bank stabilization and water quality and thus alter habitat conditions in certain areas. Water developments near tributary creeks could affect the hydrologic regime of these systems by withdrawing water.

Under all alternatives, the BLM is managing livestock grazing to comply with all of the BLM Colorado Public Land Health Standards. The BLM could, as needed, change permit terms, adjust AUMs for livestock, implement grazing systems, require rotation or deferment, impose utilization limits, and implement additional measures, such as range improvements, as necessary and feasible to reduce impacts. Intensive livestock management can reduce the magnitude of the impacts listed above by allowing vegetation to adequately rest and recover between periods of domestic grazing. However, vegetation may be damaged until it is detected and management is changed.

Vegetation Management and Range Improvements

In areas that are available for livestock grazing, there would be more impacts on aquatic wildlife from vegetation management activities and range improvements than in areas where livestock grazing is excluded.

Areas available for livestock grazing would primarily be associated with vegetation management and range improvements, such as fencing, water developments, weed treatments, chemical, biological, or mechanical vegetation treatments, burning, and seeding of disturbed areas or weed-treated areas. The primary impacts from rangeland vegetation management are habitat alteration and increased sediment loading and turbidity. Where treatments are occurring in watersheds containing occupied habitats of sediment-intolerant species (e.g., trout, sculpin species, and mountain whitefish), there is an increased risk of the identified impacts to occur because these species require cold, clear, well-oxygenated water in which to thrive.

Treatment of rangeland vegetation could result in limited indirect impacts on streams containing sediment-intolerant fish and other aquatic species. For example, there is the potential for the increased spread of weeds where vegetation is treated, which would, in turn, reduce upland habitat condition and increase erosion potential. However, these impacts would be short term and of limited scope and intensity. Where vegetation treatments are used to restore riparian areas (e.g., the removal of tamarisk), there is the potential for short-term impacts on aquatic species, including habitat alteration, increased sediment loading and turbidity, and the reduction or loss of streamside vegetation and cover. Removing invasive species would result in the loss or reduction of streamside vegetation and cover, which would impact fish in the short term. This activity, however, would result in long-term beneficial impacts on aquatic

species because native vegetation is, or would be, restored. This would improve stream bank stability, water absorption and infiltration rates, and habitat diversity.

Fish and other aquatic wildlife are considered before the identification and planning of any site-specific projects, and impacts are mitigated. All vegetation treatments are designed with the primary goals of long-term watershed improvement and meeting Standard 3 and Standard 4. In spite of the potential for short-term impacts, rangeland vegetation management results in long-term beneficial impacts on fish and other aquatic wildlife by improving upland watershed health and maintaining productive habitats that provide adequate groundcover. This, in turn, would allow for natural water infiltration and absorption rates and limited erosion potential.

In areas where range improvements associated with livestock management are constructed (such as fencing and upland water developments), there is the potential for short-term impacts on aquatic species, including habitat alteration, increased sediment loading and turbidity, and loss of vegetation. Road construction needed in order to access range improvements can create chronic long-term point sources for increased sedimentation and turbidity.

Upland water developments also tend to concentrate livestock use, which can impact amphibians as sedimentation and turbidity increases and shoreline vegetation is lost. Water developments would permanently remove vegetation within the development's footprint and would concentrate livestock in certain areas, thus reducing vegetation cover and increasing the likelihood for weed invasion and spread. This can reduce watershed health and result in poor soil retention, increased runoff, and poor water infiltration and absorption. However, many of these range improvements would result in long-term benefits to fish and other aquatic species. This is because livestock distribution would be improved, grazing would be reduced along streams, and, in some cases, amphibian habitat would be created as the result of stock pond creation.

Noxious and invasive weed management includes herbicide use, biological controls, and mechanical or manual treatments in weed-infested areas. In areas where proactive weed management in the form of treatments are occurring, or would occur, there is the potential for short-term impacts on aquatic species. This includes the loss or reduction of streamside vegetation and cover and increased sediment loading and turbidity resulting from the loss of vegetation before desirable species become established. All weed treatments would result in long-term beneficial impacts on fish and other aquatic species and to their habitats. This is because native vegetation is, or would be, restored, thereby improving watershed health and, in select cases, stream bank stability, water quantity, and habitat diversity.

Weed management is conducted in accordance with the *National Vegetation Treatments Using Herbicides on Public lands in 17 Western States Final Programmatic*

EIS (BLM 2009). The analysis of aquatic species and their habitats was addressed in this document, which set the parameters for the treatment of weeds within and near aquatic habitats. In addition, weed management is subject to the BLM Colorado Public Land Health Standards (BLM 1997), which help guide vegetation management on public lands. In areas where these standards are being met, there are reduced potential impacts on fish and other aquatic wildlife resulting from off-site erosion and increased sedimentation due to degraded weed-infested habitats.

Implementation-level grazing decisions would comply with BLM Colorado Public Land Health Standards. Where the standards are being met, rangeland management is expected to result in minimal impacts on fish and other aquatic wildlife. Healthy, productive, and diverse plant communities support aquatic wildlife communities that are productive, resilient, diverse, and vigorous and that are able to reproduce and sustain natural fluctuations and ecological processes; therefore, implementing management actions that contribute to maintaining the condition and quality of aquatic wildlife habitat would ensure that BLM Colorado Public Land Health Standards #3 and #4 would be met throughout the life of the LUPA.

Summary of Impacts by Alternative

Alternative A would allow livestock grazing and would have the most potential for vegetation management and rangeland improvements, with the fewest restrictions; therefore, Alternative A would have the greatest impact on aquatic wildlife.

The potential for vegetation management and rangeland improvements would be the same under Alternative B; however, more restrictions would be in place to protect GRSG habitat, so it would have fewer impacts on aquatic wildlife.

Alternative C would allow no livestock grazing in ADH, and no treatments that benefit GRSG would be allowed; therefore, Alternative C would have the fewest impacts on aquatic wildlife because it would have the least potential for vegetation management and rangeland improvements.

Alternative D would have the same areas available for livestock grazing as Alternatives A and B. Impacts on aquatic wildlife would be similar under Alternative D as they would be under Alternative B.

Under the Proposed LUPA, the same areas would be available for livestock grazing as Alternatives A, B, and D. Impacts on aquatic wildlife would be the same as described under those alternatives.

Water Depletions

See discussion on water depletions under *Assumptions* at the beginning of the *Aquatic Wildlife, Including Special Status Fish and Aquatic Species* section. In areas

that are available for livestock grazing, there would be more impacts on aquatic wildlife from water depletions than in areas where livestock grazing is excluded.

Summary of Impacts by Alternative

Alternative A would allow livestock grazing and would have the most potential for projects that deplete water; therefore, Alternative A would have the greatest impact on aquatic wildlife, including special status species.

The potential for projects that result in water depletions would be the same under Alternative B; however, more restrictions would be in place to protect GRSG habitat, so it would have fewer impacts on aquatic wildlife, including special status species.

Alternative C would not allow livestock grazing in ADH, and no new water developments would be allowed from spring or seep sources in ADH; therefore, Alternative C would have the fewest impacts on aquatic wildlife, including special status species, because it would have the least potential for projects that result in water depletions.

Alternative D would have the same areas available for livestock grazing as Alternatives A and B. Impacts on aquatic wildlife, including special status species, would be more restrictive under Alternative D than under Alternatives A and B.

Under the Proposed LUPA, the same areas would be available for livestock grazing as Alternatives A, B, and D. Impacts on aquatic wildlife would be the same as described under those alternatives.

Impacts from Wild Horse Management on Aquatic Wildlife

Impacts on aquatic wildlife from wild horse management would be similar but to a less broad extent as impacts from livestock grazing.

Alternative A would place the fewest restrictions on wild horse management, and so it would have the most potential for impacts on aquatic wildlife.

Alternative B would place some restrictions on the management of wild horses. Impacts on aquatic wildlife would be less than Alternatives A and D but would be similar to Alternative C.

Alternative C is expected to have the same impacts as Alternative B because the management prescriptions for Alternatives B and C are much the same for managing wild horses.

Alternative D would have fewer impacts than Alternative A but greater impacts than Alternatives A and C because it would allow more flexibility in the management of wild horses.

For the Proposed LUPA, wild horse management would be the same as Alternative D; therefore, impacts would be the same as those described under Alternative D

Impacts from Fluid Minerals Management on Aquatic Wildlife

Loss or Reduction of Streamside Vegetation and Habitat Alterations and Disruption to Species

Fluid minerals development may result in the loss, reduction, or alteration of streamside riparian vegetation. Vegetation loss can alter the nutrient dynamics of an aquatic ecosystem and may result in increased water temperatures, light levels, and autotrophic[2] production. Increased stream temperatures can affect certain aquatic species, such as trout, by reducing their growth efficiency and increasing their likelihood of succumbing to disease.

Changes in a stream's food web can alter the composition of food and thus energy sources that are available to resident fish and aquatic invertebrates. Terrestrial insect diversity and productivity also decreases with reductions in streamside vegetation, which affects food availability for resident fish. Loss or reduction of riparian vegetation can also increase peak flows as vegetation is not sufficient in root mass, size, or abundance to sufficiently slow stream velocities. In addition, the loss of streamside vegetation reduces water percolation and infiltration, leading to unnaturally high and frequent runoff (Holechek et al. 1989). This can accelerate bank erosion and sloughing, increase siltation, elevate stream temperatures, widen and braid stream channels, and cause the loss of overhanging banks. All of these are important factors affecting trout productivity in a given stream (Armour 1977; Behnke 1979a, 1979b; Claire and Storch 1977; Gardner 1950; Glinski 1977; Kaufman et al. 1983).

Stream and stream bank alteration can affect aquatic species in many ways. Actions that affect stream banks can result in soil compaction, increased erosion, and subsequent widening of stream channels. Stream widening results in a loss of habitat complexity and diversity and reduced water depths. This can reduce available habitat and increase stream temperatures. Increased temperatures can increase physiological stress, reduce feeding, and increase disease.

Stream bank alteration also exposes bare soils, which provides for points of invasion by weedy species and increases the risk of further bank erosion. Actions that increase the amount of soil exposed to the erosive effects of water would increase sediment loading and turbidity. This can alter feeding by fish that require water clarity to forage and capture prey.

[2]Pertaining to organisms that form nutritional organic substances from simple inorganic substances, such as carbon dioxide

Increased Sediment and Turbidity and Decreased Water Quality

Actions that increase sediment loading into streams can impact sediment intolerant aquatic species in many ways. Increased sediments in the stream environment reduce dissolved oxygen and raise stream temperature and can cover spawning and rearing areas, thereby reducing the survival of fish embryos and juveniles (Forest Service 2002). Excessive sedimentation can also fill in important pool habitats, reducing their depth and making them less usable to fish and other aquatic organisms. High sediment transport can fill pools and cause reduction or loss of essential salmonid juvenile rearing habitat (Frissell 1992). Pool habitats are important because over-summer and over-winter thermal refugia and, when coupled with stream flows, are often a limiting factor in many small mountain streams.

A number of sub-lethal effects on resident trout may also occur as a result of sedimentation, including avoidance behavior, reduced feeding and growth, and physiological stress (Waters 1995). Over the long term, increased sediment loading reduces primary production in streams (Forest Service 2002). Reduced macroinvertebrate productivity and diversity results when excessive sediment fills in the interstitial spaces of stream substrates needed by these aquatic invertebrates. Food webs can be altered as sediment-intolerant macroinvertebrates are replaced by sediment-tolerant species. Reducing stream productivity can disrupt the food chain and reduce food sources for resident fish species. All of these impacts can reduce population density.

Suspended sediment causes turbidity within streams, which reduces clarity; trout are visual feeders and require clear water in which to forage. The longer the duration of high turbidity the more damage is likely to fish and other aquatic organisms (Newcombe and MacDonald 1991). Roads increase surface runoff and sedimentation, and where they cross water, in-channel structures are often required, such as culverts. Bridges that remove aquatic habitat may be barriers to fish passage (Barrett et al. 1992; Bryant 1981). The effects of changes in water quality are well documented on trout species.

Increased levels of development may increase the risk for leaks or spills and sediments entering aquatic systems. Spills (e.g., of oil, condensate, and produced water) of sufficient concentration that enter streams at or above occupied habitat are likely to have direct impacts on fish populations. Effects can range from sub-lethal (stress, reduced feeding behavior, habitat avoidance) to direct mortality, depending on the type and amount of substance and stream flows. Oil pollution can affect fish (including endangered fish) by asphyxiation, destruction of food organisms, chronic toxicity, resulting in reduced resistance to infection and other stresses, and can interference with behavior.

Considering the number of federal and state regulations that require fugitive sediment and potential contaminants be managed and contained on-site (e.g., Colorado Oil and Gas Conservation Commission Rules and BLM Onshore

Orders), it is unlikely that sediment sufficient to degrade downstream aquatic habitats would be generated regardless of alternative. Individual actions that may affect critical habitat or fish populations would prompt ESA Section 7 consultation with USFWS and would result in the development of conservation actions that would prevent substantive adverse direct and indirect influences.

Water Depletions

See discussion on water depletions under *Assumptions* at the beginning of the *Aquatic Wildlife, Including Special Status Fish and Aquatic Species* section.

Habitat Protection and Restoration

Protections afforded to GRSG under the various alternatives would benefit aquatic systems whose ranges are coincident with PHMA or ADH. Conservation measures associated with each alternative, such as excluding development and limiting surface disturbance (disturbance cap), would reduce or eliminate impacts from oil and gas development (see below). Additionally, RDFs and PDFs would also reduce both direct and indirect impacts on sagebrush habitats. They also would provide incidental benefits to aquatic systems in PHMA and ADH.

Summary of Impacts by Alternative

Alternative A—Potential impacts on aquatic systems would vary based on MZ and would largely depend on stipulations outlined in each resource area's LUP. In general, Alternative A would require the fewest restrictions on fluid minerals development, so potential impacts on aquatic systems, including potential for water depletions, would be greatest under this alternative. In most cases, NSO and CSU stipulations and the current suite of state and federal processes regulating the potential for off-site sediment and contaminant delivery would be fully capable of reducing projected oil and gas development effects on discountable levels for aquatic systems.

Alternative B—Alternative B would have more restrictions on fluid minerals development than Alternatives A and D but fewer than Alternative C. Such restrictions would reduce the amount of surface disturbance (as a potential source of sediment and proximity of development as potential contaminant source) in PHMA. Examples of these restrictions are closing PHMA to fluid minerals leasing, prohibiting surface-disturbing activities in PHMA for leased parcels (with certain exceptions), applying a 4-mile NSO around leks, and limiting permitted disturbances to one per section, with no greater than 3 percent per section.

RDFs including clustering development, placing infrastructure in previously disturbed areas, road design and placement, in addition to others (see **Chapter 2**) would also decrease the potential for direct and indirect disturbance of aquatic systems in PHMA. Conservation measures applied under Alternative B would be limited to PHMA in nearly all instances and could influence 617,500 acres (25 percent) of all federally managed GRSG habitats (ADH). In general,

conservation measures required under this alternative would benefit aquatic systems in PHMA.

Relocating development into areas outside of PHMA or unsuitable inclusions with PHMA may have some potential to indirectly influence aquatic systems; however, mitigations would reduce the risk of direct and indirect impacts on aquatic habitats These include COAs, NSO, and CSU stipulations, and state and federal regulatory processes that regulate the potential for off-site sediment and contaminant delivery.

In certain MZs where GRSG habitat is limited and naturally fragmented (e.g., MZ 17), restrictions in PHMA, coupled with NSO and CSU stipulations for riparian and aquatic habitats, could limit development options, shifting development into areas more susceptible to erosion (e.g., steeper slopes). This could lead to heavier sedimentation loads, increased fugitive contaminants, and less effective reclamation, all of which increase the risk of indirectly influencing aquatic systems in the immediate area. In general, this alternative would reduce impacts on aquatic systems in areas coincident with PHMA more than Alternatives A and D.

Alternative C—Impacts on aquatic wildlife and associated habitats would be similar to those described for Alternative B, but conservation measures would be expanded to include ADH in nearly all instances. Under Alternative C, protective measures (see Alternative B and **Chapter 2**) would influence approximately 1,094,000 acres (43 percent) of all federally managed GRSG habitat (ADH). Both direct and indirect impacts from fluid minerals development would be the least under this alternative and as such would provide the greatest benefit to those aquatic systems in ADH. Similar to Alternative B, excluding or limiting surface-disturbing activities in ADH would likely shift development into other areas, with the potential to impact aquatic systems in certain MZs (see discussion above for Alternative B).

Alternative D—Alternative D would have more restrictions on fluid minerals development than Alternative A but fewer than Alternatives B and C. Under this alternative, an NSO stipulation would be applied to all unleased PHMA with exception, modification, and waiver criteria. A 5 percent disturbance cap would be applied to each MZ with certain exception, modification, and waiver criteria (see **Chapter 2**).

Similar to Alternative B, conservation measures applied under Alternative D would be limited to PHMA in nearly all instances and could influence 617,500 acres (25 percent) of all federally managed GRSG habitats (ADH). Potential for direct and indirect impacts on aquatic systems would be greater under Alternative D, compared with Alternatives B and C, due largely to the 5 percent disturbance cap and greater potential for surface-disturbing activities to occur (PHMA open for development). However, as stated above, NSO and CSU

stipulations in addition to site-specific mitigation measures would reduce or eliminate the risk of direct and indirect impacts on aquatic systems.

Under the Proposed LUPA, no new leasing would be permitted within 1 mile of active leks, and no new surface occupancy would be allowed in PHMA (see exception criteria below) and within 2 miles of active leks in GHMA (see **Appendix D**).

No modifications or waivers would be permitted. The BLM Authorized Officer may grant an exception to this NSO stipulation only under one of two scenarios:

1. The proposed action would not have direct, indirect, or cumulative effects on GRSG or its habitat or
2. The proposed action would be an alternative to a similar action occurring on a nearby parcel and would provide a clear conservation gain to GRSG

Exceptions based on conservation gain (2, above) may only be considered in PHMA of mixed ownership where federal minerals underlie less than fifty percent of the total surface, or in areas of the public lands where the proposed exception is an alternative to an action occurring on a nearby parcel subject to a valid federal fluid mineral lease existing as of the date of this RMP.

Exceptions based on conservation gain must also include measures, such as enforceable institutional controls and buffers, sufficient to allow the BLM to conclude that such benefits would endure for the duration of the proposed action's impacts.

> *Any exceptions to this lease stipulation may be approved by the Authorized Officer only with the concurrence of the State Director. The Authorized Officer may not grant an exception unless the applicable state wildlife agency, the USFWS, and the BLM unanimously find that the proposed action satisfies* [1 or 2, above]. *Such finding shall initially be made by a team of one field biologist or other GRSG expert from each respective agency. In the event the initial finding is not unanimous, the finding may be elevated to the appropriate BLM State Director, USFWS State Ecological Services Director, and state wildlife agency head for final resolution. In the event their finding is not unanimous, the exception will not be granted. Approved exceptions will be made publically available at least quarterly.*

Disturbances would be limited to 3 percent or 1 disturbance per 640 acres density of PHMA in each Colorado Management Zone, with no new leasing allowed if the disturbance cap exceeds this amount. Seasonal restrictions would apply to construction, drilling, and completion within 4 miles of active leks during the GRSG reproduction period of March 1 to July 15. The BLM

Authorized Officer may grant an exception, modification or waiver in consultation with the State of Colorado if criteria described in Appendix E are met. Impacts on aquatic wildlife due to management of fluid minerals under the Proposed LUPA would be similar to those described under Alternatives B and C.

Under the Proposed LUPA, no new leasing would be permitted within 1 mile of active leks, and no new surface occupancy would be allowed in PHMA (see exception criteria below) and within 2 miles of active leks in GHMA (see **Appendix D**).

Impacts from Solid Minerals—Coal Management on Aquatic Wildlife

Impacts from solid minerals development (surface and subsurface) on aquatic wildlife populations and habitats would be the same or similar to those discussed above under *Impacts from Fluid Minerals Management on Aquatic Wildlife* but may vary in scale, duration, and intensity.

Impacts from Locatable Minerals Management on Aquatic Wildlife

Impacts from locatable minerals development on aquatic wildlife populations and habitats would be the same or similar to those discussed above under *Impacts from Fluid Minerals Management on Aquatic Wildlife* but may vary in scale, duration, and intensity.

Impacts from Nonenergy Leasable Minerals Management on Aquatic Wildlife

Impacts from nonenergy leasable minerals development on aquatic wildlife populations and habitats would be the same or similar to those discussed above under *Impacts from Fluid Minerals Management on Aquatic Wildlife* but may vary in scale, duration, and intensity.

Impacts from Salable Mineral Management on Aquatic Wildlife

Impacts from salable minerals development on aquatic wildlife populations and habitats would be the same or similar to those discussed under *Impacts from Fluid Minerals Management on Aquatic Wildlife* but may vary in scale, duration, and intensity.

Impacts from Fuels Management on Aquatic Wildlife

Direct Habitat Loss/Modification/Fragmentation

A hot fire near an occupied stream, in combination with low flows and high air temperatures, could render some stream reaches inhospitable by removing riparian vegetation as well as upland vegetation on nearby slopes.

Some species have become adapted to fluctuations in climate and environmental conditions over their evolutionary history. Trout are particularly vulnerable to environmental change brought on by fire due to their dependence on cold, clean water. Loss of riparian vegetation could result in unfavorably warm water due

to loss of shading. Warm water may affect survivorship and reproduction, in part because warmer waters have lower levels of dissolved oxygen. Denuded riparian habitats also make stream banks vulnerable to erosion and increase the potential for inflow of upland runoff containing high levels of sediments that would normally be filtered. Loss of riparian vegetation could also reduce the amount of allochthanous[3] prey available for aquatic wildlife. Burning of riparian areas under proposed burning plans is unlikely due to low intensity burning strategies and moist riparian plant communities.

Complete removal of upland vegetation is also unlikely, but if it were to occur as a result of the fire, it could lead to increased erosion and sediment loading, which would reduce stream habitat quality. Fine sediments would reduce productivity of macroinvertebrates that serve as the principal prey for many aquatic species.

Decreased Water Quality and Increased Sedimentation and Turbidity

Soil erosion after fire can increase sediment input into the stream, which can silting over spawning gravels, smother macroinvertebrate habitat, and fill pools. These impacts depend on the intensity of the burn, slope, aspect proximity to the stream, and time lag to and intensity of precipitation. In a prescribed burn, fire intensities would be low, which would reduce sedimentation effects. Some potential also exists for increased transport of soils into streams from mowing treatments in upland shrubland habitat.

Fire suppression may also increase sediment input into streams. Fire lines would need to be properly constructed and rehabilitated to minimize possible sedimentation. Use of fire retardant would not be allowed within 300 feet of any stream, and use of stream water for fire suppression would have to be approved and closely tracked and monitored throughout the suppression period.

Mechanical treatments in pinyon-juniper woodlands would consist primarily of thinning and piling of debris, often in combination with hand cutting, and then burning or chipping and shredding. Any accelerated rates of runoff and sedimentation from upland areas as a result of mechanical treatments would be small and site specific and would progressively diminish as these surrounding areas achieved proper functioning condition.

Removing vegetation could temporarily increase erosion of surficial soils into nearby streams. Water yield and surface water runoff from the treated areas may increase in response to high-intensity storms. However, because of the small scale of most treatments, the retention of most of the plant cover in a treated area, and the maintenance of vegetated buffers along streams and

[3]From outside the stream

around ponds, treatment projects are not expected to cause significant habitat changes for aquatic organisms.

Following a wildfire, ESR efforts are implemented to protect and conserve habitats that have sustained damage or degradation from suppression or prescribed fire. These activities are beneficial overall but can have short-term negative impacts on aquatic wildlife species, such as increased sedimentation and erosion during the implementation of these protective measures.

Habitat Quality and Protection and Habitat and Water Quality Improvement

A prescribed fire would also contribute to decreasing the threat of a future catastrophic wildland fire that would change large blocks of habitat indiscriminately and probably would result in substantial increases in sediment loading. Over the long term, all treatment methods that remove nonnative and competing vegetation are likely to benefit aquatic habitats by reducing sediment inflow; therefore, vegetation treatments would eventually increase the amount of suitable habitat, potentially increasing populations of desirable species requiring relatively clean waters.

Another long-term benefit of removing woody fuels from sagebrush habitats is the decrease in the risk of a future high severity wildfire. Pinyon and juniper removal would greatly reduce the chance of a high-intensity fire that could spread to woody riparian vegetation. Diverse, vigorous, and dense stands of native riparian vegetation help to protect streams from the direct and indirect impacts of wildfires by buffering streams from temperature increases and filtering ash, woody debris, and mud carried in runoff from nearby slopes. Some disturbance to riparian areas could provide for short-term impacts but long-term maintenance. However, generally, late seral, climax riparian areas provide the best streamside habitat and cover and shading for fish.

Following a wildfire, ESR efforts are often implemented to protect and conserve habitats that have sustained damage or degradation from suppression or prescribed fire. Typically these activities are beneficial for aquatic wildlife species and are designed to improve the overall condition of the area, which in turn improves habitat for wildlife. For example, weed-seed-free seeding would stabilize soil and reduce the spread of noxious weeds. Additionally, replacing organic matter in disturbed areas would protect topsoil and provide a suitable bed for the restoration of a native vegetation community.

Summary of Impacts by Alternative

Alternative A would have the fewest restrictions for fuels management actions, with the most potential for vegetation disturbance. Additionally, Alternative A would not prioritize fire operations beyond what has already been determined in the fire management plans for the area; therefore, Alternative A would have the greatest impact on aquatic wildlife.

Alternative B is more restrictive than Alternative A, though all of the restrictions fall within PHMA; therefore, impacts from fuels management on aquatic wildlife would be less than Alternative A, but only within PHMA. Additionally, Alternative B would prioritize fire operations in PHMA and GHMA, immediately after life and property; therefore, the potential for disturbance to aquatic wildlife species within these habitats is lower under Alternative B than Alternative A.

Alternative C would prioritize fire operations in PHMA, immediately after life and property; therefore, the potential for disturbance to aquatic wildlife within PHMA would be the same as Alternative B, but less than Alternative B in GHMA. With regard to fuels management, Alternative C is more restrictive than Alternative B since all of the management actions fall within ADH; therefore, impacts from fuels management on aquatic wildlife species would be less than Alternative B. Conversely, Alternative C does not offer as many protective management actions that could benefit aquatic wildlife as Alternative B and D, so it has more potential for habitat degradation than the other alternatives.

Alternative D would give priority to fire operations in PHMA and GHMA, immediately after firefighter and public safety, but only after other resource values managed by the BLM and Forest Service are considered and if an exemption is warranted. With regard to fuels management, Alternative D is more restrictive than Alternative B since all of the management actions fall within ADH; therefore, impacts from fuels management on aquatic wildlife would be less than Alternative B. Concurrently, Alternative D offers the same protective measures as Alternative B but applies them to ADH; therefore, it has the potential for more benefits to aquatic wildlife species than Alternatives B and C.

Management of Wildfire Suppression, Fuels Management, and Fire Rehabilitation under the Proposed LUPA would be the same as those for Alternative D. Impacts from the Proposed LUPA, therefore, would be the same as described for Alternative D, above.

Impacts from Habitat Restoration on Aquatic Wildlife

Direct Habitat Loss/Modification/Fragmentation

Some species have become adapted to fluctuations in climate and environmental conditions over their evolutionary history. However, habitat restoration near an occupied stream, in combination with low flows and high air temperatures, could render some stream reaches inhospitable by removing riparian and upland vegetation on nearby slopes. Trout are particularly vulnerable to environmental change brought on by vegetation removal due to their dependence on cold, clean water. Loss of riparian vegetation could result in unfavorably warm water due to loss of shading. Warm water may affect survivorship and reproduction, in

part because warmer waters have lower levels of dissolved oxygen. Denuded riparian habitats also make stream banks vulnerable to erosion and increase the potential for inflow of upland runoff containing high levels of sediments that would normally be filtered. Loss of riparian vegetation could also reduce the amount of allochthanous prey available for aquatic wildlife. Removing vegetation near riparian areas under proposed projects is unlikely due to the application of vegetation buffers near riparian areas.

Decreased Water Quality and Increased Sedimentation and Turbidity

Mechanical treatments in pinyon-juniper woodlands would consist primarily of thinning and piling debris, often in combination with hand cutting, and then burning or chipping and shredding. Any accelerated rates of runoff and sedimentation from upland areas as a result of mechanical treatments would progressively diminish as these surrounding areas achieved PFC. For mechanical treatments in the shrubland communities, mowing of sagebrush, followed by seeding or drilling would be the most likely to occur. Treatments would target woody species (e.g., big sagebrush, rabbitbrush, and greasewood), with the goal of increasing certain other species of shrubs and native perennial grasses and forbs.

Removing vegetation could temporarily increase erosion of surficial soils into nearby streams. Water yield and surface water runoff from the treated areas may increase in response to high-intensity storms. However, because of the retention of most of the plant cover in a treated area and the maintenance of vegetated buffers along streams and around ponds, treatment projects are not expected to cause significant habitat changes for aquatic organisms.

Habitat Quality and Protection and Habitat and Water Quality Improvement

Over the long term, all treatment methods that remove nonnative and competing vegetation are likely to benefit aquatic habitats by reducing sediment inflow; therefore, vegetation treatments would eventually increase the amount of desirable vegetation, potentially increasing populations of desirable aquatic species requiring relatively clean waters.

Another long-term benefit of removing woody fuels from sagebrush habitats is the decrease in the risk of a future high severity wildfire. Pinyon and juniper removal would greatly reduce the chance of a high-intensity fire that could spread to woody riparian vegetation. Diverse, vigorous, and dense stands of native riparian vegetation help to protect streams from the direct and indirect impacts of wildfires by buffering streams from temperature increases and filtering ash, woody debris, and mud carried in runoff from nearby slopes. Some disturbance to riparian areas could provide for short-term impacts but long-term maintenance. However, generally, late seral, climax, riparian areas provide the best streamside habitat and cover and shading for fish.

Summary of Impacts by Alternative

Alternative A would have the fewest restrictions for fuels management actions, with the most potential for vegetation disturbance. Additionally, Alternative A would not prioritize fire operations beyond what has already been determined in the fire management plans for the area; therefore, Alternative A would have the greatest impact on aquatic wildlife.

Alternative B is more restrictive than Alternative A, though all of the restrictions fall within PHMA; therefore, impacts from fuels management on aquatic wildlife would be less than Alternative A but only within PHMA. Additionally, Alternative B would prioritize fire operations in PHMA and GHMA immediately after life and property. Therefore, the potential for disturbance to aquatic wildlife species within these habitats is lower in Alternative B than in Alternative A.

Alternative C would prioritize fire operations in PHMA immediately after life and property; therefore, the potential for disturbance to aquatic wildlife within PHMA would be the same as Alternative B but less than Alternative B in GHMA. With regard to fuels management, Alternative C is more restrictive than Alternative B since all of the management actions fall within ADH. Therefore impacts from fuels management on aquatic wildlife species would be less than Alternative B. Conversely, Alternative C does not offer as many protective management actions that could benefit aquatic wildlife as Alternative B and D; therefore, it has more potential for habitat degradation than the other alternatives.

Alternative D would give priority to fire operations in PHMA and GHMA immediately after firefighter and public safety, unless site-specific conditions warrant an exception. With regard to fuels management, Alternative D is more restrictive than Alternative B since all of the management actions fall within ADH; therefore, impacts from fuels management on aquatic wildlife would be less than Alternative B. Concurrently, Alternative D offers the same protective measures as Alternative B but applies them to ADH; therefore, it has the potential for more benefits to aquatic wildlife species than Alternatives B and C.

Proposed LUPA—Management of habitat restoration would be the same under the Proposed LUPA as under Alternative D; impacts on aquatic wildlife from this alternative would be the same as those described above under Alternative D.

Impacts from ACEC and Zoological Area Management on Aquatic Wildlife

Habitat Protection

Areas that are designated as ACECs would be more beneficial to aquatic wildlife than areas that are not designated. Prohibiting surface-disturbing activities and other authorized activities would benefit aquatic wildlife by precluding activities that would have direct and indirect impacts on aquatic wildlife.

Alternative A would recognize all of the existing ACEC designations. This would have fewer beneficial impacts on aquatic wildlife than Alternative C, which would make all PHMA an ACEC.

Alternative B would also recognize only the existing ACEC designations. Impacts from Alternative B would be the same as impacts from Alternative A.

Alternative C would recognize all of the existing ACECs and would also make all PHMA an ACEC to protect sagebrush habitat. Impacts on aquatic wildlife under Alternative C would be the same as for Alternatives A, B, and D. ACEC designations would provide no additional protections beyond what is included in the management actions for those alternatives for the protection of GRSG habitat.

Alternative D would recognize all of the existing ACECs but does not propose to designate any new ACECs. Impacts from Alternative D would be the same as for Alternatives A and B.

The Proposed LUPA does not propose to designate any new ACECs; therefore impacts from this alternative would be the same as those described above for Alternatives A, B, and D.

4.4.3 Summary of Impacts on Aquatic Wildlife

Alternative A provides the least amount of protection for aquatic wildlife in the planning area. Alternative A puts very few restrictions on development, which could result in the most modification of the landscape, and consequently, the most impacts on aquatic wildlife.

Alternative B provides a greater level of protection for aquatic wildlife than Alternative A, but it would provide a lower level of protection than Alternative C.

Alternative C would provide the most protection for aquatic wildlife. The most restrictions would be placed on development, which would afford the most protection for aquatic wildlife.

Alternative D would provide more protection for aquatic wildlife than Alternative A, but it would provide less protection than Alternatives B and C. More flexibility for development is built into Alternative D, which could result in higher levels of development than Alternatives B and C.

The Proposed LUPA would provide slightly greater protections for aquatic wildlife to those described under Alternative D, due to less flexibility for development and greater restrictions on surface-disturbing activities.

4.5 SPECIAL STATUS SPECIES

4.5.1 General Description

This section discusses impacts on special status species, including federally listed species, BLM and Forest Service sensitive species, and state-listed species, from proposed management actions of other resources and resource uses. Existing conditions concerning special status species are described in **Section 3.3**, Special Status Species.

To analyze the potential impacts of the alternatives on special status species, information was gathered from inventories, recovery plans, conservation agreements, the Colorado Natural Heritage Program database, relevant scientific literature, and other sources identifying the potential distribution of these species in and next to the planning area. The analysis is also based on professional expertise of BLM and Forest Service specialists, the BLM Colorado State Office, CPW, and other professional organizations.

In determining impacts, the BLM and Forest Service staff considered how the action would affect listed or candidate species known or suspected to occur in an area. Direct and indirect impacts were considered, together with the impacts of activities that are interrelated or interdependent. Impacts were quantified when possible; in the absence of quantitative data, best professional judgment, based on scientific reasoning, was used. In the following discussion, impacts are sometimes described by using ranges of potential impacts or in qualitative terms, if appropriate.

Special status fish and wildlife health within the planning area is directly related to the overall ecosystem health, habitat abundance and fragmentation, and wildlife security provided; thus, most resource management has at least an indirect impact on fish and wildlife. A large proportion of actions under all alternatives are mitigation measures for other actions and protective measures intended to minimize or reduce impacts on the health of populations or habitats.

Although data on known locations and habitats within the planning area are available, the data are neither complete nor comprehensive concerning all special status species known to occur or with potential habitat. Known and potential special status species and habitat were considered in the analysis, but the potential for species to occur outside these areas was also considered; as a result, some impacts are discussed in more general terms. Further, special status species and potential special status species habitat distributions over the landscape are patchy and localized.

4.5.2 Greater Sage-Grouse

Methodology and Assumptions

General Impacts on GRSG

Indicators of impacts on GRSG and the measurements used to describe the impacts (where available or appropriate) are as follows:

- Direct habitat loss—Acres of habitat lost. Direct habitat loss results when habitat is destroyed or converted to a form that is unsuitable for the impacted species. Direct habitat loss can be a short-term or long-term impact.
- Habitat fragmentation—Habitat fragmentation occurs when contiguous habitat is broken into smaller blocks by surface-disturbing activities. Habitat fragmentation could lead to the following:
  - Likelihood of reduced habitat quality and interference with movement patterns, leading to a decreased ability to breed or overwinter successfully to a degree that would lead, in turn, to substantial population declines
  - Likelihood that individual habitat blocks would be reduced
  - Likelihood of increased percentage of edge habitat on smaller blocks when compared to larger blocks
- Disruption to species—Direct mortality of species, including predation, collisions with structures (fences, towers, and vehicles), and disease; interference with movement patterns due to fragmented landscapes; short- or long-term displacement and physiological or behavioral influences (avoidance of otherwise functional habitats).
- Habitat degradation—Weed infestation and understory and overstory reductions indicators (reductions in herbaceous ground cover, lack of residual cover, change in understory plant composition):
  - Miles disturbed (for limits on travel management, recreation, unleased areas)
  - Miles and acres disturbed (the assumption is that habitat next to roads that are impacted by dust and dust suppression activities would have some lower level of understory next to the impacted habitat.)
- Habitat restoration or improvement—The likelihood of improving habitat quality (e.g., increased species diversity, increased habitat connectivity, and decreased weeds).

- Habitat protection—Acres protected through stipulations, withdrawals, closures, and special designations (e.g., ACECs). Also, the likelihood of reduced or prohibited surface disturbance.

If the hard trigger is reached (see Chapter 2, **Section 2.7.1**, Adaptive Management), the impacts would be similar to those described for Alternative C.

Assumptions
In addition to the assumptions listed under **Section 4.3.2**, Terrestrial Wildlife, the following would apply specifically to GRSG:

- In general, GRSG are highly sensitive to habitat fragmentation, development, or changes in habitat conditions. This is because GRSG inhabit and require large, intact sagebrush ecosystems, and are especially sensitive to disturbance and human presence.
- Alternatives proposing to protect the most GRSG habitat from disturbance are anticipated to have the greatest beneficial impact on GRSG.
- Not all habitats within mapped priority and general GRSG ranges are capable of supporting GRSG populations.
- The mapped ADH represents all occupied habitat for the GRSG. Protection of these areas is sufficient for all occupied habitat of the GRSG in Colorado.
- Historic and potential habitat is not considered in this analysis.

Implementing protective measures specific to water developments may have some influence on reducing the severity of outbreaks and subsequent losses from West Nile virus; however, the prevalence in the environment of West Nile virus cannot be fully controlled, particularly at chronic levels of occurrence.

Direct and Indirect Impacts on Greater Sage-Grouse

Impacts from Travel Management on GRSG

Habitat Degradation
Impacts would be the same as those discussed under *Impacts from Management of Travel and Transportation on Terrestrial Wildlife* (**Section 4.3.2**).

Alternative A—Under this alternative, some of the areas within BLM GRSG habitat would remain open to cross-country travel. This alternative has the highest potential for impacts on GRSG through habitat degradation.

Alternative B—Under this alternative, all areas within PHMA would be limited to designated routes, and no PHMA would be open to cross-country travel.

This alternative would reduce the likelihood of impacts from travel management on GRSG.

Alternative C—Same as Alternative B.

Alternative D—Same as Alternative B.

Proposed LUPA—same as Alternative B.

Direct Habitat Loss/Habitat Fragmentation/Disruption to Species

Impacts would be the same as those discussed under *Impacts from Management of Travel and Transportation on Terrestrial Wildlife*.

Alternative A—Under this alternative, the fewest acres would have seasonal restrictions on casual use; some of the areas within GRSG habitat would remain open to cross-country travel. This alternative has the highest potential for impacts on GRSG due to the lack of restrictions on activities that cause these impacts.

Alternative B—Under this alternative, no areas within PHMA would be designated as open to cross-country travel. The field offices and ranger districts would determine where closures and seasonal restrictions are necessary within PHMA to limit impacts on GRSG. This alternative would reduce the likelihood of impacts from travel management on GRSG.

Alternative C— This alternative would have the least potential to impact GRSG because restrictions on route construction would be applied to ADH.

Alternative D—This alternative would include the potential for seasonal limitations as necessary in ADH and would seasonally prohibit camping and other nonmotorized recreation within 4 miles of a lek. In this case, benefits to GRSG could be expanded to ADH and all habitat within 4 miles of a lek.

Proposed LUPA—Travel management would be the same under the Proposed LUPA as Alternative D; therefore impacts on GRSG would be the same as those described under Alterative D, above.

Habitat Restoration

Impacts would be the same as those discussed under *Impacts from Management of Travel and Transportation on Terrestrial Wildlife*.

Alternative A—Under this alternative, the fewest acres would be closed to cross-country travel. This alternative would have the fewest acres of habitat restoration as a result of natural revegetation.

Alternative B—Under this alternative, no areas within PHMA would be designated as open to cross-country travel. The field offices and ranger districts would determine where closures are necessary within PHMA to limit impacts

on GRSG. This alternative is expected to provide more habitat restoration than Alternative A.

Alternative C—Same as Alternative B.

Alternative D—Same as Alternative B.

Proposed LUPA—Travel management would be the same under the Proposed LUPA as Alternative D; therefore impacts on GRSG would be the same as those described under Alterative B, above.

Impacts from Recreation Management on GRSG

Permitted Use

Impacts from permitted use and the proposed alternatives would be the same as those described under terrestrial wildlife.

Alternative A—Under Alternative A, the BLM and the Forest Service would continue issuing SRPs and SUAs on a case-by-case basis. They would continue to provide opportunities for competitive and noncompetitive events and commercial outfitting services.

Alternative B—SRPs and SUAs would be authorized only where impacts on PHMA would be neutral or beneficial. This alternative is expected to provide more protection for GRSG than Alternative A.

Alternative C—Same as Alternative B.

Alternative D—This alternative limits impacts on disruption of the species as well as PHMA and thus would provide the most protections for GRSG.

Proposed LUPA—Recreation management would be the same as Alternative D; therefore, impacts on GRSG would be the same as those under Alterative D, above.

Impacts from Lands and Realty Management on GRSG

Direct Habitat Loss/Fragmentation/Degradation

In areas where ROWs are permitted, there would be more impacts on GRSG and its habitat than in areas where ROWs are excluded or avoided.

Constructing and operating ROW facilities, such as pipelines, roads, and transmission lines, may result in habitat loss, fragmentation, and degradation. Surface disturbance during construction removes vegetation and important habitat components for GRSG and, in most cases, renders the habitat unsuitable. ROWs, such as those for roads and industrial facilities, may lead to permanent loss of GRSG habitat. Other ROWs, such as those for pipelines or buried power lines, may lead to a more short-term loss of habitat if the area

were reclaimed after construction. However, following natural succession regimes, sagebrush communities would take 20 to 30 years to return to preconstruction conditions. In addition to removing vegetation, long-term occupancy of structures and facilities leads to direct habitat loss.

ROWs may also lead to habitat fragmentation and degradation. ROW projects can reduce patch size and increase edge habitats. Since GRSG require large blocks of intact habitat, linear disturbances reduce habitat quality. Surface disturbance can also lead to new weed infestations and spread weeds where infestations already occur. Noxious and invasive weeds are often of lower value to wildlife, and degrade wildlife habitat by reducing optimal cover or food.

Sagebrush-steppe communities are among the ecosystems most vulnerable to invasion and degradation by invasive weeds. Not only can invasive species outcompete most native plants when moisture is limited, they can also change site-specific fire ecology and result in the loss of critical shrub communities. The loss and degradation of sagebrush habitat can reduce the carrying capacity of local breeding populations of GRSG, especially in areas where high quality sagebrush habitat is limited (Braun 1998; Connelly et al. 2000).

Disruption Impacts

Both the construction and operation phases of ROW projects can lead to disruption impacts. Noise and an increase in human presence during construction may displace GRSG into lower quality habitat and may disrupt breeding and nesting (Holloran 2005). Although construction impacts are generally short term, many impacts would continue during routine maintenance and operation of the ROWs. GRSG would likely avoid habitat in the vicinity of infrastructure (Holloran et al. 2010), resulting in indirect habitat loss. In addition, noise and an increase in traffic during ROW operation and maintenance would disturb and likely displace GRSG (Lyons and Anderson 2003; Holloran 2005). Avoidance of habitat would be most prevalent during levels of high human activity, such as ROW construction. GRSG may avoid otherwise suitable habitat as the density of roads and infrastructure increases (Holloran 2005).

GRSG and other prairie gallinaceous birds[4] have evolved in habitat devoid of tall structures. ROW projects involving tall structures, such as power lines (distribution and transmission lines), communication towers, and meteorological towers, may lead to avoidance of suitable habitat (Pitman et al. 2005; Pruett et al. 2009; Wisdom et al. 2011). Although peer-reviewed science that demonstrated a clear avoidance of tall structures is limited for GRSG, studies conducted on species that have similar life history (i.e., the lesser and greater prairie-chickens) have shown that use of habitat is reduced when these habitats are near tall structures (Pitman et al. 2005; Pruett et al. 2009).

[4]Birds in the order Galliformes, including domestic poultry and game birds

Avian predators, particularly raptors and corvids (i.e., crows, ravens, and magpies), are attracted to overhead utility lines because they provide perches for various activities, including hunting (Avian Power Line Interaction Committee 2006). Increased predation and harassment of GRSG may occur from new ROW projects involving power lines or other tall structures (Connelly et al. 2004). In addition, ROW roads may increase mammalian predator densities.

Constructing and operating ROW facilities may also lead to direct mortality of GRSG. The potential for GRSG mortality from project construction would be low and likely limited to nesting hens or young chicks that have limited mobility. Direct mortality may occur when GRSG collide with turbines, power lines, or meteorological towers or their supporting infrastructure, such as guy wires (Connelly et al. 2004; Beck et al. 2006). In addition, an increase of traffic on roads from ROW maintenance and operations can lead to direct mortality through vehicle/GRSG collisions.

Habitat Protection

ROW exclusion or avoidance areas would eliminate or reduce the above-described impacts on GRSG and its habitat by preferentially locating ROWs outside PHMA or GHMA. Disturbances caps would limit surface disturbance and habitat fragmentation in GRSG habitat.

In general, the BLM and Forest Service would consider and analyze benefits to the public from any proposed acquisition or disposal action using land tenure adjustment criteria, with the goal that the exchange, acquisition, or disposal would increase public benefits, including those for GRSG. Any acquisition of land that includes high-value habitat can result in beneficial impacts on GRSG by maintaining or enhancing the habitat using BLM and Forest Service management restrictions or mitigation for surface-disturbing and disruptive activities. Any disposal of BLM-administered or National Forest System land with high-value habitat is typically avoided; such disposals could increase the risk of habitat loss through development because there would not be any BLM and Forest Service-required mitigation.

Lands no longer administered by the BLM or Forest Service could also experience increased human presence that can increase disturbance to wildlife in the area. Consolidating landownership through land tenure adjustments increases the manageability of lands and results in more contiguous blocks of habitat, which would beneficially impact GRSG.

Summary of Impacts by Alternative

Alternative A would have the most areas available for ROWs, with few restrictions in place to protect GRSG specifically. It would have more potential for impacts on GRSG and its habitat than Alternatives B, C, and D. The impacts described above would be greatest under this alternative.

Alternative B would have fewer areas available for ROWs through restrictions to protect GRSG habitat. Under this alternative, PHMA would be managed as an exclusion area, and GHMA would be managed as an avoidance area for new ROW projects. Conservation measures would be more protective under Alternative B than Alternatives A and D, but less protective than Alternative C, due to restrictions on siting options. However, in some cases, greater impacts on GRSG or GRSG habitat may occur on private lands as a consequence of certain projects (including linear projects) that would be prohibited on BLM-managed federal land. These management actions would be more restrictive than Alternatives A and D, but less restrictive than Alternative C; therefore, potential impacts on GRSG would be less than Alternative A but would be greater than Alternative C and D.

Alternative C would have the most protective measures for GRSG. Under this alternative, ADH would be managed as an exclusion area for new ROW projects. In addition, Alternative C would encourage consolidation through land tenure, of GRSG habitats, facilitating habitat conservation and management. Due to the extensive amount of ROW exclusion, however, in some cases, greater impacts on GRSG or GRSG habitat would occur on private lands as a consequence of certain projects (linear features) that would be prohibited on BLM-managed federal land. This alternative would have the fewest impacts on GRSG and its habitat overall but would prohibit flexibility in siting projects regardless of landownership.

Under Alternative D, PHMA would be managed as an avoidance area. ROW projects would be allowed only in PHMA if the project would not adversely affect GRSG or GRSG habitat. This alternative would be more protective than Alternative A and less restrictive but more flexible for GRSG or GRSG habitat overall than Alternatives B and C.

The Proposed LUPA would manage all PHMA and GHMA as ROW avoidance areas with exceptions for the TransWest and Energy Gateway South pending large transmission lines (see **Section 4.6.2**, Methodology and Assumptions [Lands and Realty]). Additionally, no aboveground structures would be authorized within 1 mile of active leks. Impacts on GRSG from management of lands and realty under the Proposed LUPA would be similar to those described for Alternatives B and D, with potentially considerable local impacts on GRSG leks and habitat where the PHMA and GHMA are open for TransWest and Energy Gateway South transmission lines. For the description of impacts from proposed large transmission lines in northwest Colorado, see Cumulative Impacts (**Chapter 5**).

Impacts from Wind Energy Development on GRSG

Direct Habitat Loss/Fragmentation/Degradation

In areas where wind energy facilities are permitted, there would be more impacts on GRSG and its habitat than in areas where wind energy facilities are excluded. Impacts on GRSG from constructing and operating wind energy facilities would be similar to those for ROWs and include direct habitat loss, fragmentation, and degradation (see *Impacts from Lands and Realty Management on GRSG* above).

Disruption Impacts

In areas where wind energy facilities are permitted, there would be more impacts on GRSG and its habitat than in areas where wind energy facilities are excluded. Impacts on GRSG from constructing and operating wind energy facilities would be similar to those for ROWs and include disruption, avoidance, and potential direct mortality (see *Impacts from Lands and Realty Management on GRSG* above).

Summary of Impacts by Alternative

Alternative A does not exclude wind energy developments specifically from GRSG habitat. In addition, this alternative would have the most areas available for ROWs and would lead to more impacts than Alternatives B, C, and D.

Although Alternative B does not exclude wind energy developments specifically from GRSG habitat, this alternative would have fewer areas available for ROWs. Conservation measures would be more protective under Alternative B than under Alternatives A and D but less protective than Alternative C; therefore, impacts on GRSG are less under Alternatives A and D but greater than Alternative C.

Alternative C would have the most protective measures by precluding wind developments from ADH; therefore, it would have the fewest impacts on GRSG.

Although Alternative D does not address wind energy specifically, Alternative D would be more protective in respect to all ROWs than Alternative A but less protective than Alternatives B and C.

Under the Proposed LUPA, wind energy development would be excluded from PHMA; impacts on GRSG would be similar to those under Alternative C. However, the impact on GRSG from restrictions on wind energy development are not expected to vary between alternatives because the potential for industrial wind energy in northwest Colorado is very limited.

Impacts from Solar Energy Development on GRSG

Direct Habitat Loss/Fragmentation/Degradation

In areas where solar energy facilities are permitted, there would be more impacts on GRSG and its habitat than in areas where solar energy facilities are excluded.

Impacts on GRSG from constructing and operating solar energy facilities would be similar to impacts on ROWs and would include direct habitat loss, fragmentation, and degradation (see *Impacts from Lands and Realty Management on GRSG* above).

Disruption Impacts

In areas where solar energy facilities are permitted, there would be more impacts on GRSG and its habitat than in areas where solar energy facilities are excluded.

Impacts on GRSG from constructing and operating solar energy facilities would be similar to those for ROWs and include disruption, avoidance, and potential direct mortality (see *Impacts from Lands and Realty Management on GRSG* above).

Summary of Impacts by Alternative

Alternative A does not exclude solar facilities specifically from GRSG habitat. In addition, this alternative would have the most areas available for ROWs, with few restrictions in place to protect GRSG, and would lead to more impacts than Alternatives B, C, and D.

Although Alternative B does not exclude solar facilities specifically from GRSG habitat, this alternative would have fewer areas available for ROWs. Conservation measures would be more protective under Alternative B than Alternatives A and D but less protective than Alternative C. Therefore, impacts are less than Alternatives A and D but greater than Alternative C.

Alternative C would have the most protective measures for GRSG by precluding solar facilities from ADH and therefore would have the fewest impacts.

Although Alternative D does not address solar facilities specifically. It would be more protective in respect to all ROWs than Alternative A but less protective than Alternatives B and C.

Under the Proposed LUPA, solar energy development would be excluded from PHMA; impacts on GRSG would be similar to those under Alternative C. The impact on GRSG from restrictions on solar energy development are not expected to vary between alternatives. This is because the potential for solar energy development in northwest Colorado is very limited and because all solar energy projects 20 megawatts and greater are excluded in all LUPs within the

planning area, as described in the Solar Energy Development Programmatic EIS Record of Decision

Impacts from Range Management on GRSG
Impacts from range management on GRSG would be the same or similar to the impacts from range management on terrestrial wildlife discussed in **Section 4.3.2**, Terrestrial Wildlife, with the addition of the impacts described below.

Habitat Degradation
In areas that are available for livestock grazing, there could be more impacts on GRSG than in areas where livestock grazing is excluded.

Potential impacts of herbivory[5] on GRSG habitat include long-term impacts of historic overgrazing on sagebrush habitat and GRSG habitat changes due to herbivory (Beck and Mitchell 2000).

By altering habitat components necessary for GRSG habitats, livestock grazing can impact the suitability and extent of GRSG habitats (Wyoming Sage-Grouse Working Group 2003). Holloran et al. (2005) suggest that annual livestock grazing in GRSG nesting habitats may adversely impact the next year's nesting success.

Important objectives in managing livestock grazing are to maintain residual cover of herbaceous vegetation to reduce predation during nesting (Beck and Mitchell 2000) and to maintain the integrity of riparian vegetation and other wetlands (Crawford et al. 2004). Proper livestock management (timing, location, and intensity) can assist in meeting GRSG habitat objectives and reduce fuels (Briske et al. 2011). Adams et al. (2004) identify grazing intensity and timing and duration of grazing as the most important factors in maintaining herbaceous cover for GRSG. Other GRSG habitat management objectives that control livestock movements and grazing intensities can be achieved broadly through rotational grazing patterns or locally through water and salt placements (Beck and Mitchell 2000).

Implementation-level grazing decisions would comply with Standards for Public Land Health and Guidelines for Livestock Grazing Management (BLM 1997a). If livestock grazing is the cause for lands not achieving Public Land Health Standards, changes would be made in order to address the kind, numbers, and class of livestock, as well as the season, duration, distribution, frequency, and intensity of grazing use.

Alternative A would allow livestock grazing, with no restrictions in place to protect GRSG habitat specifically and therefore would have the greatest impact on GRSG.

[5]Plant eating

Alternative B would have the same areas available for livestock grazing as Alternative A, but more restrictions would be in place to protect GRSG habitat. Those restrictions include prioritization of land health assessments in PHMA, modification or marking of fences, and restrictions on range improvements and locations of supplements in PHMA. Therefore, Alternative B would have fewer impacts on GRSG.

Alternative C would have no areas available for livestock grazing within ADH and therefore would have the fewest impacts on GRSG habitat. Under Alternative C there would be potential for fence construction in order to prevent trespass onto public lands from adjacent privately owned allotments. Fences have the potential to affect GRSG through direct mortality and habitat fragmentation.

Alternative D would be similar to Alternative B but would be slightly more restrictive as GRSG habitat objectives within grazing allotments would be applied to ADH and not just PHMA. This alternative has fewer impacts than Alternative A and more impacts than Alternative C.

The Proposed LUPA would be slightly more restrictive than Alternative D in that sheep bedding, livestock trailing, and related activities would be more closely controlled. The Proposed LUPA would also include specific habitat objectives to maintain seasonal GRSG habitat. Otherwise, the impacts of this alternative would be the same as Alternative D.

Disruption to Species

Actions that result in habitat loss or disruption to GRSG are grazing, vegetation management, and range improvements.

Potential impacts of grazing and associated activities on GRSG include direct impacts of herbivores on GRSG, such as trampling of nests and eggs, altered GRSG behavior due to presence of herbivores, and impacts on GRSG and their behavior from structures associated with grazing management (Beck and Mitchell 2000). Additionally, collisions with infrastructure have been shown to cause mortality to a number of North American and European tetraonids (Bevanger 1990; Baines and Summers 1997, Bevanger and Broseth 2000; Baines and Andrew 2003).

In particular, mortality associated with fence collisions have been documented in lesser prairie-chickens *(Tympanuchus pallidicinctus)* in Oklahoma (Wolfe et al. 2007) and GRSG in Idaho (Stevens 2011). Stevens et al. (2012) showed that topographic features, proximity to active leks, lek size, and fence design and density can influence collision potential and frequency. It was shown that fences pose a higher risk to GRSG in less rugged terrain and in proximity to active leks, especially within 1.25 miles (Stevens 2011). Furthermore, fences in areas with higher GRSG population densities had higher collision rates.

Fence post type and width of fence segment were also shown to influence collision risk. Fences with more numerous and visible posts, such as larger wooden posts, had fewer instances of collision. Areas where fence densities exceed 1.6 miles per square mile may also pose a risk to GRSG (Stevens 2011). Consideration should be taken when evaluating the need for fences and includes proper siting and design. Marking fences in high priority GRSG habitats may also reduce the risk of collision (Stevens 2011).

Alternative A would allow livestock grazing and has the most potential for vegetation management and rangeland improvements with the fewest restrictions; therefore, Alternative A would have the greatest impact on GRSG.

The potential for livestock grazing, vegetation management, and rangeland improvements is the same under Alternative B as under Alternative A; however, more restrictions would be in place to protect GRSG habitat, so it would have fewer impacts on GRSG.

Under Alternative C ADH would be an exclusion area for livestock grazing and only treatments that benefit GRSG would be allowed. While removing livestock would lead to substantial improvements in herbaceous understories, which would benefit GRSG; in all practicality the only way to keep livestock out of these areas would be fences. An estimated 5,000 miles of fence would need to be constructed under Alternative C (see **Table 4.6** in **Section 4.13**, Range Management).

Some level of GRSG injury or mortality could occur; however, the potential for injury and mortality could be moderated through fence design and siting considerations (see discussion above). Collision risk would be low in large, continuous blocks of publicly owned lands where potential fences would follow the perimeter of ADH. In areas where there is a mosaic of BLM-administered lands or National Forest System lands and privately owned lands it is suspected that fence collisions may be more frequent since private lands would likely require fencing that could bisect higher quality brood and nesting habitat.

In contrast, if livestock were removed from BLM-administered or National Forest System lands, there would be no need to maintain existing fences, particularly in areas with large, continuous tracts of BLM-administered or National Forest System lands. Removal of these fences could reduce the potential for collisions particularly if located in higher quality habitats. While impacts associated with fence construction should be carefully considered, overall Alternative C would be the most protective of GRSG habitat.

Alternative D would have the same areas available for livestock grazing as Alternatives A and B, but more flexibility to apply treatments would be allowed. Impacts on GRSG would be greater under Alternative D than Alternative B and less than Alternative A.

The Proposed LUPA would be slightly more restrictive than Alternative D in that sheep bedding, livestock trailing, and related activities would be more closely controlled. Otherwise, the impacts of this alternative would be the same as Alternative D.

Impacts from Wild Horse Management on GRSG

Degradation of Habitat

Grazing by wild horses would be similar to permitted livestock grazing (see above) and could reduce habitat effectiveness by changing structure, composition, or diversity of vegetation. Since horse diets consist primarily of grass, and horses can clip vegetation close to the ground, year-round grazing by wild horses can remove important cover for nest and young concealment. This could lead to increased predation of GRSG nests and young, if habitat were to lack hiding cover (Connelly et al. 1991; Schroeder and Baydack 2001).

Horses can also reduce or fragment shrub canopy by trampling, rubbing, and consuming it (Beever and Aldridge 2011). Beever et al. (2008) conducted a study of vegetation response to removing horses in 1997 and 1998 and concluded that sites from which horses had been removed exhibited 1.1 to 1.9 times greater shrub cover, 1.2 to 1.5 times greater total plant cover, 2 to12 greater plant species richness, 1.9 to 2.9 times greater native grass cover, and 1.1 to 2.4 times greater frequency of native grasses than did horse-occupied sites. Loss of grass and shrub cover reduces the quality of seasonal habitats for GRSG. Horses may also congregate in dry areas, especially during the hot months. This may degrade important brood-rearing areas, which are vital to survival of GRSG chicks (Beever and Aldridge 2011).

Under all alternatives, the BLM has the ability to adjust appropriate management levels of wild horses if resource damage were occurring. However, only Alternatives B, C, and D provide management guidelines specific to GRSG habitat.

For the Proposed LUPA, wild horse management would be the same as Alternative D; impacts would be the same as those described under Alternative D.

Disruption to Species

Wild horse gathers would create short-term localized disturbance to wildlife from human activity related to gathers. Vehicles, helicopters, wranglers on horseback, and the wild horses themselves would contribute to wildlife stress and displacement. Management of wild horses may result in range improvement projects, such as fences and water developments. Disturbance from construction and maintenance of range projects would be similar to impacts described under *Impacts from Range Management on GRSG* (see above). In addition, wild horses themselves could disrupt GRSG.

Summary of Impacts by Alternative

Alternative A would place the fewest restrictions on wild horse management, and therefore would have the most potential for impacts on GRSG.

Alternative B would place some restrictions on the management of wild horses. Under this alternative, gathers would be prioritized in ADH and GRSG habitat, and management considerations would be incorporated into HMA plans. These management strategies would benefit wildlife species whose ranges overlap PHMA and GHMA. Overall, impacts on GRSG would be less than Alternatives A and D but would be similar to Alternative C.

Alternative C is expected to have the same impacts as Alternative B because the management prescriptions for Alternative B and C are much the same for wild horses.

Alternative D would be similar to Alternatives B and C but would consider all resource values in conjunction with GRSG when managing wild horses. There may be a slight increase in impacts on GRSG from this alternative in comparison to Alternatives B and C. However, Alternative D would be more protective than Alternative A.

For the Proposed LUPA, wild horse management would be the same as Alternative D; therefore, impacts would be the same as those described under Alternative D.

Impacts from Fluid Minerals Management on *GRSG*

Impacts on GRSG would be greater in those MZs that are strongly influenced by energy development or would experience increases in energy development in the near future. **Table 3.40** in **Section 3.7**, Minerals—Leasable, shows acres of PHMA and GHMA that are currently leased and unleased (medium and high potential).

Direct Habitat Loss/Fragmentation/Indirect Habitat Loss or Avoidance

Direct Habitat Loss—Direct habitat loss from fluid minerals development would be attributed to vegetation clearing (from well pad, access road, and ancillary facilities construction) and longer-term facility occupation. Loss or modification of big sagebrush communities would not regain any shrubland character for GRSG for 20 to 30 years, following interim or final reclamation, or longer depending on length of occupation. In some cases, shrubland may not regain functional utility (e.g., roads and permanent facilities) to support GRSG over the life of the plan amendment.

Small herbaceous inclusions in sagebrush-dominated landscapes can serve as important sources of herbaceous and invertebrate forage for brooding GRSG. Because of population size and habitat configuration (natural geographic patterns), these impacts may be more pronounced in certain zones (e.g., Colorado MZ 17). Conservation measures outlined in each alternative would

reduce the potential for direct habitat loss across sagebrush landscapes within each MZ.

Habitat Fragmentation and Alteration—Development of well pads, roads, and associated anthropogenic (human-caused) features would reduce intact sagebrush communities, creating a mosaic across the landscape and increasing edge habitat. GRSG populations generally require large expanses of intact sagebrush habitat (Connelly et al. 2004). Fragmented or altered landscapes (attributed to energy development) lead to diminished habitat base. They have been shown to influence lek activity, nesting and brood-rearing success, adult and chick survival, and winter habitat selection (Holloran et al. 2010).

Additionally, surface-disturbing activities can alter plant community composition, decrease species diversity, and may lead to the proliferation of noxious weeds and invasive plant species. Shifts in understory composition that lead to more annual dominated or single-species dominated communities could influence local GRSG populations by reducing nesting success and chick survival. Because of population size and habitat configuration (natural geographic patterns), these impacts may be more pronounced in certain zones (e.g., Colorado MZ 17). Conservation measures outlined in certain alternatives would reduce the potential for fragmentation and degradation across sagebrush landscapes within each MZ.

Indirect Habitat Loss and Avoidance—In addition to direct habitat loss and alteration, noise and human activity (including impacts from roads) from fluid minerals development has been shown to influence GRSG behavior. Recent studies have consistently demonstrated that oil and gas development and its infrastructure influence GRSG behavior and demographics at distances of up to 4 miles (NTT 2011). This prompts declines in lek persistence and male attendance, yearling and adult hen survival, and nest initiation rates. It also elicits strong avoidance response in yearling age classes, nesting and brooding hens, and wintering birds.

Most GRSG researchers have used various measures of lek use to infer population responses in GRSG subjected to development-related disturbances. Without exception, this work documents increased rates of lek inactivity and declining male attendance in response to increased frequency (vehicle use), intensity (well density), duration, and proximity of development and infrastructure (Doherty 2008; Lyon and Anderson 2003; Walker et al. 2007; Harju et al. 2010; Holloran 2005; see also discussion in Manier et al. 2013).

Doherty (2008) found impacts on GRSG lek persistence and attendance increase with development intensity and proximity. At well densities (as a measure of development activity) of one to three per section, rates of lek inactivity were twice that of background levels, and bird abundance at remaining leks declined 30 to 55 percent. Rates of lek inactivity increased two to five times at well densities of four to eight per section. Influences became undetectable at

distances of 2 miles or more. Doherty (2008) considered development activity at intensities of one well or fewer per section in GRSG habitat to be compatible with the conservation of GRSG populations.

Holloran et al. (2010) demonstrated marked avoidance of all development infrastructure by yearling male GRSG. Although adult GRSG exhibit strong fidelity to nesting areas, there are strong indications that infrastructure and activity avoidance by and reduced survival of GRSG, particularly in yearlings, drives declines in GRSG populations that are subjected to development.

Noise from drilling, roads, and ancillary structures has been implicated as an important determinant in declining male lek attendance (Blickley et al. 2012; Holloran 2005; Manier et al. 2013). Holloran (2005) found that leks within 3 miles of drilling experienced significantly greater rates of decline than controls. But this effect was asymmetrical and primarily affected leks downwind of drilling. Likewise, Blickley et al. (2012) found that chronic noise led to a decrease in male lek attendance and was more pronounced for road noise than drilling noise.

Anthropogenic noise may displace birds in and around the area of disturbance. Noise may also indirectly influence GRSG survival by masking sounds of predators. Additionally, anthropogenic noise may mask communication between males and females, resulting in decreases in abundance (Blickley et al. 2012). Vegetation and topography would influence the distance of impact and may influence GRSG differently, depending on MZ.

Many attributes of road networks, such as road density, frequency of use, and timing of use, appear to adversely influence affected populations, including declines in lek attendance and avoidance of high traffic areas (Holloran 2005; Wyoming Wildlife Consultants 2009; Blickley et al. 2012).

Holloran (2005) found road densities that exceeded 0.7 mile per square mile within 2 miles of a lek caused progressive declines in average annual lek attendance from 15 percent (0.7 to 1 mile per square mile) to 56 percent at 1.7 miles per square mile. Birds less consistently avoided producing pads that incorporated fluids gathering systems, which implies that GRSG may also be sensitive to the frequency of vehicle use (Wyoming Wildlife Consultants 2009).

On leks within 1 mile of main access roads, male attendance declined 35 percent in areas used early in the morning during the strutting period; however, attendance declined by 11 percent in the absence of traffic (Holloran 2005). Male lek attendance declined 13 percent and up to 60 percent when vehicle use frequency exceeded 50 axles per day. In addition to indirect influences, vehicle traffic from road systems can also lead to injury or direct mortality of GRSG.

Although the use of traditional stipulations have been widely criticized as ineffective, recent research (Holloran 2005; Holloran et al. 2010; Wyoming

Wildlife Consultants 2009) demonstrates that those measures formerly adopted and espoused by the BLM, state wildlife agencies, and the USFWS (i.e., NSO and TL stipulations addressed below) are capable of reducing impacts associated with avoidance. However, based on current understandings, impacts are not reduced to the degree necessary to stem progressive declines in populations subjected to pervasive or prolonged development.

With known weaknesses in the efficacy of traditional stipulations, it is likely that some GRSG populations (defined by MZ) and GRSG habitat may be substantially influenced by fluid minerals development. In those MZs with limited fluid minerals development, conventional TL stipulations and NSO stipulations, siting considerations and moves would likely be sufficient to avoid important habitat features and seasonal activities from reproduction and winter use. It is unlikely that fluid mineral development in those MZs with development occurring at extremely low densities or in fringe areas (Doherty 2008) would have any marked influence on the abundance or persistence of GRSG populations. However, note that fringe populations are important to the overall range of GRSG.

Habitat Protection and Restoration

Conservation measures outlined in each alternative exclude development in PHMA, limit the amount of surface disturbance, design roads to the minimum standards necessary, collocate facilities, and include NSO and TL stipulations, and would benefit GRSG. This would come about by reducing or eliminating the amount of sagebrush modified or lost to energy development, in addition to reducing the amount of or potential for indirect influences.

Restoration projects related to fluid mineral development designed to promote or enhance sagebrush would benefit GRSG in both the short and long term (depending on project design). Interim and final reclamation of ROWs and well pads that use seed mixes with species that provide greater horizontal and vertical ground cover (in contrast to predisturbance composition) and that promote more diverse structural and flowering forms may prove important as substrate for invertebrate prey for GRSG, as well as a cover resource in the short term.

Summary of Impacts by Alternative

See **Table 3.41**, Acres of Oil and Gas Leasing Categories in Decision Area PHMA and GHMA, for a comprehensive table of current stipulations and unleased acres by Colorado MZ.

Alternative A—In general, Alternative A would have the least protective measures for GRSG and sagebrush habitat, but this would vary depending on MZ (existing LUPs). Protective measures would generally include seasonal restrictions during the breeding, brood-rearing, and winter periods, NSO stipulations of 0.25 or 0.60 mile from a lek, and 1 and 5 percent voluntary disturbance caps on existing leases (see **Chapter 2** for specifics). Certain lands

(such as WSAs) would be closed to fluid minerals leasing, but this would benefit GRSG and sagebrush habitats only where they are coincident. Overall, Alternative A would have the greatest impacts on GRSG and sagebrush habitat.

Alternative B—Alternative B would have more restrictions on fluid minerals development than Alternatives A and D but fewer than Alternative C. Conservation measures outlined in this alternative would close PHMA to fluid minerals leasing with exception criteria. For leased lands this alternative would exclude new surface occupancy within PHMA. Exceptions include cases where a lease is entirely in PHMA, a 4-mile NSO would be placed around the lek, and disturbance would be limited to one per section, with no greater than 3 percent disturbance. If an entire lease lies within the 4-mile lek perimeter, disturbance would be limited to one per section with no greater than 3 percent disturbance in that section, with development placed the greatest distance from the lek.

Development across the landscape (one per section) could be more detrimental to GRSG than clustering of development in strategic locations to minimize impacts on GRSG habitat. Seasonal restrictions (prohibiting drilling during nesting and brood-rearing) would be applied only to exploratory wells in PHMA (all other wells would not have seasonal restrictions). On undeveloped leases, surface disturbance would not exceed 3 percent of GRSG habitat within each lease but would remain subject to persistent long-term behavioral influences from vehicle access and pad activity (see below). See **Chapter 2** for a detailed description of conservation measures under this alternative.

Conservation measures applied under this alternative would be limited to PHMA in nearly all instances and could influence 617,500 acres (25 percent) of all federally managed GRSG habitats (ADH). The potential for direct habitat loss would be greater under this alternative than Alternative C, but it would be more protective than Alternatives A and D. Exception criteria described above would allow development in PHMA in certain situations, with a disturbance cap of 3 percent, or 1 disturbance per section. RDFs, including road siting, road design, collocating and clustering facilities, and limiting noise, would further reduce direct habitat loss or modification and disruption (indirect influences) to GRSG.

Traditional TLs (generally applied during the nesting and brood-rearing season) would be applied only for exploratory wells. While timing restrictions have been shown to be less effective in those areas with large-scale disturbance or prolonged activity, recent research provides evidence that these stipulations are capable of reducing impacts from avoidance in areas with lower levels of development (Holloran 2005; Holloran et al. 2010; Wyoming Wildlife Consultants 2009; see discussion above for *Indirect Habitat Loss/Avoidance*).

Eliminating TLs, particularly during the breeding season, may increase impacts from fluid minerals development for certain GRSG populations specifically, those populations where there has been little to no development activities (see

discussion above). Furthermore, the scale of disturbance (both direct and indirect) would depend on lease size and configuration within each MZ. Without the application of traditional timing stipulations, development under this alternative could have substantial negative impacts on GRSG during the breeding and nesting season.

Alternative C—Conservation measures addressed in Alternative C would be similar to those described above in Alternative B; however, protections offered under Alternative C would be expanded to ADH in most cases. This alternative applies further protective measures by prohibiting the construction of evaporative or infiltration reservoirs (coal bed methane wastewater), requiring agencies to explore options to amend or cancel leases in ACECs and occupied habitats, and disallowing waivers to be issued. See **Chapter 2** for a detailed description of conservation measures under this alternative.

Overall, Alternative C would provide the greatest protective measures for GRSG and sagebrush habitat, potentially influencing up to 1,094,000 acres (43 percent) of all federally managed GRSG habitat (ADH). Limiting disturbance to no greater than one well per section is considered to be compatible with the conservation of GRSG populations (Doherty 2008); however, as stated above, this may not apply with equal efficacy to all GRSG populations. The potential for the direct loss of sagebrush habitat and subsequent impacts on GRSG would be the least under this alternative.

Discussions for Alternative B regarding lack of TLs on nonexploratory wells are also applicable to this alternative. Overall Alternative C would have the least potential to directly or indirectly influence GRSG and sagebrush habitats. Prohibiting surface-disturbing activities, including vehicle travel and other human activity on exploratory wells during the nesting and brood-rearing season in ADH, would substantially reduce the potential for nest disruption and displacement, increase adult and chick survival, and sustain lek attendance. RDFs, including road siting and design, collocating and clustering facilities, and limiting noise, would further reduce direct habitat loss or modification and disruption to GRSG.

Alternative D—Alternative D would be less restrictive than Alternatives B and C but more restrictive than Alternative A in most instances. Under this alternative, surface occupancy or disturbance would be prohibited within 4 miles of a lek in PHMA during the lekking and early brood-rearing periods.

Surface disturbance would be limited to 5 percent in any MZ. In those MZs where surface disturbance exceeds 5 percent, effective mitigation would be required to offset loss of sagebrush habitat; however, the BLM Authorized Officer may authorize disturbance in excess of 5 percent if data-based documentation were available to warrant a conclusion that GRSG populations are healthy and stable or increasing. Exceptions, waivers, and modifications may be granted at the discretion of the BLM Authorized Officer and only with the

concurrence of CPW. Seasonal restrictions would be applied within 4 miles of an active lek in ADH. Design features intended to reduce impacts on GRSG and sagebrush habitat would be voluntary (PDFs) rather than required.

Similar to Alternative B, conservation measures would be limited to PHMA and would apply to no more than 617,500 acres (25 percent) of all federally managed GRSG habitats (ADH). The potential for direct habitat loss would be greater under this alternative, compared with Alternatives B and C, due largely to the 5 percent disturbance cap and allowance for development to occur in PHMA (open for development). However, all new leases in PHMA would be managed as NSO.

CSUs and TLs would be applied if exceptions were granted to NSO and to reduce indirect impacts largely dependent on the amount of ongoing fluid minerals development in each MZ. In most cases design features under Alternative D would be voluntary (incorporated in management actions where necessary, appropriate, and technically feasible). As such, this alternative would have greater potential to negatively influence GRSG populations and sagebrush habitat, both directly and indirectly, than Alternatives B and C but less than Alternative A.

Under the Proposed LUPA, no new leasing would be permitted within 1 mile of active leks and no new surface occupancy would be allowed in PHMA. No modifications or waivers would be permitted. The BLM Authorized Officer may grant an exception to this NSO stipulation only where the proposed action:

1. Would not have direct, indirect, or cumulative effects on GRSG or its habitat
2. Is proposed to be undertaken as an alternative to a similar action occurring on a nearby parcel and would provide a clear conservation gain to GRSG.

Exceptions based on conservation gain (2, above) may only be considered in PHMA of mixed ownership where federal minerals underlie less than fifty percent of the total surface, or areas of the public lands where the proposed exception is an alternative to an action occurring on a nearby parcel subject to a valid federal fluid mineral lease existing as of the date of this RMP. Exceptions based on conservation gain must also include measures, such as enforceable institutional controls and buffers, sufficient to allow the BLM to conclude that such benefits would endure for the duration of the proposed action's impacts.

> *Any exceptions to this lease stipulation may be approved by the Authorized Officer only with the concurrence of the State Director. The Authorized Officer may not grant an exception unless the applicable state wildlife agency, the USFWS, and the BLM unanimously find that the proposed action satisfies (i) or (ii). Such*

> *finding shall initially be made by a team of one field biologist or other GRSG expert from each respective agency. In the event the initial finding is not unanimous, the finding may be elevated to the appropriate BLM State Director, USFWS State Ecological Services Director, and state wildlife agency head for final resolution. In the event their finding is not unanimous, the exception will not be granted. Approved exceptions will be made publically available at least quarterly.*

Additionally, an NSO stipulation would be applied to within 2 miles of active leks in GHMA. Disturbances would be limited to 3 percent and 1 disturbance per 640 acres density of PHMA in each Colorado Management Zone, with no new leasing allowed if the disturbance cap were to exceed this amount. Seasonal restrictions would apply to construction, drilling and completion activities within 4 miles of active leks during the GRSG reproduction period of March 1 to July 15.

Under the Proposed LUPA, no new leasing would be permitted within 1 mile of active leks, and no new surface occupancy would be allowed in PHMA (see exception criteria below) and within 2 miles of active leks in GHMA (see **Appendix D**).

The Proposed LUPA would provide more protections to GRSG and GRSG habitat than Alternatives A and D. Because all of PHMA would be managed as NSO, with very rare potential for exceptions, impacts would be similar to those described for Alternative B. The potential for direct habitat loss and indirect impacts would be similar to those described under Alternative B.

One mile around active leks would be managed as closed to leasing (224,200 acres) under the Proposed LUPA; nevertheless, compared with all PHMA (1,315,500 acres), all of PHMA would be managed as NSO with very rare exceptions, making the impacts on GRSG or GRSG habitat similar. Additionally, under the Proposed LUPA, disturbance would be limited to 3 percent in PHMA and density would be limited to 1 energy facility per 640 acres, providing greater protections for GRSG and GRSG habitat than Alternatives A and D and similar to those described for Alternative B.

Leased Fluid Minerals—Under the Proposed LUPA, surface disturbance, surface occupancy and disruptive activities would be precluded within 1 mile of active leks. If it were determined that the restriction would render the recovery of fluid minerals infeasible or uneconomical (considering the lease as a whole); if development would exceed the disturbance density of 1 disturbance per 640 acres and 3 percent of a Colorado MZ, then the criteria described in **Table 2.6**, Line 47, and mitigation outlined in **Appendix D** would be used to guide development that would result in the fewest impacts on GRSG and GRSG habitat. These same criteria would be applied to proposed development in the remainder of PHMA (outside of 1 mile) or GHMA within 4 miles of active leks.

Seasonal restrictions would apply to construction, drilling, and completion within 4 miles of active leks during the GRSG reproduction period of March 1 to July 15. The BLM Authorized Officer may adjust the dates of the timing limitation, in consultation with the State of Colorado, if criteria described in **Table 2.4**, Line 47, are met.

To authorize an activity based on the criteria above, the environmental record of review must show no significant direct disturbance, displacement, or mortality of GRSG.

For existing leases, the Proposed LUPA would provide more protections to GRSG and GRSG habitat than Alternatives A and D, and similar to those described for Alternatives B and C. Conservation measures applied under the Proposed LUPA could influence1,185,400 acres of all federally managed GRSG habitats (ADH).The potential for direct habitat loss and indirect impacts would be similar to those described under Alternatives B and C. Disturbances could exceed the 3 percent and 1 disturbance per 640 acres density under the Proposed LUPA if the restriction would render the recovery of fluid minerals infeasible or uneconomical.

By contrast, Alternatives B and C would strictly limit disturbances to 3 percent or 1 per section, subject to valid existing rights. Under the Proposed LUPA, criteria provided in **Table 2.6**, line 47 would guide facility siting to minimize impacts on GRSG and GRSG habitat and provide mitigation opportunities

Alternatives B and C would apply a seasonal restriction on exploratory drilling only; however, under the Proposed LUPA, seasonal restrictions would apply to all activities associated with construction, drilling and completion within 4 miles of active leks during the GRSG reproduction period of March 1 to July 15. Depending on the development scenario, this may afford more protections to GRSG during the breeding season than Alternatives B and C.

The Proposed LUPA would provide more protective measures than Alternatives A and D as it would preclude surface occupancy and disturbance and disruption within 1 mile of active leks and would limit disturbances to 3 percent and 1 disturbance per 640 acres (when feasible) density in any Colorado Management Zone.

In comparison, Alternative D would limit permitted disturbances to 5 percent of any Colorado MZ and would only prohibit disturbances and surface occupancy during the GRSG reproduction period.

Impacts from Solid Minerals—Coal Management on GRSG

<u>Subsurface Mines</u>

Direct Habitat Loss/Degradation/Disruption to Species. Aboveground appurtenant facilities generally associated with subsurface coal mines would result in

vegetation removal or alteration and longer occupation of a site. Impacts on GRSG populations from drilling and daily operations and maintenance of aboveground facilities, including traffic, would be similar to those discussed above under *Impacts from Fluid Minerals Management on GRSG*; however, the impacts may vary in scale, duration, and intensity.

Habitat Restoration and Protection. Benefits to local GRSG populations attributed to habitat improvement projects, off-site mitigation, and reclamation would be similar to those discussed under *Impacts from Fluid Minerals Management on GRSG*. Protections are outlined in each alternative below include siting new surface facilities outside of PHMA, collocating facilities where appropriate, minimizing or limiting surface disturbance (including roads and operations and maintenance), and applying PDFs. These measures would benefit GRSG populations in both the short and long term. See detailed discussion under *Impacts from Fluid Minerals Management on GRSG*.

Summary of Impacts by Alternative. Alternative A—Impacts would vary by MZ (existing LUPs), with some federal lands being considered as unsuitable, based on potential for resource impacts (see **Table 2.2**, Comprehensive Summary of Alternatives). Impacts on GRSG habitat from surface coal mining are likely to be greater in terms of habitat loss. Overall, this alternative would have the fewest restrictive measures on solid minerals leasing and development and would result in the greatest potential for direct loss or modification of sagebrush habit and greater potential for direct and indirect impacts on GRSG; therefore, Alternative A would have the highest potential to impact GRSG and sagebrush communities.

Alternative B—Under this alternative, no new coal leases would be granted unless all appurtenant facilities were located outside of PHMA or priority areas. New facilities associated with an existing lease would be placed outside of PHMA when possible or in previously disturbed areas within PHMA. New facilities would be required to be built to the minimum standard necessary. Minimization of surface-disturbing or disruptive activities would be applied at the planning level to ADH. Alternative B would result in the least potential for loss of sagebrush habitat and would reduce the indirect influences from solid minerals development. Conservation measures designed to exclude or minimize surface-disturbing activities would provide the greatest benefit to GRSG and sagebrush communities.

Alternative C—Impacts on GRSG and its habitat under this alternative are identical to those described under Alternative B.

Alternative D—No new coal leases would be granted unless all surface-disturbing activities were located outside of PHMA, with exception criteria outlined in **Chapter 2**. Surface-disturbing activities would be limited to 5 percent within each MZ. If disturbance exceeds 5 percent, effective mitigation to offset loss of habitat would be required. For existing coal leases, lessees would

be encouraged to voluntarily follow PDFs that reduce or mitigate adverse impacts on GRSG and ADH (see **Chapter 2**). Impacts on GRSG and sagebrush communities would be similar to those described for Alternative B; however, because Alternative D allows for greater flexibility in development potential (exception criteria, 5 percent disturbance cap, and voluntary commitment), it would result in greater potential for direct habitat loss and direct and indirect impacts on GRSG than Alternatives B and C.

Proposed LUPA—For existing coal leases, impacts on GRSG and GRSG habitat would be similar to Alternative D; however, under this alternative expansions to existing coal leases may be considered if, after consultation with the State of Colorado, the proposed expansion would not have an adverse influence on GRSG and GRSG habitat based on the criteria outlined in **Table 2.4**, line 62. This alternative could allow for mineral recovery without compromising the function and utility of habitats that support GRSG.

For new coal mine leases, no surface occupancy would be allowed within 2 miles of active leks, no exceptions. A NSO stipulation would be placed on the remainder of PHMA, but exceptions may be granted. This could allow for surface occupancy within PHMA. However, based on criteria outlined in **Chapter 2, Table 2.8**, line 64, and **Appendix D**, an exception would be granted only if, through consultation with the State of Colorado, the location of the proposed facility were shown to have no negative influence on GRSG and GRSG habitat. Disturbances would be limited to 3 percent and 1 disturbance per 640 acres density of a Colorado MZ, and no new leasing would be allowed in PHMA if the disturbance cap were to exceed 3 percent.

The Proposed LUPA would have similar direct and indirect influence on GRSG and GRSG habitat as Alternatives B, C, and D but fewer than Alternative A. Conservation measures in the Proposed LUPA would be applied within PHMA. The Proposed LUPA would allow for potential development if, after consultation with the State of Colorado, the proposed surface-disturbing activity were shown to have no adverse influence on GRSG or GRSG habitat. This alternative would allow for some development without impacting GRSG or compromising the function and utility of habitats that support GRSG.

<u>Surface Mines</u>

Direct Habitat Loss/Disruption of Species/Degradation/Fragmentation. Construction and occupation of surface mines typically results in longer term loss of forage and cover for GRSG. These communities may not regain any functional utility for several decades, but this would greatly depend on reclamation effectiveness. In general, impacts on GRSG would be similar to those described under *Impacts from Fluid Minerals Management on GRSG*, but they may vary in scale, duration, and intensity.

Habitat Restoration/Protection. Benefits to local GRSG populations attributed to habitat improvement, off-site mitigation, and reclamation of surface-disturbing

activities would be similar to those discussed under *Impacts from Fluid Minerals Management on GRSG*. Protections outlined for each alternative below, including siting new surface facilities outside of PHMA, collocating facilities where appropriate, minimizing/limiting surface disturbance (including operations and maintenance), and applying PDFs, would benefit GRSG in both the short and long term. See detailed discussion under *Impacts from Fluid Minerals Management on GRSG*.

Summary of Impacts by Alternative. Alternative A—Impacts on GRSG and sagebrush communities would be similar to those described for Alternative A above for subsurface coal mining.

Under Alternative B, all surface mining would be found unsuitable under the criteria set forth in 43 CFR, Part 3461.5. Additionally, surface-disturbing or disruptive activities would be minimized at the planning level for ADH. Impacts on GRSG and sagebrush habitat would be similar to those described for Alternative B above for subsurface coal mining.

Under Alternative C, impacts on GRSG and sagebrush habitat are identical to those described for Alternative B.

Alternative D—Under this alternative, the requirements of 43 CFR, Part 3461, would be applied to determine unsuitability. Impacts on GRSG and sagebrush habitat would be similar to those described for Alternative D above for subsurface mining.

Under the Proposed LUPA, no new surface coal mine leases would be allowed in PHMA. Impacts on GRSG and GRSG habitat would be similar to those discussed in Alternatives B and C.

Impacts from Locatable Minerals Management on GRSG

<u>Direct Habitat Loss/Degradation/Disruption to Species</u>
Impacts from locatable minerals development on GRSG populations and sagebrush habitat would be the same or similar to those discussed above under *Impacts from Fluid Minerals Management on GRSG*, but they may vary in scale, duration, and intensity.

<u>Habitat Restoration/Protection</u>
Benefits to local GRSG populations from restoration and reclamation would be similar to those discussed under *Impacts from Fluid Minerals Management on GRSG*. Protections outlined in each alternative below—limiting surface disturbance, clustering development, placing infrastructure in previously disturbed areas, minimizing road development, avoiding priority sagebrush habitats, and applying RDFs and PDFs—would benefit GRSG populations. See detailed discussion under *Impacts from Fluid Minerals Management on GRSG*.

Summary of Impacts by Alternative

Alternative A—Impacts would vary depending on MZ (existing LUPs), but, overall, most BLM-administered or National Forest System lands would be available for mining claim location, with certain exceptions, such as SRMAs and ACECs (LSFO) and WSAs (WRFO). Seasonal restrictions would be applied if deemed necessary in some situations, with the potential for additional mitigation requirements. In general, this alternative would have the least restrictive measures on locatable minerals development and reclamation, resulting in a greater potential for direct loss of sagebrush habitat and direct and indirect impacts on GRSG.

Alternative B—Alternative B would withdraw mineral entry in PHMA, based on impacts on GRSG and associated habitats. Existing claims within the withdrawal area would be subject to validity exams. Additional effective mitigation and seasonal restrictions may be applied. RDFs outlined in **Chapter 2** would further reduce direct and indirect impacts in ADH. Alternative B would provide the greatest protections for GRSG and sagebrush habitat by reducing the amount of habitat lost. It would also reduce the amount of indirect impacts from locatable minerals development. Reclamation and restoration requirements would benefit GRSG in the short term but would greatly depend on reclamation success and effectiveness.

Alternative C—Impacts on GRSG and sagebrush habitat would be similar to those described for Alternative B.

Alternative D—Appropriate effective mitigation would be included in plans of operation. Seasonal restrictions would be applied if deemed necessary. Design features outlined in **Chapter 2** would be applied to ADH but would not be required for locatable minerals. Overall, Alternative D would offer fewer restrictive measures than Alternatives B and C and subsequently would have a greater impact on GRSG and sagebrush habitat.

The Proposed LUPA—management of locatable minerals would be the same under this alternative as Alternative D; impacts would be the same as described under Alternative D, above.

Impacts from Nonenergy Leasable Minerals Management on GRSG

Direct Habitat Loss/Degradation/Disruption to Species

Impacts from nonenergy leasable minerals development on GRSG populations and habitat would be the same or similar to those discussed above under *Impacts from Fluid Minerals Management on GRSG* but may vary in scale, duration and intensity.

Habitat Restoration/Protection

Benefits to local GRSG populations attributed to reclamation would be similar to those discussed under *Impacts from Fluid Minerals Management on GRSG*.

Minimization measures outlined in each alternative below—limiting surface disturbance, avoiding PHMA, collocating facilities where appropriate, minimizing or limiting surface disturbance (including operations and maintenance), and applying PDFs—would benefit GRSG populations. See detailed discussion under *Impacts from Fluid Minerals Management on GRSG*.

Summary of Impacts by Alternative

Alternative A—Impacts would vary based on MZ (existing LUPs). Under this alternative a small percentage of PHMA in MZ 17 would be closed to nonenergy leasable mineral leasing, with the remainder of ADH open to leasing (including expansion of new leases). There would be no cap on surface-disturbing activities; as such, this alternative would allow for the greatest amount of direct habitat loss (and indirect influences) and would have the greatest impact on GRSG and sagebrush habitat.

Alternative B—Under this alternative, all PHMA would be closed to nonenergy leasable mineral leasing (1,106,600 acres, or 44 percent of all federally managed GRSG habitat [ADH]). Additionally, expansions of existing mines would not be permitted. RDFs would be applied for solution mining wells in PHMA. Alternative B would result in the least sagebrush habitat lost to nonenergy leasable minerals development and would also have the least potential for indirect influences on GRSG. Overall, Alternative B would provide the greatest benefit to GRSG and sagebrush habitat.

Alternative C—Impacts on terrestrial wildlife species are identical to those described for Alternative B.

Alternative D—Under this alternative, PHMA currently available for nonenergy minerals leasing would remain open. Additionally this alternative would consider allowing expansion of existing nonenergy mineral leases. Surface-disturbing activities would be limited to 5 percent in any MZ. If disturbance exceeds 5 percent, additional mitigation would be required to offset the resulting loss of GRSG habitat. Direct habitat loss attributed to the development and expansion of nonenergy leasable minerals, as well as indirect influences, would be greater under this alternative than Alternatives B and C and would result in greater impacts on GRSG and sagebrush habitat.

Proposed LUPA—No new nonenergy mineral leasing would be allowed in PHMA. Impacts on GRSG from management of nonenergy leasable minerals would be similar to those described under Alternative B, above.

Impacts from Salable Mineral Management on GRSG

Direct Habitat Loss/Degradation/Disruption to Species

Impacts from salable minerals development on GRSG populations and habitat would be the same or similar to those discussed above under *Impacts from Fluid Minerals Management on GRSG* but may vary in scale, duration, and intensity.

Habitat Restoration/Protection

Benefits to local GRSG populations attributed to habitat restoration and reclamation would be similar to those discussed under *Impacts from Fluid Minerals Management on GRSG*. Protections outlined in each alternative below, including siting new surface facilities outside of PHMA, collocating facilities where appropriate, minimizing/limiting surface disturbance (including operations and maintenance), and applying PDFs, would benefit GRSG populations. See detailed discussion under *Impacts from Fluid Minerals Management on GRSG*.

Summary of Impacts by Alternative

Alternative A—Impacts on GRSG species would vary by MZ (existing LUPs), but in most cases this alternative would allow for the continued development of salable minerals (with certain exceptions, such as WSAs and cultural sites; see **Chapter 2**). Overall, this alternative would provide the fewest restrictive measures on salable minerals development and subsequent reclamation requirements and therefore could result in more habitat loss than Alternatives B, C, and D. As such, this alternative would have the most potential to impact GRSG and sagebrush habitat.

Alternative B—Under this alternative, PHMA would be closed to mineral material sales (1,246,200 acres, or 50 percent of all federally managed GRSG habitat [ADH]). All salable mineral pits located in PHMA that are no longer in use would be restored to meet GRSG habitat conservation objectives. This alternative would result in the least direct habitat lost to mineral materials development; however, the reclamation provision would apply only to PHMA, whereas reclamation provisions called for in Alternative D would apply to ADH. Impacts on GRSG would depend heavily on reclamation success and effectiveness. In general, Alternative B would provide the greatest benefit to GRSG and sagebrush habitat.

Alternative C—Impacts on GRSG and sagebrush habitat are identical to those described for Alternative B.

Alternative D—Under this alternative, PHMA currently available for mineral material sales would remain open. Alternative D would consider allowing existing mineral material sale sites to continue operations (including expansions). Surface-disturbing activities would be limited to 5 percent within each MZ. Where disturbance were to exceed 5 percent, mitigation to offset habitat loss would be necessary.

Restoration of salable mineral pits that are no longer in use would be required in ADH; restoration and reclamation would be required as a long-term goal to improve GRSG habitat. In general, Alternative D could allow for more direct habitat loss by allowing salable minerals development to continue. This would have greater impacts on GRSG and sagebrush habitat than Alternatives B and C. Conversely, restoration and reclamation of pits that are no longer in use would extend to ADH (compared with PHMA in Alternatives B and C), allowing for

incremental gains in forage and cover. This would greatly depend on reclamation success and effectiveness, but it would provide nominal benefit to GRSG in the short term as the BLM and Forest Service routinely require reclamation that generally satisfies GRSG-related habitat values.

Proposed LUPA—Under this alternative, mineral material sales would be prohibited in PHMA. The management of mineral material sales under this alternative would be similar to that for Alternative B, with more potential for flexibility due to the criteria described in **Chapter 2**. The impacts on GRSG from management of mineral material sales is similar to those impacts described under Alternative B.

Impacts from Wildfire Suppression, Fuels Management, and Fire Rehabilitation on GRSG

Direct Habitat Loss/Modification/Fragmentation

Depending on the extent, location, severity of a fire, and seral vegetation[6] type affected, unplanned ignitions would have short-term impacts on GRSG. This would occur by removing or degrading habitat, injuring or killing slow-moving animals, causing habitat avoidance and changes in species movement patterns, or potentially reducing population viability However, fuels treatment can result in beneficial impacts, such as habitat restoration.

A concern associated with resetting vegetation seral stage through fuels management is the invasion of undesirable plant species. Noxious and invasive weeds are often of lower value to wildlife and degrade wildlife habitat by reducing optimal cover or food. Sagebrush-steppe communities are among the ecosystems most vulnerable to invasion and degradation by invasive weeds, including cheatgrass. The areas that are most at risk for cheatgrass invasion are GRSG winter range areas with low precipitation rates. Not only can invasive species outcompete most native plants when moisture is limited, they can also change site-specific fire ecology and result in the loss of critical shrub communities.

Fire suppression removes vegetation and can disturb soil, having both short- and long-term impacts on GRSG and its habitats. For example, using heavy equipment to construct fire lines can cause habitat loss, degradation, and fragmentation in the short term. If not rehabilitated, these fire lines can cause erosion and provide opportunities for the spread of undesirable plant species, thereby resulting in long-term adverse impacts on GRSG habitat. Timely rehabilitation following fire, therefore, is important to maintaining the quality of wildlife habitats, including plans for controlling invasive species.

[6]A stage relating to the natural succession within a plant community of an ecosystem

Disruption Impacts

The noise from heavy equipment and chainsaws could temporarily disperse GRSG from breeding and nesting habitat and from other occupied habitats. Prescribed burning could also disturb nesting bird species, from smoke inadvertently drifting into occupied habitat. These activities also could remove suitable habitat or other desirable vegetation. Disturbances from heavy equipment, chainsaws, and prescribed burning would be localized and short term. Most wildlife species would move into adjacent untreated areas; however, direct mortality during the vegetation treatments is possible. TLs and site-specific COAs could mitigate the short-term impacts from the treatments.

ESR treatments following a wildfire are effective in restoring wildlife habitat; however, equipment is often noisy, and noise may alter animal behavior or cause wildlife to leave an area during the disturbance. These impacts would be short term and are not likely to have much effect on the long-term health and habitat use in the treatment area.

Habitat Protection

Although both planned and unplanned wildland fire adversely impacts wildlife habitats in the short term by removing vegetation and disturbing soil, the long-term benefits of wildland fire often outweigh the short-term adverse impacts. For example, prescribed fire can be used to restore conditions benefiting wildlife species favoring early plant succession stages and young age classes of woody plants (McAninch et al. 1984). Prolonged fire suppression has allowed fuels to build up to the point that an unplanned wildfire is likely to be much larger and greater in intensity.

Some wildlife species thrive on the occurrence of fire. The herbaceous and woody plants that establish following a burn provide abundant foliar tissue and seeds. These are more palatable for GRSG and provide an influx of insects that provide valuable nourishment for GRSG chicks. Over the short term, the plant community is changed dramatically by a fire, as taller and denser vegetation is replaced by a more open habitat. As the area gradually recovers, however, many of the pre-fire components become reestablished, and the area again supports a healthy plant community. This cycle may take decades or centuries, depending on the dominant plant species.

Alternatively, vegetation restoration might never occur if climatic conditions are no longer suitable for the former dominants. Wallmo (1980) suggests that fire improves the palatability of forage and causes browse plants to resprout close to the ground, putting the current season's growth within reach for several years. Additionally, wildland fire can improve the quality of GRSG habitat by releasing soil nutrients, reducing fuel load, or setting back trees encroaching into shrubland or grassland habitats.

Fuels treatments could be beneficial for species that depend on younger seral stages. In the long term, GRSG could benefit from some wildfires and most fuels

management, due to an increase in vegetation productivity and to increased plant diversity and age classes. This would, in turn, provide additional forage and cover. Mimicking natural periodic disturbance is often necessary in order to stimulate plant productivity and increase diversity and nutritional value. Foraging opportunities for GRSG would increase as understory grasses, forbs, and shrubs reestablish. In addition, fuels treatments in upland areas often result in increased forage production, which diverts livestock and wildlife use from riparian and wetland areas, thereby increasing the vigor and structural diversity of these plant communities.

Following a wildfire, ESR is implemented to restore habitats that have sustained damage or degradation from catastrophic wildfire. Typically these activities are beneficial for GRSG and are designed to improve the overall condition of the area, which in turn improves habitat for wildlife. For example, weed-seed-free seeding would stabilize soil and reduce the spread of noxious weeds. Additionally, replacing organic matter in disturbed areas would protect topsoil and provide a suitable bed for the restoration of a native vegetation community.

Summary of Impacts by Alternative

Alternative A would have the fewest restrictions for fuels management actions, with the most potential for vegetation disturbance. Additionally, Alternative A would not prioritize fire operations beyond what has already been determined in the fire management plans for the area; therefore, Alternative A would have the greatest impact on GRSG.

Alternative B is more restrictive than Alternative A, though all of the restrictions fall within PHMA. Restrictions include no habitat treatments in winter range and no sagebrush treatments using fire in less than 12-inch precipitation zones in PHMA. Therefore, impacts from fuels management on GRSG would be less than Alternative A, but only within PHMA. Additionally, Alternative B would prioritize fire operations in PHMA and GHMA immediately after life and property; therefore, the potential for disturbance to GRSG within these habitats is lower in Alternative B than in Alternative A.

Alternative C would prioritize fire operations in PHMA immediately after life and property; therefore, the potential for disturbance to GRSG within PHMA would be the same as Alternative B but less than Alternative B in GHMA. With regard to fuels management, Alternative C is more restrictive than Alternative B since all of the management actions fall within ADH; therefore, impacts from fuels management on GRSG would be less than Alternative B.

Alternative D would give priority to fire operations in PHMA and GHMA, immediately after firefighter and public safety unless site-specific conditions warrant an exception. With regard to fuels management, Alternative D is more restrictive than Alternative B since all of the management actions fall within ADH; therefore, impacts from fuels management to GRSG would be less than Alternative B. Concurrently, Alternative D offers the same protective measures

as Alternative B but applies them to ADH, so it has the potential for more benefits to GRSG than Alternatives B and C.

Management of wildfire suppression, fuels management, and fire rehabilitation under the Proposed LUPA would be the same as that for Alternative D. Impacts from the Proposed LUPA, therefore, would be the same as described for Alternative D, above.

Impacts from Habitat Restoration/Improvement on GRSG

Direct Habitat Loss/Modification/Fragmentation from Habitat Restoration

Depending on the extent, location, treatment, and seral type affected, habitat restoration would have short-term impacts on GRSG by possibly temporarily removing or degrading habitat, injuring or killing slow-moving animals, and causing habitat avoidance and changes in species movement patterns. In areas that are available for habitat restoration, changes in vegetation can result in negative impacts on GRSG, such as direct habitat loss, habitat fragmentation and disruption; however, it can also result in beneficial impacts, such as long-term habitat restoration. For example, sagebrush mowing can temporarily reduce the amount of winter forage, but in the long term it would reinvigorate decadent sagebrush that would offer less value in its pretreated state.

A concern of habitat restoration is the invasion of undesirable plant species from soil disturbance. Noxious and invasive weeds are often of lower value to wildlife and degrade wildlife habitat by reducing optimal cover or food. Sagebrush-steppe communities are among the ecosystems most vulnerable to invasion and degradation by invasive weeds. Cheatgrass invasion is also a threat to some treatment areas. Invasive nonnative plants with little or no forage value for GRSG are increasing in some areas. Invasive species can outcompete most native plants when moisture is limited and results in the loss of critical shrub communities through changes in site-specific fire ecology.

Disruption Impacts

The noise from heavy equipment and chainsaws could temporarily disperse GRSG from breeding and nesting habitat and at other times from occupied habitat. Disturbances from heavy equipment, chainsaws, and prescribed burning would be localized and short term. Most GRSG would move into adjacent untreated areas; however, direct mortality during the vegetation treatments is possible. TLs (such as those for lekking and nesting) and site-specific COAs could mitigate the short-term impacts resulting from the treatments.

Habitat Protection

Removing nonnative species and vegetation from habitats that support GRSG populations would benefit most populations that occur on public lands by creating more native habitat conditions and reducing the likelihood of a future catastrophic wildfire. The degree of benefit to GRSG would depend, in large part, on the current habitat condition and the effectiveness of the treatments.

Nonnative plant species reduce the suitability of some habitats to support GRSG, which requires certain plants as food. Aside from GRSGs' dependence on sagebrush for winter forage, a variety of perennial grasses and forbs make up a large part of their summer diet and provide habitat for insects, which are essential for successful brood-rearing. Such treatments as interseeding sagebrush stands with a mixture of native grasses and forbs would increase the forage quality as well as the quantity.

For GRSG, it is often the structure, rather than the species composition, of the habitat that makes it suitable. In some cases, invasive plant species alter the structure of habitats, making them less suitable for supporting sensitive wildlife species. Encroachment of nonnative plant species and displacement of native plant species that serve as important sources of food reduce the suitability of the habitat for GRSG. For this species, vegetation treatments would likely provide a long-term benefit to habitat and could improve the suitability of other areas. This could create additional habitat into which the population could expand. Treatments to control encroaching pinyon and juniper trees as well as weed infestations would likely provide a long-term benefit.

Conversion of agricultural fields and restoration of degraded habitat, such as cheatgrass monoculture, would provide long-term benefits to GRSG. Historically many of these areas were sagebrush stands that could have supported GRSG populations. Areas that were converted for agricultural use offer some benefit to GRSG, though much of this depends on the diversity of plant species. The lower the plant diversity, the lower the benefit to GRSG. Converting these areas to sagebrush would benefit GRSG by providing valuable cover and forage, though establishment of a suitable stand could take several years. An area that is severely degraded, such as a cheatgrass monoculture, has little value to wildlife in general and almost none to GRSG. Restoring these areas would have the same benefits as converting agricultural lands but at a much greater scale.

<u>Summary of Impacts by Alternative</u>

Alternative A would have the fewest restrictions for habitat restoration actions, with the most potential for vegetation disturbance. Additionally, Alternative A would not prioritize habitat restoration and provide restoration guidelines beyond what has already been determined in the LUPs for the targeted areas; therefore, Alternative A would have the greatest impact and least benefit for GRSG.

There are no discernible differences in impacts on GRSG under all of the action alternatives because GRSG habitat treatments would be prioritized in ADH.

Impacts from ACEC and Zoological Area Management on GRSG

Alternative A would recognize all of the existing ACEC designations (see **Table 3.62**, ACECs within GRSG Habitat on BLM-Administered Lands). Areas that are

designated as ACECs would likely be more beneficial to GRSG than areas that are not so designated.

Alternative B would also recognize all of the existing ACEC designations. Impacts from Alternative B would be the same as impacts from Alternative A.

Alternative C would recognize all of the existing ACECs and would also make all PHMA an ACEC. Impacts on GRSG under Alternative C would be the same as for Alternatives A, B, and D. ACEC designations would provide no additional protections beyond what is included in the management actions for those alternatives for the protection of GRSG habitat.

Alternative D would recognize all existing ACECs; no new ACECs would be proposed. Impacts from Alternative D would be the same as for Alternatives A and B.

No new ACECs would be designated under the Proposed LUPA; impacts from designation of ACECs on GRSG would be the same as described under Alternative D.

Summary of Impacts on GRSG in PHMA, GHMA, and LCHMA

Table 4.2 is a summary of which actions could result in greater impacts, as detailed in the above analysis, on GRSG by alternative, and by the threats to the northwest Colorado GRSG populations, as identified by the USFWS.

Acreages cited under Alternative A include all acres currently identified and designated in existing LUPs. There is no identified PHMA, GHMA, or LCHMA associated with this alternative. Acreage values for Alternatives B, C, and D include only identified GRSG habitats classified as PHMA, GHMA, or LCHMA (ADH).

The major threat to GRSG habitats in populations occurring across WAFWA Management Zones II and VII is energy development, primarily oil and gas development and supporting infrastructure (USFWS 2013).

Resources and resource uses identified as threats to the northwest Colorado populations of GRSG in the COT report are identified with an asterisk in **Table 4.2**.

4.5.3 Other Special Status Species of Issue

Special Status Terrestrial Wildlife

General Description

This section is a discussion of impacts on special status terrestrial wildlife from proposed management actions of other resources and resource uses.

Table 4.2
Comparison of Alleviated Threats to GRSG in Northwest Colorado by Alternative

Resource/Resource Use	Alternative A	Alternative B	Alternative C	Alternative D	Proposed LUPA
Oil and Gas Development*					
Unleased Fluid Minerals					
Areas closed to fluid mineral leasing (acres)	100,200 Existing acres closed to fluid mineral leasing (mostly WSAs).	1,347,400 No new areas would be leased in PHMA.	2,473,000 No new areas would be leased in ADH.	100,200 No new areas would be closed to leasing. No surface occupancy would be allowed in PHMA.	324,400 acres within 1 mile of active leks would be closed to leasing.
Areas open to mineral leasing with NSO stipulation (acres)	365,000 Various stipulations apply, but most are not specific to GRSG or GRSG habitat.	365,000 PHMA would be closed to new fluid mineral leasing.	365,000 ADH would be closed to new fluid mineral leasing.	1,510,600 No surface occupancy would be allowed in PHMA. No exceptions to NSO would be granted within 0.6-miles of active leks in ADH. If exceptions, modifications, or waivers are granted, additional stipulations may apply.	1,550,400 No surface occupancy would be allowed in PHMA. No modifications or waivers. Exceptions subject to criteria described in Table 2.4. No Surface Occupancy within 2 miles of active leks in GHMA.

Table 4.2
Comparison of Alleviated Threats to GRSG in Northwest Colorado by Alternative

Resource/Resource Use	Alternative A	Alternative B	Alternative C	Alternative D	Proposed LUPA
Leased Fluid Minerals					
Restrictions on surface disturbance for leased fluid minerals	Low level of protection for GRSG in ADH. Various stipulations apply, but most are not specific to GRSG or GRSG habitat.	High level of protection for GRSG in PHMA. Apply 4-mile NSO around leks in PHMA and limit disturbances to 1 per section with no more than 3 percent disturbance in that section.	Highest level of protection for GRSG in ADH. Apply 4-mile NSO around leks in PHMA and limit disturbances to 1 per section with no more than 3 percent disturbance in that section.	High level of protection for GRSG in PHMA. Apply a TL/CSU in PHMA that would prohibit surface occupancy or disturbance within 4 miles of a lek during lekking and early brood-rearing. Limit permitted disturbance to 5 percent in any Colorado MZ.	High level of protection for GRSG in PHMA. No leasing 1 mile from active leks in all occupied GRSG habitat. Apply NSO stipulation to PHMA. Apply a TL/CSU in PHMA that would prohibit surface occupancy or disturbance within 4 miles of active leks during lekking and early brood-rearing. Limit permitted disturbances to 3 percent in PHMA in any Colorado MZ.
Summary of Impacts on GRSG from Oil and Gas Development	Alternatives B, C, and D and the Proposed LUPA close PHMA to surface occupancy, which responds to the need (identified in the Conservation Objectives Team Report, April 2013) to stop population decline and habitat loss by eliminating activities known to negatively impact GRSG and its habitats through reduction in the threat of habitat loss, degradation and fragmentation. Each action alternative closes GRSG habitat—the greater number of acres the greater reduction in potential activities known to negatively impact GRSG and GRSG habitat. The action alternatives are also in agreement with the following conservation measures identified in the Conservation Objectives Team Report specific to energy development:				The Proposed LUPA provides the additional protection of closing areas within 1 mile of active leks to leasing for fluid minerals.

Table 4.2
Comparison of Alleviated Threats to GRSG in Northwest Colorado by Alternative

Resource/Resource Use	Alternative A	Alternative B	Alternative C	Alternative D	Proposed LUPA
	1. Avoid energy development in priority areas for conservation (Doherty et al. 2010). Identify areas where leasing is not acceptable, or not acceptable without stipulations for surface occupancy that maintains GRSG habitats. 2. If avoidance is not possible within priority areas for conservation due to preexisting valid rights, adjacent development or split estate issues, development should only occur in nonhabitat areas, including all appurtenant structures, with an adequate buffer that is sufficient to preclude impacts on GRSG habitat from noise and other human activities.				
Infrastructure*/Anthropogenic					
ROW avoidance areas (acres)	82,000	58,500	0	968,300	**1,081,700**
	Various areas managed as ROW avoidance, but most are not specific to protect GRSG and GRSG habitat.	No new acres of avoidance since PHMA would be an exclusion area.	No new acres of avoidance since ADH would be an exclusion area.	Specific criteria would have to be met in order to permit disturbances For example, projects must demonstrate that GRSG populations are stable or increasing at objective levels in that Colorado MZ and disturbances would be capped at 5 percent.	Specific criteria would have to be met in order to allow ROWs in avoidance areas. Subject to 3 percent disturbance in PHMA.

Table 4.2
Comparison of Alleviated Threats to GRSG in Northwest Colorado by Alternative

Resource/Resource Use	Alternative A	Alternative B	Alternative C	Alternative D	Proposed LUPA
ROW exclusion areas (acres); per BLM LUP Handbook, no exceptions permitted	24,200 Various ROW exclusion areas designated, but most are not specific to protect GRSG and GRSG habitat.	934,100 PHMA would be a ROW exclusion area.	1,744,100 ADH would be a ROW exclusion area.	24,200 No new exclusion areas for general ROWs identified.	0
Avoidance areas for large transmission lines (greater than 100 kilovolts; acres)	No avoidance areas for large transmission lines identified.	No avoidance areas for large transmission lines identified.	No avoidance areas for large transmission lines identified.	66,000 Parcels identified as avoidance areas for large transmission lines. Specific criteria would have to be met in order to permit disturbances. For example, projects must demonstrate that GRSG populations are stable or increasing at objective levels in that Colorado MZ and disturbances would be capped at 5 percent.	1,751,600 All of PHMA and GHMA are avoidance for large transmission lines, with the exception of pending projects, as detailed in **Table 2.8**.

Table 4.2
Comparison of Alleviated Threats to GRSG in Northwest Colorado by Alternative

Resource/Resource Use	Alternative A	Alternative B	Alternative C	Alternative D	Proposed LUPA
Exclusion areas for large transmission lines (greater than 230 kilovolts; acres); per BLM LUP Handbook, no exceptions permitted	No exclusion areas for large transmission lines identified.	All ROWs would be excluded in PHMA.	All ROWs would be excluded in ADH.	873,300 PHMA, except areas identified as avoidance for large transmission lines would be exclusion area for large transmission lines.	0
Travel management open/closed/limited areas respectively	202,600/52,600/ 1,484,700 Various restrictions on route construction and upgrades, but most are not specific to protect GRSG and GRSG habitat.	202,600/42,500/ 923,200 Restrictions on route construction and upgrades would be applied to PHMA.	202,600/42,500/ 923,200 Restrictions on route construction and upgrades would be applied to ADH and would include a 4-mile buffer from leks.	202,600/42,500/ 923,200 Construction and upgrades of routes would be subject to 5 percent disturbance cap.	202,600/42,500/ 923,200 Construction and upgrades of routes would be subject to a 3 percent disturbance cap in PHMA.
Summary of Impacts on GRSG from Infrastructure	Alternatives B, C, and D and the Proposed LUPA close PHMA to surface occupancy, which responds to the need (identified in the Conservation Objectives Team Report, April 2013) to stop population decline and habitat loss by eliminating activities known to negatively impact GRSG and its habitats through reduction in the threat of habitat loss, degradation and fragmentation. Each action alternative closes GRSG habitat—the greater number of acres the greater reduction in potential activities known to negatively impact GRSG and GRSG habitat. The action alternatives are in agreement with the following conservation objectives/options identified in the Conservation Objectives Team Report specific to infrastructure: 1. Avoid development of infrastructure within priority areas for conservation (objective). 2. Avoid construction of these features in GRSG habitat, both within and outside of				

Table 4.2
Comparison of Alleviated Threats to GRSG in Northwest Colorado by Alternative

Resource/Resource Use	Alternative A	Alternative B	Alternative C	Alternative D	Proposed LUPA
	priority areas for conservation (option). 3. Restrictions limiting use of roads should be enforced (option). Alternative A, in general has the least protections for GRSG and GRSG habitat from development of infrastructure. Alternative B would have more restrictions on route construction and upgrades, as well as ROWs than Alternative A and D, but would have fewer than Alternative C. See page 4-79 for a complete summary of impacts from lands and realty on GRSG. See page 4-77 for a complete summary of impacts from travel management on GRSG.				
Agriculture/Urbanization*					
Areas identified for disposal	Various parcels identified for disposal for consolidation of management without regard for GRSG habitat.	Under all action alternatives (including the Proposed LUPA), GRSG habitat would NOT be identified for disposal, unless consolidation of ownership would benefit GRSG or GRSG habitat.			
Areas identified for acquisition	No parcels identified in existing plans for acquisition.	Seek to acquire state and private lands with intact subsurface mineral estate by donation, purchase or exchange in order to best conserve, enhance or restore GRSG habitat.	Strive to acquire GRSG habitat in ADH.	Consider GRSG habitat values in acquisitions in ADH.	Consider GRSG habitat values in acquisitions in ADH.
Summary of Impacts on GRSG from Agriculture and Urbanization	Across all action alternatives (including the Proposed LUPA), the BLM and Forest Service would take advantage of opportunities to consolidate GRSG habitat. Although agriculture and urbanization have been identified as threats in northwest Colorado, the BLM and Forest Service has limited management authority over those types of activities. The Colorado				

Table 4.2
Comparison of Alleviated Threats to GRSG in Northwest Colorado by Alternative

Resource/Resource Use	Alternative A	Alternative B	Alternative C	Alternative D	Proposed LUPA
	Department of Natural Resources' Colorado GRSG Conservation Plan: The Colorado Package (**Appendix N**) identifies those actions included in the conservation strategy in the 2008 Greater Sage Grouse Conservation Plan. The Colorado Department of Natural Resources Package includes a list of those actions (including actions tied to agriculture and urbanization) and their associated responsible parties, implementation and effectiveness to date. The action alternatives are in agreement with the following conservation objectives/options identified in the Conservation Objectives Team Report specific to infrastructure: 1. Limit urban and exurban development in GRSG habitats and maintain intact native sagebrush plant communities (objective). 2. Acquire and manage GRSG habitat to maintain intact ecosystems (option). See page 4-79 for a complete analysis of land tenure on GRSG.				
Conifer Invasion*					
Areas prioritized for vegetation treatments	Few restrictions on habitat restoration actions, with the most potential for vegetation disturbance. There would be no prioritization of habitat restoration in GRSG habitat.	Across all action alternatives (including the Proposed LUPA), treatments would be prioritized to consider GRSG habitat requirements.			

Table 4.2
Comparison of Alleviated Threats to GRSG in Northwest Colorado by Alternative

Resource/Resource Use	Alternative A	Alternative B	Alternative C	Alternative D	Proposed LUPA
Grazing					
Areas closed to livestock grazing (acres)	No areas identified as closed to livestock grazing.	No areas identified as closed to livestock grazing.	1,744,100 BLM-administered and National Forest System lands within ADH would be closed to livestock grazing.	No areas identified as closed to livestock grazing.	No areas identified as closed to livestock grazing.
Areas available for livestock grazing (acres)	BLM-administered and National Forest System lands within the planning area would be available for livestock grazing.	1,702,500 BLM-administered and National Forest System lands within ADH would be available for livestock grazing.	No areas would be available for livestock grazing on BLM-administered and National Forest System lands within ADH.	1,702,500 BLM-administered and National Forest System lands within ADH would be available for livestock grazing.	1,702,500
Wild horse and burro management	Gathers prioritized without consideration of GRSG habitat requirements.	Prioritize HMAs for gathers that are within PHMA.	Prioritize HMAs for gathers that are within PHMA.	GRSG habitat requirements would be considered with other resource values when prioritizing gathers.	GRSG habitat requirements would be considered with other resource values when prioritizing gathers.

Table 4.2
Comparison of Alleviated Threats to GRSG in Northwest Colorado by Alternative

Resource/Resource Use	Alternative A	Alternative B	Alternative C	Alternative D	Proposed LUPA
Summary of Impacts on GRSG from Grazing	GRSG habitat considerations within livestock grazing allotments and wild horse management areas would be similar across all action alternatives. Range improvements are more restricted under Alternative B than under Alternative D and the Proposed LUPA. Under Alternative C, the potential for increased fencing in order to prevent trespass exists. Under Alternative A, grazing would be managed to achieve the standards of rangeland health. Consequently in most scenarios, GRSG habitat requirements would be addressed. However in some localized situations a lack of focus on GRSG-specific issues would result in adverse impacts. The most specific concern is the potential for project infrastructure up to within 0.25-mile of leks that could cause fragmentation, raptor perches, and inappropriate fence locations and designs. Alternative B puts specific focus on GRSG habitat requirements in PHMA to preclude adverse impacts with regard to both the livestock themselves and project infrastructure. Because Alternative C closes ADH to grazing, adverse issues on public lands would be precluded, but actions taken on private land to compensate for loss of public grazing might affect GRSG habitat and could be substantial (for example, volumes of fencing would likely be constructed to hold livestock on private lands). Alternative D and the Proposed LUPA would apply the specific focus on GRSG habitat described for Alternative B to ADH. For additional detail on impacts from range management, see the impacts from range management on GRSG section, beginning on page 4-85. For additional detail on impacts from wild horse management, see the impacts from wild horse management on GRSG sections, beginning on page 4-88.				See paragraph at left.
Invasive Species					
Weed control priority areas	Analysis of the impacts from weeds on GRSG were considered in the impacts on GRSG section, including, under the impacts from lands and realty on GRSG, impacts from fluid minerals on GRSG and impacts from wildfire suppression, fuels management and fire rehabilitation sections. However, weed infestations are not considered a top threat in northwest Colorado by the Conservation Objectives Team Report (USFWS 2013).				
Wildfire					
Suppression priority areas	Analyses of the impacts from wildfire suppression on GRSG were considered in the impacts on GRSG section, in the impacts from wildfire suppression, fuels management and fire rehabilitation section. However, wildfire suppression was not considered a top threat in northwest Colorado by the Conservation Objectives Team Report (USFWS 2013.				

Table 4.2
Comparison of Alleviated Threats to GRSG in Northwest Colorado by Alternative

Resource/Resource Use	Alternative A	Alternative B	Alternative C	Alternative D	Proposed LUPA
Disease					
Although impacts from West Nile Virus to GRSG are considered in the analysis, the vast majority of GRSG habitat in northwest Colorado exists at elevations above where West Nile virus is commonly found (Naugle et al. 2005). See RDFs, PDFs, and SDFs for a description of features designed to reduce the threat of West Nile Virus (**Appendix I**, Required Design Features, Preferred Design Features, and Suggested Design Features).					
Coal Mining					
Areas identified as unsuitable for coal mining	Various areas found unsuitable for coal mining, but few tied specifically to protection of GRSG habitat.	Under Alternatives B and C, the BLM and Forest Service would find PHMA unsuitable for surface mining. The BLM and Forest Service would grant no new sub-surface mining leases unless all facilities could be located outside of PHMA.		Under Alternative D, the BLM would apply the unsuitability criteria to ADH for surface mining. The BLM would grant no new sub-surface mining leases unless all facilities could be located outside of ADH. Any disturbances associated with coal mining would be subject to the 5 percent disturbance cap.	Under the Proposed LUPA, the BLM would apply the unsuitability criteria to ADH for surface mining. It would grant no new subsurface mining leases unless all facilities could be located outside of ADH. Any disturbances associated with coal mining would be subject to the 3 percent disturbance cap
Weather					
There is no resource program in an LUP for addressing this threat to GRSG and its habitat.					
Predation					
See RDFs and SDFs for Lands and Realty and Minerals for a description of features designed to reduce the threat of predation (**Appendix I**, Required Design Features, Preferred Design Features, and Suggested Design Features).					

Table 4.2
Comparison of Alleviated Threats to GRSG in Northwest Colorado by Alternative

Resource/Resource Use	Alternative A	Alternative B	Alternative C	Alternative D	Proposed LUPA
Prescribed Fire					
Areas suitable for prescribed fire use	Treatments considered on a case-by-case basis, and not prioritized specific to GRSG habitat.	No treatments would be allowed in known winter range in PHMA, unless treatment is designed to strategically reduce wildfire risk around or in winter range and would maintain winter habitat range quality.	No treatments would be allowed in known winter range in ADH, unless treatment is designed to strategically reduce wildfire risk around or in winter range and would maintain winter habitat range quality.	Performance-based objectives, which include canopy cover, would be used when considering treatments in ADH (70/30 sagebrush thresholds).	Performance-based objectives, which include canopy cover, would be used when considering treatments in ADH (70/30 sagebrush thresholds).
Water Development					
Identify number, type, and location of range water developments	Although impacts from West Nile Virus to GRSG are considered in the analysis, the vast majority of GRSG habitat in northwest Colorado exists at elevations above where West Nile virus is commonly found (Naugle et al. 2005). See RDFs, PDFs, and SDFs for a description of features designed to reduce the threat of West Nile Virus (**Appendix I**, Required Design Features, Preferred Design Features, and Suggested Design Features).				
Hard Rock Mining					
Locatable Minerals	Various areas recommended for withdrawal/currently withdrawn (mostly special designations). May be some overlap with GRSG habitat.	Alternatives B and C would propose a withdrawal from locatable mineral entry in PHMA. Existing claims in PHMA would be subject to validity exams.		No new proposed withdrawal from locatable mineral entry. Validity exams, per 43 CFR 3809.100, would be required in PHMA in currently withdrawn areas.	Validity exams, per 43 CFR 3809.100, would be required in PHMA in currently withdrawn areas.

Table 4.2
Comparison of Alleviated Threats to GRSG in Northwest Colorado by Alternative

Resource/Resource Use	Alternative A	Alternative B	Alternative C	Alternative D	Proposed LUPA
Salable Minerals/Mineral Materials	Various areas closed to mineral material sales. May be some overlap with GRSG habitat.	Under Alternatives B and C, PHMA would be closed to mineral material sales.		Existing mineral material sales sites could continue and potentially expand in PHMA, subject to mitigation and the 5 percent disturbance cap in the Colorado MZs.	Under the Proposed LUPA, PHMA would be closed to mineral material sales.
Summary of Impacts on GRSG from Hard Rock Mining	Effective mitigation for existing mining claims and mineral material sites is similar across all action alternatives. See the impacts from locatable minerals on GRSG section (page 4-100) and the impacts from salable minerals section to GRSG section (page 4-102) for a complete analysis.				
Hunting					
There is no resource program in an LUP for addressing this threat to GRSG and its habitat.					
Climate Change					
There is no resource program in an LUP for addressing this threat to GRSG and its habitat. However, the BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado include provisions for altering grazing management practices in response to drought conditions. In addition, several programs have contingency plans for management during drought conditions.					
Contaminants					
There are no management actions in this LUPA for addressing this threat to GRSG and its habitat. Regulations applied to mineral development and **Appendix I**, Required Design Features, Preferred Design Features, and Suggested Design Features, include requirements and design features to prevent the potential threat of contaminants.					

Source: BLM 2013a

To analyze the potential impacts of the alternatives on special status terrestrial wildlife, information was gathered from inventories, recovery plans, conservation agreements, the Colorado Natural Heritage Program database, relevant scientific literature, and other sources identifying the potential distribution of these species in and next to the planning area. The analysis is also based on professional expertise of BLM and Forest Service specialists, BLM Colorado State Office specialists, the CPW, and other professional organizations.

Methodology and Assumptions

General Impacts on Special Status Terrestrial Wildlife

General impacts on special status terrestrial wildlife are identical to those discussed in **Section 4.3.2**, Terrestrial Wildlife.

Assumptions

The following list presents basic assumptions about special status terrestrial species that apply to the impacts assessment for Alternatives A through D in this EIS.

- The BLM and the Forest Service are primarily responsible for managing habitat, whereas state and federal wildlife management agencies (the CPW and USFWS) primarily oversee management of special status species.
- All permitted activities that could affect federally threatened or endangered species would be required to undergo ESA Section 7 consultation with USFWS.
- Implementation-level actions would be further assessed at an appropriate spatial and temporal scale and level of NEPA analysis. Before any implementation-level activity, a special status species analysis or inventory would occur, in accordance with NEPA, to determine if any such species would be present in the project area.
- The BLM and Forest Service would continue to manage special status fish and wildlife habitats, in coordination with the CPW and USFWS.
- Activities that lead to the listing of a species would not be authorized (Section 6840, Special Status Species Management Manual).
- Management actions aimed at benefiting specific species can have adverse or beneficial impacts on other species.
- Disturbance during sensitive periods adversely impacts special status species.

- Federal oil and gas regulations prevent the BLM and Forest Service from being able to apply new or additional lease stipulations to existing leases. However, federal regulations do allow the BLM and Forest Service to apply other protection measures, in conjunction with planning and implementing oil and gas projects. These include applying stipulations consistent with the most recent LUPs as terms and conditions for discretionary approvals (e.g., ROW actions) and applying COAs to augment protections related to lease activities.
- The BLM and Forest Service would use best available information, management and conservation plans, and other research and related directives to guide wildlife habitat management on BLM-administered and National Forest System lands.
- Under all of the alternatives, proposed actions would comply with BLM Colorado Public Land Health Standard #3. Healthy, productive, and diverse plant communities support terrestrial wildlife communities that are productive, resilient, diverse, vigorous, and able to reproduce and sustain natural fluctuations and ecological processes; therefore, implementing management actions that contribute to maintaining the condition and quality of wildlife habitat would ensure that BLM Colorado Public Land Health Standard #3 would be met throughout the life of the plan amendment.

Direct and Indirect Impacts on Special Status Terrestrial Wildlife

Impacts from implementing management for the following resources or resource uses would be the same or similar to those discussed under *Direct and Indirect Impacts on Terrestrial Wildlife* and *Direct and Indirect Impacts on GRSG*: travel and transportation management, recreation management, lands and realty management, wind energy development, solar energy development, range management, wild horse management, and ACECs.

<u>Impacts from Fluid Minerals Management on Special Status Terrestrial Wildlife</u>

In general, impacts on special status terrestrial species would be similar to those discussed under *Impacts from Fluid Minerals Management on Terrestrial Wildlife* and *Impacts from Fluid Minerals Management on GRSG*. Those species more closely associated with sagebrush communities or whose ranges are largely coincident with PHMA and GHMA (e.g., Brewer's sparrow and to a lesser extent white-tailed prairie dog, black-footed ferret, western burrowing owl, and ferruginous hawk) would benefit from conservation measures designed to protect GRSG and sagebrush habitat under each alternative. These species would benefit from conservation measures designed to protect GRSG and sagebrush habitat under each alternative.

Conversely, excluding or avoiding development in GRSG habitats may lead to increased activity in other vegetation types (e.g., pinyon-juniper, mountain shrub, and aspen/spruce/fir). Special status species associated with these habitat

types, such as northern goshawk, BLM-sensitive bat species, Canada lynx, and Columbian sharp-tailed grouse, may be adversely influenced to varying degrees, depending on alternative and development scenarios.

Conservation measures designed to decrease or eliminate disturbance to sagebrush communities would reduce the indirect influences of fluid minerals development on those species more closely associated with sagebrush communities. In addition to COAs applied to special status raptor nests and important vegetation communities for migratory bird nesting (e.g., aspen and riparian communities), NSO and TL stipulations would be effective in allowing nesting activity to progress undisturbed during important reproduction times.

Habitat improvement projects or off-site mitigation designed to reduce oil and gas-related impacts on GRSG and sagebrush habitat could both positively and negatively influence other wildlife species, depending on the vegetation communities involved. Habitat restoration projects designed to benefit GRSG would ostensibly benefit other sagebrush obligate species (particularly nongame mammals and birds). Modifying other community types (pinyon-juniper and mountain shrub) to promote sagebrush may adversely influence the species that rely on those vegetation types for food or for cover or nesting substrate. Impacts may vary, depending on scale. Prompt and effective reclamation practices would accelerate the restoration of lands disturbed by development, thus benefiting wildlife species in general by improving forage and cover resources (increased forb and perennial grass expression, reductions in annual invasive species and noxious weeds).

Impacts from Solid Minerals—Coal Management on Special Status Terrestrial Wildlife

Impacts from solid minerals development on special status terrestrial wildlife would be the same or similar to those discussed under *Impacts from Solid Minerals—Coal Management on Terrestrial Wildlife*, *Impacts from Solid Minerals—Coal Management on GRSG*, and *Impacts from Fluid Minerals Management on Special Status Terrestrial Wildlife*, above.

Impacts from Locatable Minerals Management on Special Status Terrestrial Wildlife

Impacts from locatable minerals development on special status terrestrial wildlife would be the same or similar to those discussed in *Impacts from Locatable Minerals Management on Terrestrial Wildlife*, *Impacts from Locatable Minerals Management on GRSG*, and *Impacts from Fluid Minerals Management on Special Status Terrestrial Wildlife*, above.

Impacts from Nonenergy Leasable Minerals Management on Special Status Terrestrial Wildlife

Impacts from nonenergy leasable minerals development on special status terrestrial wildlife would be the same or similar to those discussed in *Impacts from Nonenergy Leasable Minerals Management on Terrestrial Wildlife*, *Impacts from*

Locatable Nonenergy Leasable Minerals Management on GRSG, and *Impacts from Fluid Minerals Management on Special Status Terrestrial Wildlife*, above.

Impacts from Salable Mineral Management on Special Status Terrestrial Wildlife

Impacts from salable minerals development on special status terrestrial wildlife would be the same or similar to those discussed in *Impacts from Salable Mineral Management, Management on Terrestrial Wildlife*, *Impacts from Salable Mineral Management on GRSG*, and *Impacts from Fluid Minerals Management on Special Status Terrestrial Wildlife*, above.

Impacts from Fuels Management on Special Status Terrestrial Wildlife

Direct Habitat Loss/Modification/Fragmentation from Fuels Management. Depending on the extent, location, severity, and seral type affected, unplanned ignitions would have short-term impacts on special status wildlife species. It would do this by removing or degrading habitat for some species, injuring or killing slow-moving species, causing habitat avoidance and changes in species movement patterns, or reducing population viability and increasing the contribution to the need to list a species. In areas that are available for fuels treatments, changes in vegetation can result in negative impacts on special status wildlife species, such as direct habitat loss, habitat fragmentation, and disruption to species; however, it can also result in beneficial impacts, such habitat restoration.

A concern of resetting vegetation seral stage through fuels management is the invasion of undesirable plant species. Noxious and invasive weeds are often of lower value to wildlife and degrade wildlife habitat by reducing optimal cover or food. Sagebrush-steppe communities are among the ecosystems most vulnerable to invasion and degradation by invasive weeds.

Cheatgrass invasion is also a threat to some treatment areas. Invasive nonnative plants with little or no forage value for special status wildlife species are increasing in some areas. The greatest impacts have occurred on winter range areas with low precipitation rates. Not only can invasive species outcompete most native plants when moisture is limited, they can also change site-specific fire ecology and result in the loss of critical shrub communities. Cheatgrass may provide some short-term forage benefits to special status wildlife species while in early stages of growth; however, it lacks the ability to provide high quality forage during most of the year.

Fire suppression removes vegetation and disturbs soil and can have both short- and long-term impacts on special status wildlife and other habitats. For example, using heavy equipment to construct fire lines can cause habitat loss, degradation, and fragmentation in the short term. Moreover, if not rehabilitated, these fire lines can cause erosion and provide opportunities for the spread of undesirable plant species, thereby resulting in long-term adverse impacts on wildlife habitat. Timely rehabilitation following fire, therefore, is important to maintaining the quality of wildlife habitats.

Disruption Impacts. The noise from heavy equipment and chainsaws could temporarily disperse bird species from breeding and nesting habitat and wildlife from occupied habitat. Prescribed burning could also disturb nesting bird species, as the result of smoke inadvertently drifting into occupied habitat. These activities could remove suitable habitat or other desirable vegetation.

Disturbances from heavy equipment, chainsaws, and prescribed burning would be localized and short term. Most wildlife species would move into adjacent untreated areas; however, direct mortality during the vegetation treatments is possible. TLs (such as those for big game birthing areas, raptor nesting, and big game winter habitat), as well as site-specific COAs (such as TLs for migratory bird nesting), could mitigate the short-term impacts resulting from the treatments.

ESR treatments following a wildfire are effective in restoring wildlife habitat, but equipment is often noisy, and noise may alter animal behavior or cause wildlife to leave an area during the disturbance. These impacts would be short term and are not likely to have much effect on the long-term health and habitat use of wildlife in the treatment area.

Habitat Protection. Although both planned and unplanned wildland fire adversely impacts wildlife habitats in the short term by removing vegetation and disturbing soil, the long-term benefits of wildland fire often outweigh the short-term adverse impacts. For example, prescribed fire can be used to restore conditions benefiting wildlife species favoring early plant succession stages and young age classes of woody plants (McAninch et al. 1984). Prolonged fire suppression has allowed fuels to build up to the point that an unplanned wildfire is likely to be much larger and greater in intensity.

Some wildlife species thrive on the occurrence of fire. The herbaceous and woody plants that establish following a burn provide abundant leaves and seeds, which are used by small rodents and birds that in turn are important prey for a variety of avian and mammalian predators. Over the short term, the wildlife community is changed dramatically by a fire, as taller and denser vegetation is replaced by a more open habitat. As the area gradually recovers, however, many of the pre-fire components become reestablished, and the area again supports a community associated with denser forests. This cycle may take decades or centuries, depending on the dominant plant species, or it might never occur if climatic conditions are no longer suitable for the former dominants.

Wallmo (1980) suggests that fire improves the palatability of forage and causes browse plants to resprout close to the ground, putting the current season's growth within reach of deer for several years. Additionally, wildland fire can improve the quality of wildlife habitat by releasing soil nutrients, reducing fuel load, or setting back trees encroaching into shrubland or grassland habitats.

Fuels treatments could be beneficial for species that depend on younger seral stages. In the long term, wildlife would benefit from most wildfires and fuels management due to an increase in vegetation productivity and to increased plant diversity and age classes, which would, in turn, provide additional forage, cover, and prey base.

Mimicking natural periodic disturbance is often necessary in order to stimulate plant productivity, increase diversity, and increase nutritional value. Foraging opportunities for big game and other herbivores would increase as understory grasses, forbs, and shrubs reestablish. The benefits for mule deer and elk are likely to be long term. Directly following application of fire there is generally more palatable browse available for wild ungulates. Improving vegetation in upland areas would provide more forage to big game species and other herbivorous species that occur in these areas and would result in direct beneficial impacts. In addition, fuels treatments in upland areas often increase forage production, which diverts livestock and wildlife use from riparian and wetland areas, thereby increasing the vigor and structural diversity of these plant communities.

Following a wildfire, ESR is implemented to protect and conserve habitats that have sustained damage or degradation from catastrophic wildfire. Typically these activities are beneficial for special status wildlife species and are designed to improve the overall condition of the area, which in turn improves habitat for wildlife. For example, weed-free seeding would stabilize soil and reduce the spread of noxious weeds. Additionally, replacing organic matter in disturbed areas would protect topsoil and provide a suitable bed for the restoration of a native vegetation community.

Summary of Impacts by Alternative

Alternative A would have the fewest restrictions for fuels management actions and the most potential for vegetation disturbance. Additionally, Alternative A would not prioritize habitat restoration beyond what has already been determined in the fire management plans for the area; therefore, Alternative A would have the greatest impact on special status wildlife.

Alternative B is more restrictive than Alternative A, though all of the restrictions fall within PHMA; therefore, impacts from fuels management on special status wildlife would be less than Alternative A, but only within PHMA. Additionally, Alternative B would prioritize fire operations in PHMA and GHMA immediately after life and property; therefore, the potential for disturbance to special status wildlife species within these habitats is lower under Alternative B than Alternative A. The greatest amount of benefit under Alternative B would be provided to those species whose ranges overlap PHMA. There is potential to negatively influence those special status species that use other habitat types.

Alternative C would prioritize fire operations in PHMA immediately after life and property; therefore, the potential for disturbance to special status wildlife

within PHMA would be the same as Alternative B but less than Alternative B in GHMA. With regard to fuels management, Alternative C is more restrictive than Alternative B since all of the management actions fall within ADH; therefore, impacts from fuels management on special status wildlife species would be less than Alternative B. Conversely, Alternative C does not offer as many protective management actions that could benefit special status wildlife as Alternatives B and D; therefore, it has more potential for habitat degradation than the other alternatives. However, the greatest amount of benefit under Alternative C would be provided to those species whose ranges overlap ADH. There is potential to negatively influence those special status species that use other habitat types.

Alternative D would give priority to fire operations in PHMA and GHMA, immediately after firefighter and public safety, unless site-specific conditions were to warrant an exception. With regard to fuels management, Alternative D is more restrictive than Alternative B since all of the management actions fall within ADH; therefore, impacts from fuels management on special status wildlife are less than Alternative B. Concurrently, Alternative D offers the same protective measures as Alternative B but applies them to ADH; therefore, it has the potential for more benefits to special status wildlife species than Alternatives B and C.

Management of wildfire suppression, fuels management, and fire rehabilitation under the Proposed LUPA would be the same as that for Alternative D. Impacts from the Proposed LUPA, therefore, are the same as those described for Alternative D, above.

Impacts from Habitat Restoration Special Status Terrestrial Wildlife

Direct Habitat Loss/Modification/Fragmentation from Habitat Restoration. Depending on the extent, location, treatment, and seral type affected, habitat restoration would have short-term impacts on special status wildlife species. It would do this by removing or degrading habitat for some species, injuring or killing slow-moving species, causing habitat avoidance and changes in species movement patterns, or reducing population viability and increasing the contribution to the need to list a species.

In areas that are available for habitat restoration, changes in vegetation can result in negative impacts on special status wildlife species, such as direct habitat loss, habitat fragmentation, and disruption to some species; however, it can also result in beneficial impacts, such long-term habitat restoration for others. For example, removing encroaching pinyon and juniper is beneficial for sagebrush-dependent species, but it has negative impacts on pinyon- and juniper-dependent species.

A concern associated with habitat restoration is the invasion of undesirable plant species from the soil being disturbed. Noxious and invasive weeds are often of lower value to wildlife and degrade habitat by reducing optimal cover

or food. Sagebrush-steppe communities are among the ecosystems most vulnerable to invasion and degradation by invasive weeds. Cheatgrass invasion is also a threat to some treatment areas. Invasive nonnative plants with little or no forage value for big game species are increasing in some areas. Not only can invasive species outcompete most native plants when moisture is limited, they can also change site-specific fire ecology and result in the loss of critical shrub communities.

Disruption Impacts. The noise from heavy equipment and chainsaws could temporarily disperse bird species from breeding and nesting habitat and wildlife from occupied habitat. Disturbances from heavy equipment, chainsaws, and prescribed burning would be localized and short term. Most wildlife species would move into adjacent untreated areas, but direct mortality during the vegetation treatments is possible. TLs (such as those for big game birthing areas, raptor nesting, and big game winter habitat), as well as site-specific COAs (such as TLs for migratory bird nesting), could mitigate the short-term impacts resulting from the treatments.

Habitat Protection. Removing nonnative species and vegetation from habitats that support special status wildlife populations would likely provide some degree of benefit to most special status species that occur on public lands. It would do this by creating more native habitat conditions and reducing the likelihood of a future catastrophic wildfire. The degree of benefit to special status wildlife would depend, in large part, on the habitat needs of the species and its ability to avoid a fire.

Nonnative plant species reduce the suitability of some habitats to support special status wildlife species. Some species require, or at the very least prefer, certain plants as food. Encroaching nonnative plant species and displacing native plant species that serve as important sources of food reduce the suitability of the habitat for these wildlife species. For these species, vegetation treatments would likely provide a long-term benefit to habitat and could improve the suitability of other areas, potentially creating additional habitat into which the population could expand.

For some special status wildlife species, it is the structure, rather than the species composition of the habitat, that makes it suitable. For example, the southwestern willow flycatcher occurs in riparian areas with dense growths of deciduous shrubs and trees (USFWS 1995). In some cases, invasive plant species alter the structure of habitats, making them less suitable for supporting sensitive wildlife species (e.g., the encroachment of pinyon and juniper into GRSG habitat). For these species, treatments to control weed infestations would likely provide a long-term benefit. In other cases, nonnative plant species may invade an area without making drastic structural changes. In such cases, the suitability of the habitat, though not ideal, is maintained (e.g., thickets of salt cedar and Russian olive providing nesting habitat for the southwestern willow flycatcher).

For these species, vegetation treatments may result in some improvement of habitat, but the long-term benefits may not outweigh the short-term risks to the species associated with certain treatment methods.

Summary of Impacts by Alternative

Alternative A would have the fewest restrictions for habitat restoration actions, with the most potential for vegetation disturbance. Additionally, Alternative A would not prioritize habitat restoration and restoration guidelines beyond what has already been determined in the LUPs for the targeted areas; therefore, Alternative A would have the greatest impact on special status wildlife species.

Alternative B is more restrictive than Alternative A, so impacts from habitat restoration on special status wildlife species would be less than Alternative A. Additionally, Alternative B provides guidelines that are specific to the restoration of sagebrush for GRSG; therefore, Alternative B would have more impacts on those special status species that have different or contrary habitat requirements.

Alternative C is more restrictive than Alternative B, so impacts from habitat restoration on special status wildlife species are less than Alternative B. Additionally, Alternative C provides guidelines that are specific to the restoration of sagebrush for GRSG, so it would have more impacts on those special status species that have different or contrary habitat requirements.

Alternative D is more restrictive than Alternative A but less than Alternatives B and C. Alternative D offers habitat restoration guidelines but offers exemptions for other resources valued by the BLM and Forest Service; therefore, there is potential for less impact on special status species for Alternative D from the habitat restoration guidelines than from Alternatives B and C.

Management of habitat restoration under the Proposed LUPA would be the same as under Alternative D; impacts on special status species from habitat restoration would be the same as those for the Proposed LUPA.

<u>Impacts from ACEC/Zoological Area Management on Special Status Terrestrial Wildlife</u>

Impacts from ACECs on special status terrestrial wildlife would be the same or similar to those discussed under *Impacts from ACECs and Zoological Area Management on Terrestrial Wildlife* and *Impacts from ACECs and Zoological Area Management on GRSG*.

Summary of Impacts on Special Status Terrestrial Wildlife

Alternative A provides the least amount of protection for special status terrestrial wildlife in the planning area. It puts very few restrictions on development, which could result in the most modification of the landscape, and consequently, the most special status terrestrial wildlife.

Alternative B provides a greater level of protection for special status terrestrial wildlife than Alternative A but would provide a lower level of protection than Alternative C.

Alternative C would provide the most protection for special status terrestrial wildlife. The most restrictions would be placed on development under Alternative C, which would afford the most protection for special status terrestrial wildlife.

Alternative D would provide more protection for special status terrestrial wildlife than Alternative A but would provide less protection than Alternatives B and C. More flexibility for development is built into Alternative D, which could result in higher levels of development than Alternatives B and C.

The Proposed LUPA has greater restrictions than Alternative D, including no leasing within 1 mile of active leks. The impacts on special status species under the Proposed LUPA are less than under Alternatives A and D and would be similar to those under Alternatives B and C.

Special Status Plant Species

General Description

This section discusses impacts on vegetation from proposed management actions of other resources and resource uses.

To analyze the potential impacts of the alternatives on vegetation, information was gathered from the Colorado Natural Heritage Program database, relevant scientific literature, and other sources identifying the potential distribution of vegetation in and next to the planning area. The analysis is also based on professional expertise of BLM and Forest Service specialists, BLM Colorado State Office specialists, the CPW, and other professional organizations.

Methodology and Assumptions

General Impacts on Special Status Plant Species

Indicators of impacts on special status plant species and the measurements used to describe the impacts (where available or appropriate) are described below.

Direct Mortality. Distributions of special status plants and the number of plants per occurrence vary in number. In small occurrences, loss of a portion of the plants can compromise species viability. Indicators are:

- Number of plants lost
- Number of occurrences suffering mortality

Direct Habitat Loss. Direct habitat loss results when habitat is destroyed or converted to a form that is unsuitable for the impacted species. Direct habitat

loss can be short term or permanent. Short-term habitat loss can coincide with habitat improvement projects, such as removing encroaching junipers in sagebrush habitats. In general, because special status plants have very specific habitat requirements, any habitat disturbance that alters any required habitat constituent for a particular species would result in habitat loss. Whether habitat loss is short-term or long-term, habitat occupied at the time of loss would coincide with direct mortality to plants and potential extirpation of special status plant occurrences.

- Acres of habitat lost, both short term and long term

Habitat Degradation and Disruption to Species. Habitat degradation occurs as an indirect effect of ground-disturbing activities, including roads, trails, power lines, well pads, and pipelines. The area of potential habitat degradation is generally identified as the project impact zone around the area of disturbance. Disturbance factors resulting in habitat degradation include increased dust levels, invasive species establishment and spread, and herbicide drift. Another factor is foot and vehicle trampling and crushing from increased accessibility provided by ground-disturbing activities.

The width of the impact zone varies depending on the type of ground-disturbing activity, but for purposes of this analysis, it is assumed to be 984 feet from the edge of ground disturbance. Within this impact zone, numerous impacts on plants can occur. This does not necessarily result in immediate plant mortality or loss of habitat, but it reduces rare plant success and viability over time. These impacts are as follows:

- Alteration of light and availability of water
- Alteration of temperatures on plants at the microsite level
- Increased dust levels on leaf surfaces
- Alteration of soil properties, such as pH, salinity, nutrient availability, mycorrhizal, microbial communities, and organic matter
- Alterations of herbivory patterns
- Competition from invasive species
- Impacts from herbicide use to control invasive species
- Alteration of fire regimes
- Shifts in competitive advantage to more aggressive native plant species within the overall plant community
- Habitat fragmentation

Little is known about the ecophysiology[7] of most special status plant species; because of this, exact environmental needs and how plants might respond to subtle alterations of their environments are generally unknown. These impacts can be assessed at a plant occurrence level, by quantifying plant occurrence changes over time. They can also be addressed at the larger scale of habitat degradation.

- Acres within both a 984-foot zone around ground-disturbing activities and within a 984-foot buffer of special status plant occurrences or suitable special status plant habitat
- Number of invasive species occurrences and the number of acres infested within 984 feet of special status plant occurrences
- Percent reduction in population numbers over time
- Percent reduction in reproduction capability over time, measured as percent reduction in both viable seed set and in new shoots from vegetation reproduction
- Reduction in area of occupied habitat over time

Pollinator Habitat Fragmentation and Loss. Habitat fragmentation occurs when contiguous habitat is broken into smaller blocks by surface-disturbing activities, and distances between suitable habitat patches increase. Because pollinators fly only limited distances, they are less likely to use small and isolated patches of habitat, and habitat fragmentation can effectively isolate pollinators from special status plant occurrences. Habitat fragmentation occurs concurrently with habitat loss. As suitable habitat for pollinators decreases in proximity to special status plants that depend on these pollinators for reproduction, plant reproduction success and genetic diversity decrease. This can result in reduced viability at the plant occurrence level and potentially at the species level for species with few occurrences.

- Acres of pollinator habitat lost within buffer zones around plant occurrences
- Buffer width would vary depending on the individual plant species and its potential pollinators

Habitat Restoration. Habitat restoration can result from vegetation management projects, restoration of hydrologic function, removing invasive species, restoration of historic fire regimes, alteration of grazing management, or other methods. However, any habitat restoration project for special status plants must be designed specifically for the individual plant species and its specific habitat and site conditions. Generalized habitat restoration projects that do not focus on special status plant needs can have negative impacts on these species.

[7]The science of the interrelationships of organisms and their environment

- Acres of habitat improved for special status plants

Habitat Protection.

- Acres protected through stipulations, withdrawals, closures, or special designations (e.g., ACECs)

Assumptions

The following list presents basic assumptions related to special status plants that apply to the impacts assessment for Alternatives A through D in this EIS.

- The BLM and Forest Service are responsible for managing both habitat and occurrences of special status plants.
- Any special status plant habitat disturbance, unless specifically designed for a particular special status plant species under specific circumstances, would be detrimental to special status plants. This includes sagebrush habitat improvement projects, such as juniper removal, mastication, and prescribed fire, which might have long-term positive impacts but would result in special status plant mortality and habitat degradation in the short term.
- Disruption of any component of a species habitat would be detrimental, with the degree of detriment dependent on the type, intensity, time of year, and extent of the disruption, as well as on the plant species affected. This can also include the disruption of natural disturbance patterns, to which special status plant species may be adapted.
- Different special status plant species grow in different types of habitats, so the relative risk of any given activity or project would vary for each plant species. See **Tables 4.3** and **4.4** for a summary of planning area special status plant species and their habitats.
- The exact locations of future surface-disturbing activities cannot be predicted at the programmatic EIS level.
- Unsurveyed potentially suitable habitat for special status plant species occurs within and next to the identified PHMA, GHMA, and LCHMA. Exact locations of all special status occurrences and acreage of habitat existing for each special status species are unknown.
- Significant plant communities identified by the Colorado Natural Heritage Program are present within the analysis area and may be impacted by GRSG management. Potential impacts on these significant plant communities are not analyzed in this document due to inadequate data from field offices.

Table 4.3
Known Threatened, Endangered, and Sensitive Plant Species Occurrences within GRSG PHMA, GHMA, and LCHMA, and within a 984-Foot Buffer of these GRSG Habitats

Species Common Name	Species Scientific Name	Field Offices*	Species Status **	Number of Occurrences			Number of Occurrences in 300-meter Buffer		
				In GHMA	In PHMA	In LCHMA	In GHMA	In PHMA	In LCHMA
Boat-shaped bugseed	*Corispermum navicula*	KFO	S	0	1	0	0	1	0
Cathedral Bluff dwarf gentian	*Gentianella tortuosa*	WRFO	S	0	8	0	1	1	0
Cathedral Bluffs meadowrue	*Thalictrum heliophilum*	GJFO, WRFO	S	1	10	1	16	15	0
Clay hill buckwheat	*Eriogonum viridulum*	LSFO	S	1	0	0	0	0	0
Colorado feverfew	*Parthenium ligulatum*	LSFO, WRFO	S	3	0	0	3	0	0
Colorado hookless cactus	*Sclerocactus glaucus*	GJFO	FT	84	1	0	5	0	0
DeBeque phacelia	*Phacelia submutica*	GJFO	FT	5	0	0	60	0	0
Debris milkvetch	*Astragalus detritalis*	LSFO, WRFO	S	26	3	0	4	0	0
Duchesne milkvetch	*A. duchesnensis*	LSFO, WRFO	S	3	0	0	0	0	0
Dudley Bluffs twinpod	*Physaria obcordata*	WRFO	FT	0	0	0	1	0	0
Ephedra buckwheat	*Eriogonum ephedroides*	WRFO	S	6	0	0	3	0	0
Flaming Gorge evening primrose	*Oenothera acutissima*	LSFO, WRFO	S	3	9	0	0	0	0

Table 4.3
Known Threatened, Endangered, and Sensitive Plant Species Occurrences within GRSG PHMA, GHMA, and LCHMA, and within a 984-Foot Buffer of these GRSG Habitats

Species Common Name	Species Scientific Name	Field Offices*	Species Status **	Number of Occurrences			Number of Occurrences in 300-meter Buffer		
				In GHMA	In PHMA	In LCHMA	In GHMA	In PHMA	In LCHMA
Fragile rockbrake	*Cryptogramma stelleri*	KFO	S	0	0	0	1	0	0
Gibbens's beardtongue	*Penstemon gibbensii*	LSFO	S	11	0	0	0	0	0
Graham's beardtongue	*P. grahamii*	WRFO	FP	1	0	0	8	0	0
Hairy Townsend daisy	*Townsendia strigosa*	LSFO	S	1	0	0	0	0	0
Harrington's penstemon	*Penstemon harringtonii*	CRVFO, KFO	S	58	54	0	23	25	0
Narrow-stem gilia	*Alciella stenothyrsa*	WRFO	S	0	0	0	1	0	0
Naturita milkvetch	*Astragalus naturitensis*	GJFO	S	10	0	0	1	0	0
North Park phacelia	*Phacelia formosula*	KFO	FE	0	85	0	0	0	0
Osterhout milkvetch	*Astragalus osterhoutii*	KFO	FE	36	24	0	7	4	0
Pale blue-eyed grass	*Sisyrinchium pallidum*	KFO	S	0	1	0	0	0	0
Parachute penstemon	*Penstemon debilis*	CRVFO	FT	2	0	0	0	0	0
Penland beardtongue	*P. penlandii*	KFO	FE	5	6	0	0	0	0
Piceance bladderpod	*Lesquerella parviflora*	GJFO, WRFO	S	18	24	21	26	27	1

Table 4.3
Known Threatened, Endangered, and Sensitive Plant Species Occurrences within GRSG PHMA, GHMA, and LCHMA, and within a 984-Foot Buffer of these GRSG Habitats

Species Common Name	Species Scientific Name	Field Offices*	Species Status **	Number of Occurrences			Number of Occurrences in 300-meter Buffer		
				In GHMA	In PHMA	In LCHMA	In GHMA	In PHMA	In LCHMA
Roan Cliffs blazingstar	*Mentzelia rhizomata*	CRVFO	S	2	0	0	2	0	0
Rock tansy	*Sphaeromeria capitata*	LSFO	S	0	1	0	0	0	0
Rollins cryptantha	*Cryptantha rollinsii*	WRFO	S	3	2	0	3	0	0
Singlestem buckwheat	*Eriogonum acaule*	LSFO	S	1	0	0	0	0	0
Tufted cryptantha	*Cryptantha caespitosa*	LSFO	S	2	0	0	1	0	0
Uinta Basin springparsley	*Cymopterus duchesnensis*	LSFO	S	3	0	0	0	0	0
Woodside buckwheat	*Eriogonum tumulosum*	LSFO	S	1	0	0	2	0	0
Total				**286**	**229**	**22**	**168**	**73**	**1**

**FE = federally endangered, FT = federally threatened, FC = candidate for federal listing, FP = proposed for federal listing, S = BLM sensitive

Table 4.4
Habitats for Special Status Plant Species within the Planning Area, Grouped by Habitat Guilds

Common Name	Scientific Name	Status	Offices	Habitat Type
Green River Shale Formation				
Narrow-stem gilia	*Alciella stenothyrsa*	S	WRFO, GJFO	Grassland, sagebrush, mountain mahogany or pinyon-juniper; silty to gravelly loam soils of the Green River Formation, 6,200 to 8,600 feet
Rollins cryptantha	*Cryptantha rollinsii*	S	WRFO	White shale slopes of the Green River Formation, in pinyon-juniper or cold desert shrub communities. 5,300 to 5,800 feet

Table 4.4
Habitats for Special Status Plant Species within the Planning Area, Grouped by Habitat Guilds

Common Name	Scientific Name	Status	Offices	Habitat Type
Ephedra buckwheat	*Eriogonum ephedroides*	S	LSFO, WRFO	Shale and clay flats of slopes in saltbush, sage and pinyon-juniper habitats, 4,900 to 6,900 feet
Cathedral Bluff dwarf gentian	*Gentianella tortuosa*	S	WRFO	Barren shale knolls and slopes of the Green River Formation, 8,500 to 10,800 feet
Piceance bladderpod	*Lesquerella parviflora*	S	CRVFO, GJFO, WRFO	Shale outcrops of the Green River Formation, on ledges and slopes of canyons in open areas 6,200 to 8,600 feet
Roan Cliffs blazingstar	*Mentzelia rhizomata*	S	CRVFO, GJFO	Steep talus slopes of the Parachute Creek Member of the Green River Shale Formation in Garfield County and in wash bottoms with eroded shale 5,800 to 9,000 feet
Colorado feverfew	*Parthenium ligulatum*	S	LSFO, WRFO	Barren shale knolls, 5,400 to 6,500 feet
Parachute penstemon	*Penstemon debilis*	FT	CRVFO, GJFO	Steep talus slopes of the Parachute Creek Member of the Green River Shale Formation in Garfield County and in wash bottoms with eroded shale, 6,000 to 9,000 feet
Graham's beardtongue	*P. grahamii*	FP	WRFO	Talus slopes and knolls of the Green River Formation in sparsely vegetated desert scrub and pinyon-juniper, 5,800 to 6,000 feet
White River beardtongue	*P. scariosus* var. *albifluvis*	FC	WRFO	Sparsely vegetated shale slopes of the Green River Formation Desert in shrub and pinyon-juniper communities, 5,000 to 7,200 feet
Dudley Bluffs bladderpod	*Physaria congesta*	FT	WRFO	Barren, white shale outcrops of the Green River and Uinta Formations, 6,000 to 6,700 feet
Dudley Bluffs twinpod	*P. obcordata*	FT	WRFO, CRVFO	Barren white outcrops and steep slopes of the Parachute Creek Member of the Green River Formation, 5,900 to 7,500 feet
Cathedral Bluffs meadowrue	*Thalictrum heliophilum*	S	CRVFO, GJFO, WRFO	Dry shale barren communities in Garfield, Mesa, and Rio Blanco Counties in northwestern Colorado, 6,200 to 8,800 feet

Table 4.4
Habitats for Special Status Plant Species within the Planning Area, Grouped by Habitat Guilds

Common Name	Scientific Name	Status	Offices	Habitat Type
Wasatch Formation				
DeBeque milkvetch	*Astragalus debequaeus*	S	CRVFO, GJFO	Varicolored, fine textured, seleniferous or saline soils of Wasatch Formation—Atwell Gulch Member, 5,100 to 6,400 feet
DeBeque phacelia	*Phacelia submutica*	FT	CRVFO, GJFO	Sparsely vegetated areas in high clay content soils on low-angle to steep slopes of the Atwell Gulch and Shire Members, Wasatch Formation. Soils often have large cracks or alligator-skin to popcorn surface texture because of the high shrink-swell potential of the clays, 4,700 to 6,200 feet
Juniper				
Naturita milkvetch	*Astragalus naturitensis*	S	CRVFO, GJFO	Sandstone mesas, ledges, crevices, and slopes in pinyon-juniper woodlands, 5,000 to 7,000 feet
Sagebrush to Juniper, in Barren to Gravelly Soils				
Debris milkvetch	*A. detritalis*	S	LSFO, WRFO	Pinyon/juniper and mixed desert shrub, often on rocky soils ranging from sandy clays to sandy loams; also alluvial terraces with cobbles, 5,400 to 7,200 feet
Duchesne milkvetch	*A. duchesnensis*	S	LSFO, WRFO	Pinyon/juniper woodland and desert shrub, around sandstone or shale outcrops, 4,600 to 6,400 feet
Tufted cryptantha	*Cryptantha caespitosa*	S	LSFO, WRFO	Sparsely vegetated shale knolls, with pinyon-juniper or sagebrush; usually with other cushion plants, 5,500 to 8,100 feet
Uinta Basin springparsley	*Cymopterus duchesnensis*	S	LSFO	Cold desert shrub, sagebrush, and juniper communities, in sandy clay and clay soils derived from shales, 4,700 to 6,800 feet
Singlestem buckwheat	*Eriogonum acaule*	S	LSFO	Barren hillsides in fine particle soils, 5,680 to 6,820 feet
Woodside buckwheat	*E. tumulosum*	S	LSFO	Mixed desert shrub and pinyon-juniper woodlands, on rocky outcrops, sedimentary gravels, or clays, 5,800 to 6,300 feet
Clay hill buckwheat	*E. viridulum*	S	LSFO	Sandy or silty flats or clay slopes and hills, in saltbush or sagebrush communities, or pinyon-juniper woodlands, 4,620 to 7,260 feet

Table 4.4
Habitats for Special Status Plant Species within the Planning Area, Grouped by Habitat Guilds

Common Name	Scientific Name	Status	Offices	Habitat Type
Hairy Townsend daisy	*Townsendia strigosa*	S	LSFO	Shaley, sandy, or alkaline clay substrates in desert shrub, sagebrush, or pinyon-juniper habitats, 4,950 to 6,600 feet
Sagebrush, on Basalt Parent Material Soils				
Harrington's penstemon	*Penstemon harringtonii*	S	CRVFO, KFO	Open sagebrush or sagebrush sites with encroaching pinyon-juniper. Soils are typically rocky loams and rocky clay loams derived from coarse calcareous parent materials (basalt) 6,200 to 9,200 feet.
Desert Scrub				
Colorado hookless cactus	*Sclerocactus glaucus*	FT	CRVFO, GJFO	Rocky hills, mesa slopes, and alluvial benches in salt desert shrub communities, often with well-formed microbiotic crusts. Can occur in dense cheatgrass, 4,500to6,600 feet
Rock tansy	*Sphaeromeria capitata*	S	LSFO	Dry, rocky hills, and desert flats in silty soil, 7,500 to 7,900 feet
Browns Park Formation				
Gibbens' beardtongue	*Penstemon gibbensii*	S	LSFO	Sparsely vegetated shale or sandy-clay slopes of the Browns Park Formation. Surrounding vegetation is pinyon-juniper woodland, sagebrush, or greasewood-saltbush, 5,500 to 7,700 feet
Niobrara and Pierre Shales				
Osterhout milkvetch	*Astragalus osterhoutii*	FE	KFO	Selenium-rich clay soils, derived mostly from Niobrara and Pierre shale, on relatively flat areas and barren knolls within Grand County. **Occurs only within the planning area**, 7,500 to 7,700 feet
Penland beardtongue	*Penstemon penlandii*	FE	KFO	Selenium-rich clay soils, derived mostly from Niobrara and Pierre shale, on relatively flat areas and barren knolls within Grand County. **Occurs only within the planning area,** 7,500 to 7,700 feet
Cold North Park Dunes				
Boat-shaped bugseed	*Corispermum navicula*	S	KFO	Known only from the cold climate dunes in Northern Colorado. **Known only within the planning area.**

Table 4.4
Habitats for Special Status Plant Species within the Planning Area, Grouped by Habitat Guilds

Common Name	Scientific Name	Status	Offices	Habitat Type
Coalmont Formation—North Park				
North Park phacelia	*Phacelia formosula*	FE	KFO	Barren exposures where the Coalmont Formation forms outcrops of sandy soil or ledges. Grows most abundantly on steep, sparsely vegetated and erodible slopes (such as on the sides of deep ravines), within central Jackson County and northwest Larimer County, **almost exclusively within the planning area.**
Riparian and Wet Meadows				
Flaming Gorge evening primrose	*Oenothera acutissima*	S	LSFO, WRFO	Seasonally wet areas in meadows and depressions or along arroyos in mixed conifer forest to sagebrush, on sandy gravelly, or rocky soils 5,300 to 8,500 feet
Western prairie fringed orchid	*Platanthera praeclara*	FT	KFO, Routt National Forest	Found in Minnesota, Iowa, Missouri, Nebraska, North Dakota, and Manitoba, Canada. Associated with sedge meadows, primarily within the tallgrass prairie biome, and generally in fire- and grazing-adapted grassland communities.
Pale blue-eyed grass	*Sisyrinchium pallidum*	S	KFO	Found in northwest Jackson County and northwest Larimer County. Prefers fens, wet meadows, and stream edges.
Ute ladies'-tresses orchid	*Spiranthes diluvialis*	FT	CRVFO, KFO, LSFO, WRFO	Sub-irrigated alluvial soils along streams and in open meadows in floodplains, 4,500 to 7,200 feet
Calcareous Cliff Crevices and Rock Ledges in Coniferous Forest				
Fragile rockbrake	*Cryptogramma stelleri*	S	KFO	Occurs in cool, moist, sheltered calcareous cliff crevices and rock ledges, typically in coniferous forest or other boreal habitats. Has a wide distribution but low abundance within occurrences.

- Special status plant surveys would be conducted at the appropriate time of year for plant identification before any project that could impact any special status plant species or its habitat. In instances where surveys could not be performed, such as in years when annual species do not appear due to annual climatic variability, the presence of special status plant species would be assumed in all potentially suitable habitats, and appropriate conservation measures and protections would be implemented. Section 7 consultations with USFWS would be conducted for any projects with the potential to impact any federally listed plant species. GRSG PHMA and GHMA areas overlap areas of designated critical habitat for two federally listed plant species, Parachute penstemon and DeBeque phacelia.
- The BLM and Forest Service would use the best available science, information, conservation assessments, and related directives as appropriate to guide special status plant management on BLM-administered and National Forest System lands.
- COAs and siting conditions would be applied to all projects near special status plant occurrence sites inside and outside the planning area. NSOs would be applied to all federally listed plant occurrences inside and outside the planning area and to sensitive plant occurrences, to the degree possible.
- If management actions (e.g., grazing, energy development, and travel/recreation) are excluded from PHMA and GHMA, development would occur with increased concentration in non-sagebrush habitats (e.g., barrens, desert shrub, pinyon-juniper, mountain shrub, and spruce-fir), with potential adverse impacts on species that inhabit these habitat types.
- Federal oil and gas regulations prevent the BLM and Forest Service from applying new lease stipulations or additional lease stipulations to existing leases. However, federal regulations do allow the BLM and Forest Service to apply other protection measures in conjunction with planning and implementing oil and gas projects. These include applying stipulations consistent with the most recent LUP as terms and conditions for discretionary approvals (e.g., ROW actions) and applying COAs to augment protections related to lease activities. The latter include requirements for exclosure or temporary construction fencing, botany monitors during construction, dust abatement, site-specific reclamation, weed control with restrictions on herbicide use, and restoration of special status plant species through nursery propagation.

Direct and Indirect Impacts on Special Status Plant Species

Impacts from Travel Management on Special Status Plant Species

Travel management designates certain areas as closed to motorized vehicle use, open to OHV use, vehicle use limited to existing routes, vehicle use limited to existing routes with seasonal closures, and vehicle use limited to designated routes. The analyzed alternatives include variations from the existing travel management conditions to generally include greater limitations on motorized travel within GRSG habitat, permanent or seasonal road or area closures, limitations on new route construction and realignments, varying restrictions on upgrading existing routes, and restoration of undesignated routes.

Direct Mortality. Motorized vehicle use can result in direct mortality to special status plants due to crushing, uprooting, or gradual starvation of plant resources as plants try to recover from repeated vehicle damage. Travel management actions that stop or restrict motorized vehicle use could reduce the risk of direct mortality to special status plants in areas where these plants are present. Upgrading or realigning routes and constructing new routes could result in direct mortality if special status plants were present. Restoring routes would have a low probability for direct mortality, but drill seeding closed routes could crush special status plants if they were present, with a slight risk of direct mortality.

Alternative A—Under the no action alternative, travel management would continue as described in the corresponding field office LUPs. Any direct mortality risks from motorized vehicles would remain unchanged. Because areas of unrestricted cross-country OHV use are permitted under this alternative, it would have the greatest risk of direct mortality to special status plants, particularly those species in habitats where unrestricted motorized use is allowed.

Alternative B—Under Alternative B, motorized travel would be restricted to existing roads, primitive roads, and trails. The need for permanent or seasonal closure of these existing routes would be evaluated. Constructing new routes or upgrading routes would be limited to areas where necessary for safe access to existing ROWs. For any new disturbance exceeding 3 percent for a given habitat area, mitigation would be required to offset loss of GRSG habitat. Undesignated routes would be restored using appropriate seed mixes, and the use of transplanted sagebrush would be considered.

Because this alternative would reduce the area within GRSG habitat where direct mortality from motorized vehicles could occur, this alternative would likely have a reduced risk of direct mortality for special status plants within the PHMA, GHMA, and LCHMA. This would be particularly true for those plants growing in sagebrush and pinyon-juniper habitats. However, it could divert

motorized vehicle traffic to sites outside of GRSG habitat and increase the direct mortality risk to special status plant species growing in other habitats.

Alternative C—Alternative C is similar in design and potential direct mortality impacts as Alternative B; however, it would prohibit new road construction within 4 miles of active GRSG leks and would avoid new road construction in occupied GRSG habitat. All existing routes would be upgraded only when necessary for motorist safety. These additional restrictions could provide greater protections to special status plants in sagebrush habitats but could shift the potential mortality risk to species growing in other habitat types.

Alternative D—Alternative D is also similar to Alternative B, except that it has less stringent restrictions on new road construction and road upgrades and allows new disturbance to occur up to a 5 percent disturbance cap without mitigation. This alternative could have a greater risk of direct mortality on special status plants growing in sagebrush habitats, relative to Alternatives B and C.

See *Habitat Restoration*, below.

Direct Habitat Loss. Constructing new roads or rerouting existing roads results in direct habitat loss whenever there is potential habitat for a special status species along the route. Cross-country vehicle use can also result in direct habitat loss where vehicles are repeatedly driven across plant habitat, resulting in vegetation loss. The potential for direct habitat loss is therefore contingent on the probability for new road construction or increased cross-country vehicle use resulting in vegetation loss.

Alternative A—Under Alternative A, travel management would continue as described in the corresponding field office LUPs. Direct habitat loss could occur from new road construction. Because areas of unrestricted cross-country OHV use are permitted under this alternative, it would have the greatest risk of direct habitat loss for special status plants. This would be particularly true for those species with habitats in areas where unrestricted motorized use is allowed.

Alternative B—Under Alternative B, motorized travel would be restricted to existing roads, primitive roads, and trails. The need for permanent or seasonal closure of these existing routes would be evaluated. Constructing new routes or upgrading existing routes would be limited to areas where necessary for safe access to existing ROWs. For any new disturbance exceeding 3 percent for a given habitat area, mitigation would be required to offset loss of GRSG habitat. Undesignated routes would be restored using appropriate seed mixes, and the use of transplanted sagebrush would be considered.

Because this alternative would reduce the area within GRSG habitat where direct habitat loss from motorized vehicles could occur, this alternative would likely have a reduced risk of direct mortality for special status plants within the

PHMA, GHMA, and LCHMA. This would be particularly true for those growing in sagebrush to pinyon-juniper habitats. However, it could divert motorized vehicle traffic to sites outside of GRSG habitats and increase the direct habitat loss risk for special status plant species growing in other habitat types.

Alternative C—Alternative C is similar in design and potential direct mortality impacts to Alternative B; however, it would prohibit new road construction within 4 miles of active GRSG leks and would avoid new road construction in occupied GRSG habitat. All existing routes would be upgraded only when necessary for motorist safety. These additional restrictions could provide greater protections to special status plants in sagebrush habitats, but they could shift the potential habitat loss risk to species growing in other habitat types.

Alternative D—Alternative D is also similar to Alternative B, except that it has less stringent restrictions on new road construction and road upgrades and allows new disturbance to occur up to a 5 percent disturbance cap without mitigation. This alternative could have a greater risk of direct habitat loss for special status plants growing in sagebrush habitats, relative to Alternatives B and C.

See *Habitat Restoration*, below.

Habitat Degradation and Disruption to Species. Impacts of vehicles on established roads or trails can impact many ecological components of plant habitats. Increased dust levels from road traffic, particularly on dirt and gravel roads, can negatively impact plants by clogging openings in the leaves, impeding gas exchange, and reducing the ability of plants to take in carbon dioxide. Dust on the leaf surface can also effectively reduce light availability at the leaf surface. Light and carbon dioxide are both critical for plants to conduct photosynthesis, and reductions in either can reduce the quantity of carbohydrates plants can produce through photosynthesis, thereby reducing plant growth and seed production. Dust on leaf surfaces can also facilitate plant tissue uptake of toxic pollutants (Farmer 1993; Sharifi et al. 1997; Thompson et al. 1984). However, the degree of impact from dust on leaf surfaces is not always measureable in some individual plant species and under some circumstances (Wijayratne et al. 2009).

Dust can also affect snowmelt patterns and resulting hydrology and soil moisture availability, can alter soil pH and nutrient availability, and can result in plant community composition changes (Angold 1997; Auerbach et al. 1997; Field et al. 2010; Gieselman 2010; Johnston and Johnston 2004). Roads and their traffic provide both habitat and transport for noxious weeds and other invasive nonnative plants (Gelbard and Belnap 2003; Larson 2003; Parendes and Jones 2000; Schmidt 1989; Zaenepoel et al. 2006). These nonnative species can negatively impact special status plants, both directly through competition for resources and indirectly through alteration of soil microbial communities

(Hierro et al. 2006; Klironomos 2002; Reinhart and Callaway 2006; Vogelsang and Bever 2009).

Herbicide treatments of noxious weeds can also result in negative impacts on or mortality of special status plants if they are collocated (BLM 2007).

Impacts from cross-country vehicles include those associated with vehicle use on established routes. But the degree of these indirect impacts would depend on the amount of vehicle traffic in any given area. Vehicles also provide access for recreation, such as camping, hunting, and hiking. This could have indirect impacts on special status plants farther away from roads. This could result in smashing, trampling, introducing nonnative species, and compacting soil from recreation near roads.

This increase in recreation facilitated by roads could also increase the risk of wildfires from campfires or from sparks generated by vehicles or by camping or wood-cutting equipment. Road closures and subsequent seeding can have both positive and negative impacts on special status plants, depending on the type of vegetation establishing after closures. Use of aggressive nonnative grass species, or even aggressive native grass species, can have negative impacts on special status plants.

Alternative A—Disruption of special status plant species would differ in areas where motorized vehicles remain on established roads and trails and in areas where they are allowed to travel cross country. Potential impacts on particular special status plant species would be contingent on the proximity of roads and cross-country vehicles to plants, road size and amount of traffic, season of use, amount and type of recreation, and individual species and their specific habitat types and ecologies.

Alternative B—Under Alternative B, closing cross-country vehicle use areas within GRSG habitat would reduce the potential for indirect vehicle impacts on special status plants and their habitats within these areas. However, it could increase vehicle use on existing routes. Since habitat degradation and disruption of special status plant species can increase with increased intensity of nearby vehicles, potential impacts on special status plant occurrences near established routes, or outside of sagebrush habitats, could increase.

The types of impacts described under the Alternative A would also occur under Alternative B; however, the distribution of these impacts could shift. Route closures under this alternative would be reseeded using appropriate seed mixes, and the use of sagebrush would be considered. This alternative does not specify that only native species would be seeded. This leaves open the possibility that aggressive nonnative grass species could be used for restoration, and these would have a negative effect on special status plant habitats. Again, actual impacts on special status plants would depend on proximity of plants to motorized vehicles and on the intensity and season of vehicle use.

Alternative C—Under Alternative C, the types of potential impacts on special status plants would be the same as for Alternatives A and B; however, this alternative proposes greater protections from roads within a 4-mile buffer around leks. This could provide greater protections for sagebrush habitat plant species but could also shift negative motorized vehicle impacts and cause them to increase in other habitat types. For restoration of closed routes, this alternative specifies that appropriate native seed mixes would be used, as well as transplanted sagebrush. This would reduce the risk of negative impacts on special status plants.

Alternative D—Under Alternative D, the types of potential impacts on special status plants would be the same as for the other three alternatives. However, this alternative would allow for increased road construction and would result in roads being constructed to a higher standard. It would also leave open the possibility of seeding restored routes with nonnative species. Impacts on special status plants would be contingent on how near they are to roads and on road size and amount of traffic. Because of this, Alternative D could result in greater negative impacts on special status plants within sagebrush habitats but potentially fewer impacts on plants growing in other habitat types, relative to Alternatives B or C.

See *Habitat Restoration*, below.

Pollinator Habitat Fragmentation and Loss. The importance of pollinator habitat impacts on special status plants varies considerably between individual plant species. For such species as DeBeque phacelia, which appears to be self-pollinated, impacts on pollinator habitat would have no effect. However, most special status plant species are pollinated by insects, including bees, wasps, ants, flies, butterflies, and beetles. For many special status plant species, the pollinator species are unknown (Winder 2012).

Pollinators depend on both appropriate floral communities and on appropriate nesting habitat, and these habitat requirements are often naturally fragmented even in undisturbed sites. However, many pollinators show fidelity to specific habitats, and if these sites become isolated from contiguous habitat by disturbances such as roads, pollinators may be reluctant to cross these barriers to other habitats (Bhattacharya et al. 2002; Osborne and Williams 2001).

Roads and vehicles can negatively impact pollinators by creating barriers, by removing habitat during road construction, and by posing direct mortality through collisions. Fragmentation of pollinator habitat can result in reduced cross-pollination between occurrences of special status plants, with the associated potential for loss of genetic diversity and the associated potential loss of species viability.

Alternative A—Under the No Action Alternative, negative impacts of roads and cross-country vehicles on pollinators would continue. Impacts from cross-

country vehicles would likely be less than those from established roads, except in areas where cross-country traffic results in extensive vegetation loss.

Alternative B—Under this alternative, impacts would be similar to Alternative A, but any negative impacts from cross-country traffic would be eliminated within GRSG habitat. Restrictions on new road development would also reduce the potential for negative impacts on pollinators within sagebrush habitats.

Alternative C—This alternative would have similar impacts on pollinators as Alternative B.

Alternative D—This alternative would have similar impacts on pollinators as under Alternatives B and C. However, it would have a somewhat greater risk of pollinator habitat fragmentation and loss due to more lax restrictions on new road construction.

See *Habitat Restoration,* below.

Habitat Restoration. Habitat restoration for special status plants could result either from projects specifically designed for particular special status plant habitats or as an indirect effect of other management actions, such as road closures. However, a management action that might be beneficial for a general habitat type would not necessarily be beneficial to special status plant species, since these species usually have very specific habitat requirements.

Alternative A—There would be no special status plant habitat restoration in the context of travel management under this alternative.

Alternative B—There would be some potential for special status plant habitat restoration through the closure of routes within GRSG habitats. However, this restoration would be contingent on the proximity of the restoration site to special status plant habitat and on the particular plant species seeded in the restoration.

Alternative C—This alternative would have some potential for special status plant restoration, contingent on location and species seeded. However, this alternative would require native species for seeding, which would make it somewhat more likely to restore special status plant habitat within sagebrush areas.

Alternative D—This alternative would have a slightly reduced potential for restoration of special status plant habitat relative to Alternative B since it places less emphasis on route closures and does not specifically state that only native species would be used for restoration seeding.

Proposed LUPA—Travel management would be the same under the Proposed LUPA as under Alternative D; therefore, impacts for direct mortality, direct

habitat loss, habitat degradation, habitat fragmentation, and habitat restoration from recreation on special status plant species are similar to those under Alternative D.

Impacts from Recreation Management on Special Status Plant Species

Direct Mortality/Direct Habitat Loss/Habitat Degradation and Disruption to Species and Pollinator Habitat Fragmentation and Loss

While recreation management in general is a complex area with numerous potential impacts on special status plants, the current analysis addresses only recreation special use permitting and seasonal camping prohibitions within 4 miles of active GRSG leks. Permitted uses include SRPs and Forest Service recreational SUAs. These activities are typically larger organized recreational groups and include competitive and noncompetitive events and commercial outfitting services. SUPs can include specific COAs to protect special status plants when appropriate.

Recreation, particularly by large groups, can result in direct mortality to plants from trampling, uprooting, or smashing under tents or other recreation equipment or other forms of direct damage. The risk of direct mortality generally increases as the size of the recreational group increases, but it varies depending on the particular activity, its location, and the plant species potentially impacted. For example, a riparian species, such as Ute ladies'-tresses, would have a greater potential of impact from commercial river rafting than an upland species, and a prickly species, such as Colorado hookless cactus, would likely have a lower risk of being smashed under a tent than a softer textured species. Indirect impacts from these recreation activities can be similar to those described in more detail under travel management. This is because most recreation involves motorized vehicles to access sites, and for some activities, motorized vehicles are integral to the activity itself.

Alternative A—Under this alternative, SRPs and SUAs would continue to be issued on a case-by case basis. The potential for negative impacts on special status plants or their habitats would depend on the types and locations of the permitted activities and the degree to which protections for special status plants were addressed in each case.

Alternative B—Under this alternative, any SRPs or recreational SUAs issued within PHMA would be required to have a neutral or positive effect on this habitat. This could reduce the potential for negative impacts on special status plants or their habitats within the PHMA. Otherwise, the impacts would be identical to Alternative A.

Alternative C—This alternative is identical to Alternative B, except that it would also seasonally prohibit camping within 4 miles of active GRSG leks. Potential negative impacts on special status plants and their habitats would be slightly

reduced for those species occurring within 4 miles of active leks, relative to the other alternatives.

Alternative D—This alternative would have potential negative impacts on special status plants and their habitats equivalent to those of Alternative B.

Proposed LUPA—Recreation management under the Proposed LUPA would be the same as under Alternative D; therefore, impacts for direct mortality, direct habitat loss, habitat degradation, habitat fragmentation, and habitat restoration from recreation on special status plant species are similar to those under Alternative D.

Impacts from Lands and Realty Management on Special Status Plant Species

This heading addresses utility ROW exclusion and avoidance areas, withdrawal of lands from mineral activity, and retention or disposal of public lands. Developing new ROWs or burial of existing overhead facilities result in ground disturbance, while restricting new ROWs to existing disturbances can reduce the total acreage of disturbance.

Retaining lands under federal ownership provides greater protections for special status plants. Projects with potential impacts on federally listed plants require Section 7 consultation with USFWS when plants are located on federally owned lands or when the project involves accessing federal minerals. Similarly, sensitive plants growing on federal lands or on private or state surface overlying federal minerals receive protections based on agency policies and regulations. Because the State of Colorado has no protections for rare plants, special status plants not connected to federal lands or minerals have no protections in the state; therefore, disposal of federal lands with special status plant occurrences on them would result in loss of protections for these plants.

<u>Direct Mortality/Habitat Loss/Habitat Degradation and Disruption to Species and Pollinator Habitat Fragmentation and Loss</u>

Developing ROW exclusion and avoidance areas, relocating utility corridors outside of PHMA, burying existing overhead facilities, and constructing new road, ditch, or other non-utility ROWs would have impacts similar to those addressed more fully under travel management and minerals management. Ground disturbance from utility line installation, particularly buried utilities, is similar to new road construction and pipeline construction from oil and gas development. LUPs, the ESA, and agency policies and regulations protect special status plant species when ground-disturbing activities occur on federal lands or in association with federal minerals. If federal lands are transferred to private or other government ownership, these protections are lost, resulting in a much greater risk of mortality, habitat loss, habitat degradation, and disruption to species and pollinators.

Habitat Restoration/Habitat Protection

Restricting development of utility or non-utility ROWs in PHMA would increase habitat protection for special status plant species in sagebrush habitats. However, this could shift potential negative impacts from sagebrush habitat plant species to those special status species occurring in other habitats. Reclamation of habitat immediately following utility installation would help to protect any nearby special status plants or habitat from noxious weed establishment and would be beneficial for these species, as appropriate native plant species are used. Retention of lands in federal ownership continues to provide legal protections for special status plants. Acquisition of new federal lands that have special status plants or habitat, as well as GRSG habitat, would be beneficial for these species.

Summary of Impacts by Alternative

All of the alternatives could negatively impact special status plant species. The variation among alternatives would have more to do with which special status species and habitats would be more likely to receive negative impacts.

Alternative A—Under Alternative A, ROW development and land acquisition and disposal would continue, in accordance with existing LUPs, which would cause the greatest impacts on special status plant species.

Alternative B—Alternative B could provide slightly greater protections for special status plants in GRSG habitats. It would limit total disturbance of these areas to 3 percent, would place new ROWs within existing disturbance to the extent possible, would propose lands within GRSG habitat for mineral withdrawal, would place greater restrictions on disposal of public land parcels to protect GRSG habitat, and would promote acquisition of new lands to enhance GRSG habitat.

Alternative C—Alternative C is similar to Alternative B, but with slightly tighter restrictions to limit new disturbance, protect GRSG habitats, and retain federal landownerships. These restrictions could affect only those special status plant species growing within GRSG habitat.

Alternative D—Alternative D has similar potential impacts on special status plants as Alternatives B and C; however, it would provide slightly lower protections for those species in GRSG habitats. This is because it would allow up to 5 percent disturbance within these habitats, would not propose any lands for mineral withdrawal, and would place fewer restrictions on disposal of isolated federal parcels and less emphasis on land acquisition for conservation, enhancement, or restoration of GRSG habitat.

The Proposed LUPA would manage all PHMA and GHMA as ROW avoidance areas, with exceptions for pending large transmission lines. Additionally, no aboveground structures would be authorized within 1 mile of active leks. Impacts on special status plants from managing lands and realty under the

Proposed LUPA are similar to those for Alternative D, with potentially large local impacts where PHMA and GHMA are open for large transmission lines. For the description of impacts from proposed large transmission lines in northwest Colorado, see Cumulative Impacts (**Chapter 5**).

Impacts from Wind Energy Development on Special Status Plant Species
In general, wind energy development would require compliance with existing LUPs. Restrictions on wind energy development are specifically addressed only under Alternative C.

Direct Mortality/Habitat Loss/Habitat Degradation and Disruption to Species
Wind energy development would result in ground disturbance impacts similar to those described under the mineral development impact analysis sections of this document. Potential impacts are those from dust, noxious weeds, herbicide application, and alterations of native plant community dynamics described in detail under *Impacts from Management of Travel and Transportation on Special Status Plant Species*. In addition, wind energy could have additional impacts on pollinators if windmill blades were to impact pollinator flight paths or result in pollinator mortality.

Habitat Restoration/Habitat Protection
Wind energy development would provide no benefits in and of itself for special status plant species. Closure of special status plant habitats to wind energy development would protect these plants and their habitats from this disturbance.

Summary of Impacts by Alternative
Alternative A—Under Alternative A the existing LUPs do no specifically address wind energy. Any wind energy development would be permitted in accordance with ROW allocations currently in place.

Alternative B—Alternative B does not specifically address wind energy development; therefore, under this alternative any wind energy development would be managed under the provisions of existing LUPs, and potential impacts on special status plants are identical to those under Alternative A.

Alternative C—Under Alternative C, wind energy development would not be sited within occupied GRSG habitat. This alternative would provide greater protections for special status plant species in occupied GRSG habitat. It would have no additional benefit for special status plant species outside of occupied GRSG habitat. It could increase the potential for negative impacts on these other plants if it were to shift wind energy development from GRSG habitats to other special status plant habitats.

Alternative D—Alternative D does not specifically address wind energy development; therefore, under this alternative, any wind energy development

would be managed under the provisions of existing LUPs. Potential impacts on special status plants are identical to those under Alternative A.

Proposed LUPA—Wind energy development would be excluded from PHMA; impacts on special status plant species would be the same as those under Alternative C.

Impacts from Industrial Solar Energy Development on Special Status Plant Species
In general, solar energy development would require compliance with existing LUPs. Restrictions on wind energy development are specifically addressed only under Alternative C.

Direct Mortality/Habitat Loss/Habitat Degradation and Disruption to Species
Solar energy development would result in ground disturbance impacts similar to those described under the mineral development impact analysis sections of this document. Potential impacts include those from dust, noxious weeds, herbicide application, and alterations of native plant community dynamics described in detail under *Impacts from Management of Travel and Transportation on Special Status Plant Species*. Additionally, solar energy development would result in a foreseeably permanent loss of plant habitat as solar panels would block sunlight from reaching the ground and thereby would eliminate most plants.

Habitat Restoration/Habitat Protection
Solar energy development would provide no benefits in and of itself for special status plant species. Closure of special status plant habitats to solar energy development would protect these plants by and their habitats from this disturbance.

Summary of Impacts by Alternative
Alternative A—Under Alternative A the existing LUPs do no specifically address solar energy. Any solar energy development would be permitted in accordance with ROW allocations currently in place. Impacts on special status plants would be minimal under this alternative. This would be due to the fact that there is very little development potential for solar energy in the decision area, and there are no solar energy zones identified in the Solar Energy Development Programmatic EIS (BLM 2012) in the decision area.

Alternative B—Alternative B does not specifically address solar energy development; therefore, under this alternative any solar energy development would be managed under the provisions of existing LUPs and potential impacts on special status plants are identical to those under Alternative A.

Alternative C—Under Alternative C, solar energy development would not be sited within occupied GRSG habitat. This alternative would provide greater protections for special status plant species in occupied GRSG habitat. It would have no additional benefit for special status plant species outside of occupied GRSG habitat. It could increase the potential for negative impacts on these

other plants if it were to shift solar energy development from GRSG habitats to other special status plant habitat.

Alternative D—Alternative D does not specifically address solar energy development; therefore, under this alternative, any solar energy development would be managed under the provisions of existing LUPs. Potential impacts on special status plants are identical to those under Alternative A.

Proposed LUPA—Solar energy development would be excluded from PHMA; impacts on special status plant species would be the same as those under Alternative C.

Impacts from Range Management on Special Status Plant Species

Livestock grazing on BLM lands is currently managed under the guidance of field office LUPs to meet livestock forage needs, while meeting or exceeding BLM Colorado Public Land Health Standards (BLM 1997). These standards also address special status, threatened, and endangered species and their habitats. Periodic land health assessments monitor range conditions and management success in meeting the BLM Colorado Public Land Health Standards.

Livestock grazing can significantly alter plant community composition and densities, depending on how it is managed. Different grazing regimes impact particular plant species and habitat types differently, with some species favored by particular regimes and other species responding negatively. Alternatives analyzed in this document are intended to favor plant communities desirable for GRSG at different stages of its life cycle.

The potential impacts on special status plants from these proposed modifications of grazing regimes would be species specific and site specific, depending on species ecophysiology, species palatability to livestock, soil and moisture conditions. They would also depend on current plant community composition, including presence and densities of noxious weeds and other nonnative plant species, such as nonnative range grasses deemed desirable for livestock grazing. Also, Section 7 consultation has occurred and would continue to occur as needed regarding potential impacts of range management on federally listed plants (BioLogic 2012).

<u>Direct Mortality</u>

Direct mortality of special status plants resulting from range management can occur from livestock trampling or ingesting plants or by workers removing plants while installing range improvements, such as fences, stock ponds, wells, water pipelines, cattle guards, and corrals. The risk of trampling increases greatly in areas where cattle congregate, such as near water sources and salting stations, along fence lines and trailing routes, and near corrals. Riparian areas are particularly vulnerable to livestock trampling since the presence of water, forage, and shade all draw animals to these areas, where use becomes concentrated and vegetation damage ensues (Fitch and Adams 1998).

Trampling impacts are generally greater in sparsely vegetated soils when they are wet, as these areas lack dense plant rooting matrices to support the weight of livestock. Livestock hooves can punch deeply into these wet soils, which increases the risk of mortality to small rare plant species, such as DeBeque phacelia.

Direct Habitat Loss

Direct habitat loss is most likely to occur as a result of range improvements, such as stock ponds, corrals, salting stations, wells, and water lines. It also occurs in areas where livestock congregate, such as near water and salt sources, along fence lines and trailing routes, and in corral areas.

Habitat Degradation and Disruption to Species

The indirect impacts of livestock grazing on special status plant species can be overt and easily quantified, such as in degradation of riparian areas. Alternately, it can be subtle and more difficult to quantify, such as in alteration of soil nutrient availability due to trampling of microbiotic soil crusts, alterations of soil microbial community composition, or shifts in plant species' competitive abilities within overall plant community dynamics.

A common indirect impact of livestock grazing is the introduction and spread of noxious weeds and other nonnative plant species. Noxious weed seeds can attach themselves to animal fur or can be embedded in mud on animal hooves and be spread to new sites. Trampled areas create disturbed sites ideal for weed establishment and proliferation. Potential impacts of weeds and of herbicides used to treat weeds on special status plants are described in more detail under *Impacts from Management of Travel and Transportation on Special Status Plant Species*.

Livestock grazing of special status plant species can negatively impact these plants even if grazing does not result in direct mortality. From some special status plant species, the risk of livestock herbivory is quite low, such as with Colorado hookless cactus or DeBeque phacelia, while the potential of herbivory is more likely for other species, such as Harrington's penstemon.

Nonfatal herbivory can reduce plant reproduction success since energy that might otherwise go to flowering and seed production must be used to replace plant tissue lost to herbivory (Hickman and Hartnett 2002).

Livestock also trample and damage biological soil crusts, which can result in lost soil stability, alteration of soil permeability to water, changes in soil temperatures, reduced plant-available nutrients, reduced soil carbon with related impacts on soil microbial communities, and alteration of plant community composition (Belnap et al. 2001). Some of the soil nutrient loss resulting from biological soil crust impacts comes from reduced nitrogen fixation within the crusts themselves, while other nutrients are lost to wind erosion when the stabilizing capability of the crusts is lost (Neff et al. 2005).

Grazing impacts on plants can also reduce mycorrhizal colonization of their roots. Most plant species depend on mycorrhizae to enhance nutrient availability to their roots, and certain fungi are dependent on their host plant for the carbon they require to survive. Because of this, grazing can indirectly impact this important component of the soil microbial community (Trent et al. 1988). Mycorrhizal losses can lead to a feedback loop, resulting in the decline of native plants and an increase of nonnative plants. This loss would be worsened where non-mycorrhizal noxious weeds are already established (Vogelsang and Bever 2009).

Livestock grazing can also alter plant community composition through selective grazing. Ungulates graze more heavily on preferred plant species, causing these species to decrease and allowing less preferred or avoided species to increase (Augustine and McNaughton 1998; Cagney et al. 2010; Milchunas and Noy-Meir 2004). These shifts can be positive, negative, or neutral to special status plant species, depending on how the increasing or decreasing plant species interact with the special status plant species.

Species growing in barren sites with few other species may experience little of this effect, while species growing with other species desirable to livestock, such as in sagebrush communities, or in wetland or riparian areas could be more heavily impacted. Plant communities can also be altered intentionally by range management practices, such as seeding nonnative grasses, which withstand grazing pressure but also compete with native species and reduce plant community diversity. These species are smooth brome (*Bromus inermis*), intermediate wheatgrass (*Thinopyrum intermedium*), crested wheatgrass (*Agropyron cristatum*), timothy (*Phleum pratense*), and orchardgrass (*Dactylis glomerata*). Aggressive native range species, such as western wheatgrass (*Pascopyrum smithii*), seeded near special status plant species can also have negative impacts if they encroach on the rare plant habitat and become a source of competition for resources.

Management of rangelands for sustained forage availability can also result in loss of species diversity, with a potential loss of rare plant species (Fuhlendorf et al. 2012). Fragmentation of rare plant habitat can result in declines of special status species, although how any single species might respond to livestock grazing generally cannot be predicted with the available data (Pueyo et al. 2008).

<u>Pollinator Habitat Fragmentation and Loss</u>

The interactions between range management and insect pollinators for special status plant species can be complex. The direct and indirect impacts of livestock grazing on plants, as described above, can have indirect impacts on insect pollinators, particularly bees. Trampling can also have negative impacts on pollinator nesting sites, destroying active nests and causing soil compaction when can prevent new nest construction.

Modification of water sources, such as constructing steep-sided stock ponds, can modify water availability for bees since they need to position themselves at the edge of shallow water to drink (Kearns and Inouye 1997). The need to create steep-sided watering areas to reduce mosquito populations and the risk of West Nile disease in GRSG can be at odds with the water needs of bee pollinators. Because special status plants are often pollinated by generalist pollinators, who rely on a diversity of plant species, the overall plant community is important for retaining pollinators needed by special status plants. Livestock grazing can therefore affect pollinator availability for special status plants (Potts et al. 2003).

In areas with established noxious weeds and other invasive species, pollinators can become dependent on these otherwise undesirable species. In these instances, removing noxious weeds to improve range quality can negatively impact special status plants by negatively impacting pollinators. These types of interactions between livestock and special status plants vary among the different special status plant species, depending on which pollinators they depend on and the existing site conditions. For self-pollinating species, such as DeBeque phacelia, pollinator impacts are unimportant.

Habitat Restoration

In very specific instances, livestock grazing can be useful in restoring habitat for special status plants. In areas where noxious weeds have invaded nearby or within special status plant occurrences, use of herbicide to treat the weeds may be precluded due to the probability of also killing the protected plants. Closely controlled, targeted, livestock grazing may be a viable tool for habitat restoration in these instances. Similarly, in areas where nonnative range grasses or highly competitive native grasses have been introduced into rare plant habitat, livestock grazing may be important in controlling or eliminating competition and habitat altering impacts of these introduced species. Carefully controlled livestock grazing at the appropriate time of year could be beneficial for particular special status plant species, such as Ute ladies'-tresses, if it reduces competition from other native plant species without harming the rare plants.

Habitat Protection

Areas occupied by special status plants, and where special status plant habitats are intact, are protected when they are closed to livestock grazing. Closure of these areas in order to protect GRSG habitat would therefore be beneficial to special status plants.

Summary of Impacts by Alternative

The current management focuses on sustainable management of range resources for both livestock grazing and for special status species. The analyzed alternatives vary somewhat in their details, but all have the same objectives, as follows:

- Maintaining residual plant cover to reduce GRSG predation during nesting
- Avoiding GRSG habitat changes due to herbivory
- Avoiding direct impacts of herbivores on GRSG such as trampling
- Avoiding altering GRSG behavior due to the presence of herbivores
- Avoiding impacts on GRSG from structures associated with range management
- Maintaining and developing agreements with partners consistent with these objectives

Alternative A—Under Alternative A, range management would continue in accordance with existing LUPs. Periodic land health assessments would be performed to monitor range health and potential grazing impacts on special status plants. Impacts on special status plants are the greatest under this alternative.

Alternative B—Alternative B would emphasize restoration of GRSG habitats, including upland sagebrush, wet meadow, and riparian areas, particularly in those sites with a high potential for successful restoration. This could include restoring areas currently dominated by nonnative range grasses and returning them to sagebrush habitat. This would provide greater benefit to special status plant habitats within these areas than Alternative A. However, it would authorize new water development for diversion from spring or seep sources when GRSG would benefit. This could have negative impacts on special status plants if occurrences or habitat are in the vicinity of these developments.

Alternative C—Alternative C is similar to Alternative B but would provide slightly more stringent habitat protections and would not authorize any new water diversion developments within GRSG habitat. Alternative C would also exclude livestock grazing in ADH, which would be benefit special status plant species whose habitat is coincident with grazing allotments. This would provide better protection for special status plants than Alternative B.

Alternative D—Alternative D is similar to Alternative B but would be slightly less restrictive of range management and range improvement developments. It would provide slightly less protection for special status plant habitats than Alternative B, but greater protections than Alternative A.

Proposed LUPA—This would be slightly more restrictive than Alternative D in that sheep bedding, livestock trailing, and related activities would be more closely controlled. Moreover, those activities would be less likely to impact special status plants. Otherwise, the impacts of this alternative would be the same as those for Alternative D.

Impacts from Wild Horse Management on Special Status Plant Species

Management is targeted toward maintaining wild horse populations within established appropriate management level. Adjustments are made to the appropriate management level based on monitoring data, rate of herd increase, frequency of gathers, herd genetics, other management options, and competing uses.

Direct Mortality/Direct Habitat Loss/Habitat Degradation and Disruption to Species and Pollinator Habitat Fragmentation and Loss

Potential direct and indirect negative impacts of wild horses on special status plants are generally similar to those of livestock grazing. There are likely differences in grazing patterns, congregation areas, and species-specific impacts relative to special status plant species. However, insufficient data exists to adequately analyze these differences; therefore, for purposes of this analysis, the potential negative impacts of wild horses are considered to be essentially the same as for livestock but with a few exceptions. Overall, the wild horse appropriate management levels are lower in number than livestock numbers within grazing allotments. However, they are on the range year-round and their distributions are generally less controlled than the distributions of livestock. As a result, lesser impacts overall might be expected from wild horses than from livestock, but greater impacts per individual animal might be anticipated since they are on the range year-round.

Habitat Restoration/Habitat Protection

Similar to cattle and sheep, wild horses selectively feed on preferred plant species and avoid other species. Since they may graze more heavily on nonnative range grasses, such as smooth brome, intermediate wheatgrass, orchardgrass, timothy, and crested wheatgrass, they may have some benefit to special status plant species by keeping these exotic species in check. Because their movements are mostly unregulated, wild horses probably have little or no potential for habitat restoration through targeted grazing of noxious weeds.

Summary of Impacts by Alternative

The overall goals of the analyzed alternatives are to avoid reductions in grass, forb, and shrub cover and to avoid increasing unpalatable forbs and invasive plants, such as cheatgrass.

Alternative A—Under Alternative A, management of wild horse herds would continue under the direction of existing LUPs. Impacts on special status plants would be the greatest under this alternative.

Alternative B—Under Alternative B, wild horse management would be modified to emphasize protection of GRSG habitats. This alternative would provide slightly greater protections for special status plants occurring within GRSG habitats than would Alternative A.

Alternative C—Alternative C would be essentially identical to Alternative B, with the same level of protections for special status plants.

Alternative D—Alternative D would place greater emphasis on range management for GRSG and other uses than on wild horses. While it might provide a slight reduction in negative impacts from wild horses on special status plants than would Alternatives B and C, this could be offset by the relatively greater impacts from other range uses in lieu of wild horse use than would Alternatives B and C.

For the Proposed LUPA, wild horse management would be the same as under Alternative D; impacts are therefore the same as those under Alternative D.

Impacts from Fluid Minerals Management on Special Status Plant Species

Fluid minerals management includes several types of ground-disturbing activities, including seismic exploration, well and hydraulic fracturing facility construction, cuttings disposal sites, roads, buried pipelines, and temporary surface pipelines. Temporary reclamation occurs on portions of the initial well pad disturbance area following drilling, with final reclamation on completed pipelines and at well pads following well closure. Reclaimed and temporarily reclaimed areas are reopened frequently as new wells are drilled on existing pads and new pipelines are installed along existing pipeline corridors.

Direct Mortality/Direct Habitat Loss

Directly mortality to special status plants occurs when plants are growing within the disturbance area for any of the roads, pads, pipelines, or associated facilities. In many instances, roads and facilities can be moved sufficiently to avoid direct mortality, but this is not always possible. Direct habitat loss often occurs even when direct mortality of plants is avoided, and it can have long-term impacts for the species. Mortality and habitat loss are greater risks for species with locally abundant occurrences within areas of high development potential for fluid minerals, such as Harrington's penstemon. Restrictions on fluid minerals development within GRSG habitat would reduce the risk of direct mortality for special status plants growing within these areas; however, it would likely shift these impacts on other special status plant species and increase the risk of mortality and habitat loss for non-sagebrush habitat species.

Habitat Degradation and Disruption to Species/Pollinator Habitat Fragmentation and Loss

The types of potential negative impacts of fluid minerals management on special status plant and pollinator habitats are essentially the same as those described for roads under *Impacts from Management of Travel and Transportation on Special Status Plant Species*. Impacts from fluid minerals management are in addition to those of roads and cause an increased cumulative negative impact on special status plants. The focus on selectively protecting GRSG habitats would shift relative impact levels away from sagebrush habitat plant species and onto plant species growing in other habitat types.

Habitat Restoration

Habitat restoration COAs are attached to all drilling permits, with specific requirements regarding approved species for seeding, weed management requirements, and protections for any special status species or habitats near the developed areas. The potential to adequately restore habitat for special status plant species following disturbance varies across species and habitat types. Some species, such as Harrington's penstemon, have higher potential for habitat restoration, while others, such as DeBeque phacelia, have very specific soil requirements that cannot be restored after disturbance.

Habitat Protection

When all development from fluid minerals can be kept at least 984 feet from any special status plant or suitable habitat for these species, the habitat can generally be protected. However, there may be some indirect impacts that extend beyond this 984-foot buffer, such as dust, herbicide drift, and pollinator impacts.

Summary of Impacts by Alternative

All of the analyzed alternatives would provide basic protections and mitigations for special status plants under existing LUPs, agency regulations and policies, and ESA compliance. All of the action alternatives would shift development impacts away from GRSG habitats and into other habitats.

Alternative A—Under Alternative A, fluid minerals are managed in compliance with existing LUPs. Surveys for special status plants and noxious weeds are required before any ground-disturbing activity. Use of existing disturbance areas is encouraged whenever possible. Developments are sited away from special status plants to the extent possible, and all permits contain COAs requiring management of noxious weeds, restoration with native plant species, and other project-specific plant protections and mitigations as appropriate.

Alternative B—All of the protections listed under Alternative A would also be implemented under Alternative B. However, this alternative would provide greater protections from ground disturbance within GRSG habitats, so it would provide greater protections for special status plants within these areas.

Alternative C—Alternative C is very similar to Alternative B, but it would provide greater protections because restrictions extend to ADH and include efforts to close existing leases within these habitats, if possible.

Alternative D—Impacts from Alternative D are similar to those under Alternative B, with slightly greater potential for ground disturbance. This is because Alternative D includes a 5 percent, rather than a 3 percent for Alternative B, disturbance cap. Under the Proposed LUPA, no new leasing would be permitted within 1 mile of active leks, and no new surface occupancy would be allowed in PHMA. No modifications or waivers would be permitted. The BLM Authorized Officer may grant an exception to this NSO stipulation only where the proposed action were to result in the following:

1. It would not have direct, indirect, or cumulative effects on GRSG or its habitat
2. It is proposed to be an alternative to a similar action occurring on a nearby parcel and would provide a clear conservation gain for GRSG

Exceptions based on conservation gain (2, above) may be considered only in PHMA of mixed ownership, where federal minerals underlie less than fifty percent of the total surface, or in areas of public lands where the proposed exception is an alternative to an action occurring on a nearby parcel subject to a valid federal fluid mineral lease as of the date of this RMP (revision or amendment). Exceptions based on conservation gain must also include measures, such as enforceable institutional controls and buffers, sufficient to allow the BLM to conclude that such benefits would last for the duration of the proposed action's impacts.

> *Any exceptions to this lease stipulation may be approved by the Authorized Officer only with the concurrence of the State Director. The Authorized Officer may not grant an exception unless the applicable state wildlife agency, the USFWS, and the BLM unanimously find that the proposed action satisfies (i) or (ii). Such finding shall initially be made by a team of one field biologist or other GRSG expert from each respective agency. In the event the initial finding is not unanimous, the finding may be elevated to the appropriate BLM State Director, USFWS State Ecological Services Director, and state wildlife agency head for final resolution. In the event their finding is not unanimous, the exception will not be granted. Approved exceptions will be made publically available at least quarterly.* (**Appendix D**, Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations)

Disturbances would be limited to 3 percent or 1 disturbance per 640 acres density of PHMA in each Colorado Management Zone, with no new leasing allowed if the disturbance cap were to exceed this amount.

Proposed LUPA—No new leasing would be permitted within 1 mile of active leks, and no new surface occupancy would be allowed in PHMA (see exception criteria below) and within 2 miles of active leks in GHMA (see **Appendix D**).

The Proposed LUPA would provide more protections than Alternatives A and D to special status plant species that coincide with GRSG and its habitat. Because all PHMA would be managed as No Surface Occupancy, with very rare potential for exceptions, impacts would be similar to those for Alternative B. The potential for direct habitat loss and indirect impacts is similar to that under Alternative B.

Impacts from Solid Minerals—Coal Management on Special Status Plant Species
Coal management ground disturbance is generally larger in area for surface mining than for underground mining. Disturbed areas include mine sites, facilities locations, and access roads. Mines are generally open for a period during active mining, then closed and reclaimed.

Direct Mortality/Direct Habitat Loss/Habitat Degradation and Disruption to Species and Pollinator Habitat Fragmentation and Loss
The potential negative impacts on special status plants and their pollinators from coal management would be similar to those for fluid minerals management and are also described more fully under *Impacts from Management of Travel and Transportation on Special Status Plant Species* and *Impacts from Fluid Minerals Management on Special Status Plant Species*.

Habitat Restoration/Habitat Protection
Habitat restoration and protection considerations would be similar to those for fluid minerals management and are described in more detail under *Impacts from Fluid Minerals Management on Special Status Plant Species*.

Summary of Impacts by Alternative
All of the analyzed alternatives would provide basic protections and mitigations for special status plants under existing LUPs, agency regulations and policies, and ESA compliance. All of the action alternatives would shift development impacts away from GRSG habitats and into other habitats.

Alternative A—Under Alternative A, coal management occurs in compliance with existing LUPs. Surveys for special status plants and noxious weeds are required before any ground-disturbing activity. Use of existing disturbed areas is encouraged whenever possible. Developments are sited away from special status plants to the extent possible, and all permits contain COAs requiring management of noxious weeds, restoration with native plant species, and other project-specific plant protections and mitigations, as appropriate.

Alternative B—All of the protections listed under Alternative A would also be implemented under Alternative B. However, this alternative would place greater restrictions on surface-disturbing activities within GRSG habitats, and thus provide greater protections for special status plants occurring within these areas.

Alternative C—Alternative C would provide essentially the same protections as Alternative B.

Alternative D—Alternative D is very similar to Alternatives B and C, but it would have greater reduced limitations on allowable disturbance area within GRSG habitats than Alternatives B and C.

Proposed LUPA—Impacts would be similar to those for Alternative D. However, additional restrictions on land use and other authorizations would be included for the Proposed LUPA, including restricting surface disturbance to 3 percent in PHMA. Impacts on special status plant species are similar to those for Alternative D, with slightly greater protections for special status plants due to increased restrictions on disturbance and disruption.

Impacts from Locatable Minerals Management on Special Status Plant Species
The types of ground disturbance from locatable minerals would be similar to those from coal management, as described above.

Direct Mortality/Direct Habitat Loss/Habitat Degradation and Disruption to Species and Pollinator Habitat Fragmentation and Loss
Potential negative impacts on special status plants from locatable minerals would be similar to those described for coal management. In-depth analysis of potential impacts are described more fully under *Impacts from Management of Travel and Transportation on Special Status Plant Species* and *Impacts from Fluid Minerals Management on Special Status Plant Species*.

Habitat Restoration/Habitat Protection
Habitat restoration and protection considerations would be similar to those for fluid minerals management and are described in more detail under *Impacts from Fluid Minerals Management on Special Status Plant Species*.

Summary of Impacts by Alternative
All of the analyzed alternatives would provide basic protections and mitigations for special status plants under existing LUPs, agency regulations and policies, and ESA compliance. All of the action alternatives would shift development impacts away from GRSG habitats and into other habitats.

Alternative A—Under Alternative A, locatable minerals are managed according to existing LUPs. Surveys for special status plants and noxious weeds are required before any ground-disturbing activity. Use of existing disturbance areas is encouraged whenever possible. Developments are sited away from special status plants to the extent possible, and all permits contain COAs, requiring management of noxious weeds, restoration with native plant species, and other project-specific plant protections and mitigations as appropriate.

Alternative B—All of the protections listed under Alternative A would also be implemented under Alternative B. However, this alternative would place greater restrictions on surface-disturbing activities within GRSG habitats, so it would provide greater protections for special status plants in these areas.

Alternative C—Alternative C would provide essentially to same protections as Alternative B.

Alternative D—Alternative D is very similar to Alternatives B and C, but it would have more reduced limitations on allowable disturbance area within GRSG habitats that would Alternatives B and C.

Proposed LUPA—Management of locatable minerals would be the same under the Proposed LUPA as under Alternative D; impacts are the same as under Alternative D, above.

Impacts from Nonenergy Leasable Minerals Management on Special Status Plant Species

The types of ground disturbance from leasable minerals would be similar to those from coal management, as described above.

Direct Mortality/Direct Habitat Loss/Habitat Degradation and Disruption to Species and Pollinator Habitat Fragmentation and Loss

Potential negative impacts on special status plants from leasable minerals would be similar to those described for coal management. In depth analysis of potential impacts are described more fully under *Impacts from Management of Travel and Transportation on Special Status Plant Species* and *Impacts from Fluid Minerals Management on Special Status Plant Species*.

Habitat Restoration/Habitat Protection

Habitat restoration and protection considerations would be similar to those for fluid minerals management and are described in more detail under *Impacts from Fluid Minerals Management on Special Status Plant Species*.

Summary of Impacts by Alternative

All of the alternatives would provide basic protections and mitigations for special status plants under existing LUPs, agency regulations and policies, and ESA compliance. All of the action alternatives would shift development impacts away from GRSG habitats and into other habitats.

Alternative A—Under Alternative A, leasable minerals are managed according to existing LUPs. Surveys for special status plants and noxious weeds are required before any ground-disturbing activity. Use of existing disturbed areas is encouraged whenever possible. Developments are sited away from special status plants to the extent possible, and all permits contain COAs, requiring management of noxious weeds, restoration with native plant species, and other project-specific plant protections and mitigations as appropriate.

Alternative B—All of the protections listed under Alternative A would also be implemented under Alternative B. However, this alternative would place greater restrictions on surface-disturbing activities within GRSG habitats, so it would provide greater protections for special status plants occurring within these areas.

Alternative C—Alternative C would provide essentially to same protections as Alternative B.

Alternative D—Alternative D is very similar to Alternatives B and C, but it would have more reduced limitations on allowable disturbance area within GRSG habitats than would Alternatives B and C.

Proposed LUPA—No new nonenergy mineral leasing would be allowed in PHMA. Impacts on special status plants from managing nonenergy leasable minerals are similar to those under Alternative B, above.

Impacts from Salable Mineral Management on Special Status Plant Species

Direct Mortality/Habitat Degradation and Disruption to Species and Pollinator Habitat Fragmentation and Loss

Potential negative impacts on special status plants from salable minerals would be similar to those described for coal management. In-depth analysis of potential impacts are described more fully in under *Impacts from Management of Travel and Transportation on Special Status Plant Species* and *Impacts from Fluid Minerals Management on Special Status Plant Species*.

Habitat Restoration/Habitat Protection

Habitat restoration and protection considerations would be similar to those for fluid minerals management and are described in more detail under *Impacts from Fluid Minerals Management on Special Status Plant Species*.

Summary of Impacts by Alternative

All of the analyzed alternatives would provide basic protections and mitigations for special status plants under existing LUPs, agency regulations and policies, and ESA compliance. All of the action alternatives would shift development impacts away from GRSG habitat and into other habitat.

Alternative A—Under Alternative A, salable minerals would be managed according to existing LUPs. Surveys for special status plants and noxious weeds are required before any ground-disturbing activity. Use of existing disturbed areas is encouraged whenever possible. Developments would be sited away from special status plants to the extent possible, and all permits would contain COAs, requiring management of noxious weeds, restoration with native plant species, and other project specific plant protections and mitigations as appropriate.

Alternative B—All of the protections listed under Alternative A would also be implemented under Alternative B; however, this alternative would place greater restrictions on surface-disturbing activities within GRSG habitats, so it would provide greater protections for special status plants in these areas.

Alternative C—Alternative C would provide essentially the same protections as Alternative B.

Alternative D—Alternative D is very similar to Alternatives B and C, but it would have more reduced limitations on allowable disturbance area within GRSG habitats than would Alternatives B and C.

Proposed LUPA—Mineral material sales would be prohibited within PHMA; mineral material sales would be considered only if the overall impact on GRSG would be greater if it were not allowed on federal land. The management of mineral material sales under this alternative is similar to that for Alternative B, and the impacts are similar to those for Alternative B.

Impacts from Fuels Management on Special Status Plant Species
Fuels management projects can be designed to reduce fuel loading with one or more of the following goals:

- Prevention of high intensity, high severity fires that might threaten developed areas
- Prevention of high severity fires, beyond the normal range of fire severity for a given habitat, which could threaten the survival of special status species
- Reestablishment of fire regimes to those prior to Euro-American contact
- Restoration of fire-adapted habitats impacted by past fire suppression

Fuels management can consist of mechanical fuel removal, prescribed burning, or managing naturally caused wildfires for habitat improvement or fuels management. Different habitat types have evolved with different average fire return intervals and rotations, and individual plant species and communities respond differently to fire. Fire regimes prior to Euro-American contact were artificially altered in many habitat types, although some habitats have likely seen little alteration, such as barrens, rocky habitats, wetlands, and upper subalpine to alpine habitats. Causes of fire regime shifts in impacted habitats are as follows:

- Disrupting Native American burning
- Removing trees for railroad ties during railroad construction
- Removing trees near early settlements for building and mine construction and firewood
- Increasing accidental fire starts from human activities during the early settlement period

- Reducing range fires from heavy livestock grazing and resulting removal of fine fuels
- Actively suppressing fires after 1910
- Establishing invasive plant species (particularly cheatgrass), which alter fire regimes

Climate change also plays a part in shifting fire regimes.

Sagebrush communities are among those heavily impacted by these changes, particularly by the impacts of historic heavy livestock grazing, fire suppression, introduction of cheatgrass, and expansion of native pinyon-juniper woodland into sagebrush areas. For this analysis, mechanical fuels treatment impacts on special status plants are covered under GRSG habitat restoration. The fuels management section is focused primarily on fire impacts.

Direct Mortality

Direct mortality of special status plants due to fire can occur either from lethal surface flames or from lethal soil heating. Different plant species have differing abilities to survive fire (Brown and Smith 2000). Some species grow in habitats with natural fire breaks or with such low fuel loading that they effectively do not experience fire; therefore, these species have not adapted to survive fire. At the same time, they are also unlikely to suffer direct mortality from prescribed fire if there continue to be inadequate fuels to carry fire. Special status species in this category include Parachute penstemon, DeBeque phacelia, Dudley Bluffs twinpod, and boat-shaped bugseed (see **Table 4.4**).

However, if nonnative species, such as cheatgrass, invade these habitats, they may create enough fuel loading to carry lethal fire to the special status species. One species of particular concern in this context is Colorado hookless cactus, whose desert scrub habitat now has extensive cheatgrass establishment. Under these conditions, either prescribed fire or wildfire could destroy the cactus.

Grassland species are often well adapted to periodic fire, and many areas now dominated by sagebrush were dominated by grasses before intensive livestock grazing (Baker 2006). Special status plant species occurring within this habitat type may in general be well adapted to survive and resprout or germinate following fire. However, if woody species' densities have increased sufficiently above the norm, fire in these systems could become lethal to special status plants.

Fuels management, which strives for a 15 percent canopy cover of sagebrush, could be beneficial for special status plants in these habitats, as this could prevent higher severity wildfires with a higher likelihood of plant mortality. Special status plants growing within pinyon-juniper forests, such as Naturita milkvetch, may also have a higher risk of mortality with fire. Historic fire return intervals in western Colorado pinyon-juniper woodlands have been estimated at

400 years or longer, with a high severity stand-replacing fire regime (Floyd et al. 2004). Plants growing with these trees could experience high flame lengths and surface heating, as well as severe soil heating from burning root masses. This might be somewhat improved by plants growing near rock outcrops with sparser vegetation.

Direct Habitat Loss

Direct habitat loss as a result of either prescribed fire or wildfire in sagebrush habitats is most likely to occur where cheatgrass is present. Cheatgrass is widespread throughout sagebrush and pinyon-juniper habitats and increases readily in response to fire. Once it becomes established, cheatgrass can markedly shorten fire return intervals and convert sagebrush, desert scrub, or pinyon-juniper habitats into weedy annual grasslands. This habitat conversion could result in loss of habitat for special status plants in sagebrush, desert scrub, or pinyon-juniper habitats. A similar type of habitat conversion and loss could also occur with other invasive plant species and fire. Restrictions on use of prescribed fire in less zones where less than 12 inches of precipitation falls and where cheatgrass is present could be beneficial to special status plants.

Habitat Degradation and Disruption to Species

As with direct habitat loss, the greatest potential for habitat degradation from fire would be from noxious weeds and other nonnative invasive plant species. Cheatgrass is the most problematic invasive, which responds rapidly to fire and is particularly competitive for soil moisture following fire (Melgoza et al. 1990). Other noxious weeds also respond positively to fire and can be problematic to special status plants. The impacts of noxious weeds and herbicide treatments of noxious weeds on special status plants are described in more detail under *Impacts from Management of Travel and Transportation on Special Status Plant Species*.

Fire can also alter plant community composition, as both the species composition and the relative densities of different species shift immediately following fire. If this shifts the competitive edge to other species, it could be a negative effect on special status plants, although it would likely be a short-term negative effect in fire-adapted plant communities if invasive species were not present.

Pollinator Habitat Fragmentation and Loss

Low-severity fires often do not heat the soil sufficiently at great enough depths to impact ground-nesting species. However, under higher fuel loading conditions, below ground fire severity could be sufficient to destroy ground-nesting pollinators. Fire could also remove nesting habitat for wood-nesting pollinators. Altering plant community composition could also temporarily or permanently remove flowers necessary to support pollinators. In many instances, particularly in fire-adapted habitats, flowering plants increase following

low severity fires. However, if flowering plants are replaced by cheatgrass, this would result in a loss of pollinator habitat.

Habitat Restoration

For special status plants growing in fire-adapted habitats, where noxious weeds and other nonnative species are absent, return of fire to the habitat can be beneficial. Some rare plant species depend on periodic fire to remove competition from other plant species in order for them to survive on the landscape (Kaye et al. 2001). Fire-adapted species may have seeds whose germination is stimulated by fire, either through soil heating, smoke, or ash.

Habitat Protection

Many special status plant species occur in habitats where fire is not functionally present, such as barren areas, sand dunes, and rock outcrops. Species growing in desert scrub, sagebrush, and pinyon-juniper habitats are the most likely to experience negative impacts from fire; however, as described above, the positive or negative impacts of fire depend largely on whether invasive species have entered the habitat. Protection of special status plant habitats from fire is most important where invasive species are present. In areas with unnatural fuel loading resulting from fire suppression, use of prescribed fire could help protect special status plant habitats from lethal high severity wildfires. Each situation would need to be addressed individually, assessing the particular plant species present and the current habitat conditions, in order to protect special status plant habitat.

Summary of Impacts by Alternative

All of the analyzed alternatives address maintaining a minimum 15 percent canopy cover of sagebrush in GRSG habitat. Additionally, they place seasonal restrictions on fuels management projects designed to protect GRSG but which could shift implementation times to seasons that might intensify negative impacts on special status plants and their pollinators. In general, they are designed to protect and restore sagebrush habitats.

Alternative A—Under Alternative A, fuels management projects would occur under the guidance of existing LUPs. This alternative would result in the greatest level of impacts on special status plants.

Alternative B—This alternative would place a greater emphasis on not using fire to treat sagebrush in zones with less than 12 inches of precipitation, except as a last resort for fuel breaks or enhancement of land health. It would also place a greater emphasis on protecting and restoring sagebrush habitats and their native plant constituents. This would provide slightly more protections for special status plant species in sagebrush habitats than Alternative A.

Alternative C—Alternative C places slightly greater emphasis on promoting higher quality sagebrush habitats and on using fuels treatments only in interfaces with human developments and disturbances. This alternative would provide

slightly more protections for special status plants in sagebrush habitats than Alternative B.

Alternative D—Alternative D would allow areas of lower sagebrush canopy cover and a greater overall percentage of disturbed areas within sagebrush habitats. As a result, it would provide slightly lower protections for special status plants in sagebrush habitats than Alternative B.

Proposed LUPA—Fuels management would be the same as Alternative D; impacts on special status plant species are the same as under Alternative D.

Impacts from Fire Operations Management on Special Status Plant Species

Fire operations must balance protection of natural resources with protection of human lives and structures. Firefighter safety must take the highest priority in wildfires, followed by structure protection. However, resource advisors are also involved in fire operations to facilitate protection of natural resources, including special status plants, from unnecessary harm during fire line construction and other firefighting activities. Where human lives or structures are not at risk, firefighting strategies may be modified to support resource protection needs.

Direct Mortality/Direct Habitat Loss/Habitat Degradation and Disruption to Species and Pollinator Habitat Fragmentation and Loss

Potential impacts of fire on special status plants and their habitats are described above under *Impacts from Fuels Management on Special Status Plant Species*. For special status plant species in sagebrush habitats, fire may be positive, negative, or neutral, depending on the individual species and the existing habitat conditions. As with fuels treatments, wildfire can have negative impacts on these species under particular circumstances.

Habitat Restoration/Habitat Protection

As described above under *Impacts from Fuels Management on Special Status Plant Species*, some special status plant species have evolved with fire and could benefit from wildfire burning through their habitat. Also, allowing wildfires to burn nearby areas could remove fuels and prevent potentially lethal wildfires in the future. These situations would be species and site specific.

Summary of Impacts by Alternative

All of the analyzed alternatives except Alternative A emphasize suppression of wildfires to prevent burning of GRSG habitats.

Alternative A—Under Alternative A, fire suppression would continue under the guidance of existing LUPs. Protection of GRSG habitats from wildfires is not specifically addressed under this alternative.

Alternative B—Under Alternative B, suppression of fire would be prioritized in PHMA, after protection of life and property. This alternative would provide

slightly reduced protections for special status plants than Alternative A since it would lower their priority in wildfire suppression decisions.

Alternative C—Alternative C is essentially identical to Alternative B.

Alternative D—Alternative D would allow consideration of other resource values in conjunction with GRSG habitat when deciding wildfire suppression priorities. This alternative would provide slightly greater protections for special status plant species than Alternatives B or C and approximately the same protections as Alternative A.

Management of fire operations would be the same under the Proposed LUPA as under Alternative D; impacts on special status plant species are the same as under Alternative D.

Impacts from Emergency Stabilization and Rehabilitation on Special Status Plant Species

Following wildfires, a burned area emergency response team evaluates resource impacts from the fire and assesses the need for ESR. When deemed necessary for resource protection, burned areas may be seeded soon after the fire.

Direct Mortality/Direct Habitat Loss/Habitat Degradation and Disruption to Species and Pollinator Habitat Fragmentation and Loss

As described above under *Impacts from Fuels Management on Special Status Plant Species*, many plant communities have evolved with periodic wildfire, and many plant species have adapted to survive fires. Some even require periodic fire within their habitats in order to proliferate. Introducing seed from off-site sources following wildfire can interfere with the natural response of these communities to fire. Plant species genetically adapt, to varying degrees, to local site conditions, and introducing seed from other sites can genetically dilute these site-specific adaptations, even though the seed is of native species (Leger 2008).

Also, native plant seed is available only in limited quantities and from a limited number of species. Post-fire seeding resorts to using nonnative species seed when native species seeds are unavailable. This can lead to the negative impacts of nonnative species, which is described in more detail under *Impacts from Management of Travel and Transportation on Special Status Plant Species* and *Impacts from Range Management on Special Status Plant Species*.

Introducing seeds from off-site sources also introduces competition for often limited soil moisture, and seeded species are often chosen for their aggressiveness and rapid establishment to stabilize soils. This means that the introduced seeds may outcompete seeds remaining in the soil seed bank following the fire, negatively impacting the native plants. When native seed is unavailable for post-fire seeding, sterile hybrid cereal grains are often used, with the intention of preventing weed establishment. This may be effective initially,

but these cereal grains also create competition with native seeds remaining in the soil seed bank and can outcompete the native germinants. When the sterile cereal grain later dies out, it can leave bare patches, which are ideal for weed establishment. In this manner they may ultimately facilitate cheatgrass establishment, even if they inhibit cheatgrass during the first year post-burn. Commercially produced seed also carries the risk of having weed seed contaminants, and sowing this seed in burned areas can introduce new invasive plant species.

Habitat Restoration/Habitat Protection

In severely degraded habitats, or following fires of much greater severity than would occur under the historic fire regimes, seeding native species that would naturally occur on the site may be beneficial. They may reduce the risk of noxious weeds and other invasive plant species that might otherwise encroach on special status plants and habitats. Post-fire seeding can also reduce surface erosion and sedimentation of streams, preventing negative impacts on riparian species, such as Ute ladies'-tresses orchid and western prairie fringed orchid.

Summary of Impacts by Alternative

All of the alternatives emphasize post-fire seeding in GRSG habitats.

Alternative A—Under Alternative A, post-fire restoration would plant native seed mixes, including grasses and forbs, as well as container stock of sagebrush where appropriate.

Alternative B—Under Alternative B, use of native seed would be emphasized, but use of nonnative seed would be allowed if it were to meet GRSG habitat conservation objectives. Because this alternative would allow greater freedom to use nonnative seed, it would provide lesser protections for special status plants in GRSG habitats than would Alternative A.

Alternative C—Alternative C is similar to Alternative A, but it would require livestock grazing exclusion from burned areas until woody and herbaceous plants have achieved GRSG habitat objectives. This would provide slightly greater protections for special status plants growing in GRSG habitats than would Alternative B.

Alternative D—Alternative D would provide greater freedom to use nonnative seed for post-fire seeding than would Alternative B. This alternative would provide the least protection for special status plants.

Proposed LUPA—Management of ESR habitat restoration would be the same as under Alternative D; impacts on special status plant species are the same as under Alternative D.

Impacts from Habitat Restoration on Special Status Plant Species

Different species have different habitat requirements, have adapted to different natural disturbance regimes, and have varying capabilities to survive different types of habitats. This means that efforts to improve sagebrush habitats for GRSG can have impacts on special status plant species, ranging from positive to neutral to negative. This would depend on the individual plant species, the particular habitat characteristics, the type of habitat restoration activity implemented, and the time of year in which the activity is implemented.

These impacts can also range from temporary, to long term, to permanent. Common types of sagebrush habitat restoration are as follows:

- Cutting junipers, with subsequent mastication, pile burning, lopping and scattering branches, or removing woody material
- Mowing sagebrush
- Implementing prescribed broadcast burning
- Seeding with plant species desirable for GRSG, which may or may not be native to the restoration site
- Treating cheatgrass and other noxious weeds with herbicide

Direct Mortality

The potential for direct mortality of special status plant species as a result of GRSG habitat restoration would be an issue only for those species occurring in the habitats targeted for restoration. These would be primarily species growing in sagebrush or pinyon-juniper habitat types, they could also include species growing in barren areas within these habitat zones, if they were impacted by equipment access, herbicide drift, addition of woody debris from mastication or lop and scatter, or pile burning on top of special status plant occurrences.

Vegetation treatments, such as hydro-axing[8] of junipers, can also increase fuel loading, and subsequent wildfires in these areas could become lethal to plants in areas that normally would not have sufficient fuels to carry lethal fire into particular special status plant sites.

Direct mortality can also occur as a result of smashing, trampling, or uprooting by equipment or personnel involved in habitat improvement vegetation treatments. Herbicides used to treat noxious weeds can also kill special status plants, and impacts from herbicides can affect plants up to half 1 mile from the application site, depending on the herbicide used and the environmental conditions at the time of application (BLM 2007).

[8]This is a powerful mulching attachment, which makes mulch out of unwanted vegetation, including trees up to 6 inches in diameter

Plants may be able to recover if only a portion suffer mortality. However, if an entire occurrence, including the soil seed bank, suffers mortality, the species may be extirpated from the site, even if the habitat later returns to a desirable condition. The ability of any given plant species to recolonize a site following complete mortality and subsequent habitat recovery would depend on proximity to another seed source and an adequate vector to move seeds to their original site. This scenario cannot be predicted.

Direct Habitat Loss

Any direct habitat loss for special status plants resulting from GRSG habitat improvement is likely to be short term. However, if aggressive plant species not naturally occurring with a special status plant species are seeded or if they expand into the site as a result of habitat improvement, this could alter the habitat such that the special status species could no longer survive there. In such an instance, habitat would be lost.

Habitat Degradation and Disruption to Species

Altering plant species composition within or next to special status plants can have negative impacts on these plants. GRSG habitat restoration focuses on restoring or increasing plant species deemed beneficial to GRSG. In most instances, these species would also be beneficial for special status plants growing within sagebrush habitats. However, aggressive plant species that are not normally present with special status plant species may degrade the habitat and disrupt plants, either through direct competition for resources or through alteration of soil microbial communities.

Special status plant species occurring within sagebrush or pinyon-juniper habitats are the ones most likely to be affected, but species growing in relatively barren habitats within these larger vegetation zones could also be impacted. These barren areas could be at increased risk of invasion by cheatgrass or other weeds. This is because such treatments as juniper removal and prescribed burning can establish and spread invasive species, particularly cheatgrass.

Pollinator Habitat Fragmentation and Loss

Pollinators of special status plant species frequently depend on flowers of other plant species for survival since rare plants do not necessarily flower every year, may be few, and may have widely spaced occurrences; therefore, reductions in other flowering plant species or in their flower production rates can have negative impacts on these species. Ground-disturbing activities that reduce or destroy pollinator nesting habitat can also reduce pollinator numbers. Many bees and wasps nest either in the ground or in wood. GRSG habitat improvements could impact both nesting habitat and flowering plant species, although these impacts are more likely to be short term. There may be a lag time between habitat recovery and pollinator recovery.

Habitat Restoration

Restoring GRSG habitat could also restore habitat for special status plant species that grow within sagebrush habitats. This would be most likely to occur for such species as Harrington's penstemon, which grows in relatively generalized sagebrush habitat, and less likely for species occurring in special habitat microsites within the generalized sagebrush vegetation type. Habitat restoration could result from removing noxious weeds and other nonnative species, removing encroaching young juniper trees, seeding appropriate native plant species, and planting sagebrush. However, there is also a high probability of mortality and temporary degradation of habitat from habitat improvement before habitat is effectively restored.

Habitat Protection

Habitat could be protected indirectly as a result of habitat restoration in areas next to special status plants and their habitat. Removing noxious weeds and other invasive species through GRSG habitat restoration could prevent spread of these species into rare plant habitats.

Summary of Impacts by Alternative

None of the alternatives specifically address restoration parameters of direct importance to special status plant species. In general, the greater the alternative emphasis on using native plant species for habitat restoration, the more likely restoration is to benefit special status plants in the long term. However, all GRSG habitat restoration could negatively impact certain special status plant species, at least in the short term.

Alternative A—Under Alternative A, sagebrush habitat improvement would continue to occur, following guidance in applicable LUPs. The focus would be on restoring and increasing plant species deemed valuable for GRSG and for livestock forage. This alternative would have the fewest restrictions on habitat restoration and could have slightly greater negative impacts on special status plant species.

Alternative B—Alternative B places more restrictions on restoration within GRSG habitats, with a greater emphasis on restoring plant species that are beneficial to GRSG. However, these restrictions do not address protections for special status plant species.

Alternative C—Alternative C would require the use of only native plant species for habitat restoration and would require planting sagebrush in restoration areas. This alternative would provide the greatest protection for special status plant species.

Alternative D—This alternative would have a higher disturbance threshold for requiring GRSG habitat restoration. This would provide less protection for special status plants, in that it would have a higher tolerance for invasive species. On the other hand, the reduced emphasis on habitat restoration could result in

reduced negative impacts from GRSG habitat restoration on special status plants. Overall, the impacts from this alternative would likely be somewhat lower than Alternative A and slightly greater than Alternatives B or C.

Proposed LUPA—Management of habitat restoration is the same as Alternative D; impacts on special status plant species are the same as under Alternative D.

Impacts from ACEC and Zoological Area Management on Special Status Plant Species

Direct Mortality/Direct Habitat Loss/Habitat Degradation and Disruption to Species and Pollinator Habitat Fragmentation and Loss

Designation of special status plant habitats as ACECs provides beneficial protections to the plants by prohibiting activities that could have detrimental impacts.

Alternative A—Alternative A would recognize all of the existing ACEC designations but would not add any new ACEC designations. Because no new ACECs would be designated under this alternative, special status plant occurrences outside of the existing ACECs would not receive any ACEC protections from negative impacts.

Alternative B—Alternative B would recognize all of the existing ACEC designations but would not add any new ACEC designations. Because no new ACECs would be designated under this alternative, special status plant occurrences outside of the existing ACECs would not receive any ACEC protections from negative impacts. This alternative would have the same impacts on special status plants as Alternative A.

Alternative C—Alternative C would recognize all of the existing ACECs and would also designate all PHMA as an ACEC. This alternative would prevent negative impacts from ground-disturbing activities on special status plant occurrences and their habitats within PHMA. It would provide identical protections as Alternatives A, B, and D for those special status plants growing outside of the PHMA areas and those growing within existing ACECs.

Alternative D—Alternative D would recognize all of the existing ACEC designations but would not add any new ACEC designations. Because no new ACECs would be designated under this alternative, special status plant occurrences outside of the existing ACECs would not receive any ACEC protections from negative impacts. This alternative would have the same impacts on special status plants as Alternatives A and B.

Proposed LUPA—No new ACECs would be designated; impacts from designating ACECs on special status species are the same as under Alternative D.

Summary of Impacts on Special Status Plant Species

There are currently 37 special status plant species within the planning area potentially impacted by management actions within the planning area. These species occur in many different microhabitat types and have adapted to different types of disturbances. Any given type of management action could positively affect some species and negatively affect others, while having no effect on other species. None of the analyzed alternatives specifically address special status plant species. Any definitive protections for these species would come from existing LUPs, agency regulations and policies, and ESA compliance. Specific protections for individual occurrences would be decided at the project level.

Alternative A—Alternative A would rely on existing LUPs, without emphasizing GRSG habitat protections. This alternative would not specifically increase protections of sagebrush habitats, which might result in greater development pressures near special status plants growing in sagebrush habitats. On the other hand, it might result in lower development pressures near special status plants in other habitats and fewer negative impacts on those species.

Alternative B—Alternative B provides a greater level of protection for sagebrush habitats than Alternatives A or D and would reduce development pressures near special status plants growing in sagebrush habitats. However, it would increase development pressures and associated potential negative impacts for special status plants in other habitat types.

Alternative C—Alternative C would provide the most protection for sagebrush habitats, and the least development pressures near special status plants in sagebrush habitats. It would also result in the greatest shift of development pressures to other habitat types, with greater potential negative impacts on these other special status plant species.

Alternative D—Alternative D would provide more protection for sagebrush habitats than Alternative A but less protection than Alternatives B or C. It would provide intermediate protections between those of Alternative A and Alternative B for sagebrush habitats and for special status plants growing in these habitats. Conversely, its potential negative impacts on special status plants growing in other habitat types would also be intermediate between Alternative A and Alternative B.

Proposed LUPA—The Proposed LUPA would provide greater protections for special status plant species than Alternatives A and D, but slightly less protection than Alternatives B and C. For those negative impacts on plants growing in non-sagebrush habitats, the Proposed LUPA would have fewer impacts than Alternatives B and C but more than Alternative D.

4.6 LANDS AND REALTY

4.6.1 General Description

This section analyzes potential impacts on BLM-administered and National Forest System lands and realty program from proposed management actions of other resources and resource uses. Existing conditions are described in **Section 3.4**, Lands and Realty. The lands and realty program includes land use authorizations (i.e., ROWs, leases, permits, and easements) and land tenure adjustments (i.e., purchases, sales, exchanges, donations, and withdrawals).

Forest Service land use plan prescriptions are similar to the BLM's exclusion and avoidance areas. Prescriptions can restrict or prohibit certain uses in a planning area. The Forest Service grants SUAs (ROWs, permits, easements, and leases), while the BLM grants ROWs on the lands that it administers. The Forest Service completes landownership adjustments (purchase, exchange, donation, and ROW acquisition), while the BLM conducts land tenure adjustments (withdrawals, disposals, and acquisitions).

4.6.2 Methodology and Assumptions

General Impacts on Lands and Realty

Lands and realty are considered a resource use rather than a biological resource. Impacts on lands and realty generally are a result of management actions prescribed for other resources, including restrictions or limitations on land use authorizations. The discussion of the impacts on lands and realty in each alternative is limited to the impacts on permitted or authorized uses. These are restrictions, costs, and issuance or denial of land use authorizations and consideration of land tenure adjustments. Management actions of other resources were assessed to determine restrictions or limitations on lands use authorizations (including ROWs) and land tenure.

Indicators of impacts on lands and realty and the measurements used to describe the impacts (where available or appropriate) are as follows:

- Ability to accommodate preferred routes for ROWs
  - Acreage and location of ROW exclusion areas and limitations or prohibitions on surface disturbance
- Ability to accommodate preferred routes or locations for all ROWs, including access routes, pipelines, communications sites, and transmission and distribution power lines
  - Acreage and location of ROW exclusion areas and limitations or prohibitions on surface disturbance
- Cost of developing and designing ROWs

  - Acreage and location of ROW exclusion areas and limitations or prohibitions on surface disturbance
- Demand for ROW authorizations
- Requests for new ROW authorizations
- Ability to process land tenure adjustments necessary for more effective management
  - Acreage and locations of lands identified as priority for land tenure adjustments

Assumptions

The analysis is based on the following assumptions:

- Decisions specifically applicable to ROWs are:
  - ROW avoidance area—An area identified through resource management planning to be avoided but may be available for ROW location with special stipulations; these special stipulations could result in relocation or increased costs for projects requiring ROWs
  - ROW exclusion area—An area identified through resource management planning that is not available for ROW location under any conditions
- Existing ROWs and communications sites would be managed to protect valid existing rights.
- On renewal, assignment, or amendment of existing ROWs, additional mitigation or modification of stipulations may be included.
- ROW holders may continue their authorized use as long as they are in compliance with the terms and conditions of their grant.
- The BLM and Forest Service would continue to process land tenure adjustments and to grant land use authorizations on a case-by-case basis.
- The demand for communication facilities and ROWs would increase over the life of this plan.
- Maintaining and upgrading existing utilities and other ROWs is preferred before constructing new facilities.
- Demand for access through land use authorizations may increase as rural development occurs on dispersed private parcels.
- Renewable energy would continue to be a possible interest in the area and could increase in the future, based on site suitability; applications for development would be considered as they are proposed, on a case-by-case basis.

Implementing management for the following resources or resource uses would have negligible or no impact on land use authorizations or land tenure; therefore, these resources are not discussed in detail: recreation management, range management, riparian areas, livestock grazing, wild horse management, fuels and fire management, and ACECs.

4.6.3 Direct and Indirect Impacts on Lands and Realty

BLM and Forest Service management of resources and uses affects the lands and realty program by increasing or decreasing the program's ability to carry out land use authorization or land tenure/landownership adjustment actions. The effects on the lands and realty program are typically the result of management that excludes or avoids ROWs or SUAs in certain areas, requires stipulations on land use activities, or applies criteria for land tenure actions.

Impacts from Travel Management on Lands and Realty

Impacts on the Ability to Accommodate Preferred Routes for ROWs and Preferred Routes or Locations for all ROWs and the Cost to Develop and Design ROWs

Impacts on the lands and realty program would result from transportation and travel stipulations described in the action alternatives. These include limits on upgrades to existing routes, limits on new route construction, and stipulations on realignments of existing routes. As a result of stipulations on route construction, upgrading, and realignments, constraints would be placed on new authorizations.

In some areas, there is a high concentration of intermixed private and public land, corridors, and oil and gas development. In such areas, there would be restrictions on the ability to upgrade or construct new routes.

Seasonal restrictions on travel could impact site accessibility, impact the ability to construct and maintain ROWs, and increase project costs.

There are the fewest restrictions on travel under Alternative A and thus the least impact on lands and realty. Also, this alternative would not impact the lands and realty program on both BLM-administered and National Forest System lands.

For valid exist rights, Alternative B would require new routes to be constructed to the minimum standard, with a disturbance cap of 3 percent. If the cap were exceeded, mitigation would be required. This could result in greater impacts than under Alternative A due to the potential for increased costs associated with mitigation and restrictions and the potential for increased difficulty in accessing public and private land.

Alternative C would have the greatest impact on the lands and realty program. This alternative limits road construction in ADH and prohibits road construction within a 4-mile buffer from leks. In addition, all construction in

GRSG habitat would require mitigation. Alternative C has the greatest number of acres with restrictions on construction and activity. It has the most potential for increased cost of construction of ROWs and increased difficulty to access public and private land.

Alternative D requires mitigation if there is an exceedance of a 5 percent discretionary disturbance cap in the biologically significant unit (Colorado MZs) and the proposed project analysis area. It requires that constructing new routes and upgrading existing routes provide a net conservation gain to GRSG and its habitat. The impact on the lands and realty program due to the potential increase in cost of construction, potential mitigation costs, and potentially limited access to public and private land is greater under Alternative D than Alternative A, but less than under Alternatives B and C.

Under the Proposed LUPA, travel management would be similar to that under Alternative D; however, discretionary anthropogenic disturbance would be limited to 3 percent in PHMA in a biologically significant units and a project analysis area. Impacts on the lands and realty program are therefore somewhat similar to those described under Alternative D with greater potential for increased cost and access issues due to smaller allowable percentage of discretionary disturbance.

Impacts from Lands and Realty Management on Lands and Realty

Impacts on the Ability to Accommodate Preferred Routes for ROW s and Preferred Routes or Locations for all ROWs and on the Cost of Developing and Designing ROWs
Impacts as a result of management actions for the lands and realty program are limitations on placement of ROWs due to acres identified as ROW exclusion areas. Additionally, increased costs associated with construction could result from identifying areas as ROW avoidance and requirements for mitigating projects constructed in GRSG habitat. For linear ROWs (e.g., pipelines and transmission lines) this could increase the length of these projects, thus increasing project costs. Costs also would be incurred as a result of requirements for mitigation in areas with limits on surface disturbance.

Stipulations could restrict project location or delay the availability of an energy supply by delaying or restricting construction of pipelines, transmission lines, or renewable energy projects. Additionally, stipulations could limit future access, delay energy supplies or increase their cost, or delay or restrict communications service availability. As a result of stipulations, alternative routes may need to be identified to protect GRSG habitat. There may be increased processing time and costs due to the potential need to relocate facilities or due to greater design, mitigation, and siting requirements.

In some areas, there is a high concentration of intermixed private and public land, corridors, oil and gas development, and existing authorizations. In these areas, restrictions on the ability to permit ROWs and land tenure adjustments

would have a greater impact than in areas with lesser degrees of intermixed ownership, ROW corridors, oil and gas development, and existing authorizations. Despite these restrictions, the existing ROW corridor and ROW network would provide opportunities for the collocation of compatible ROWS.

Table 2.2 shows the acres of ROW exclusion and avoidance areas in the decision area for each alternative, which are described in detail in **Tables 2.3** and **2.4**.

Under Alternative A, 25,600 acres would continue to be managed as ROW exclusion areas and 127,600 acres would continue to be managed as ROW avoidance area within ADH. This alternative includes the fewest restrictions on locations of ROW corridors and ROWs and the fewest restrictions for construction. There is no disturbance cap for construction of new ROWs. Alternative A would have the least impact on the lands and realty program.

Under Alternative B, all PHMA would be managed as exclusion areas for new BLM ROWs or Forest Service SUPs, totaling 930,500 acres. Limits associated with valid existing rights would be placed on authorization of new ROWs or SUPs in PHMA, including a 3 percent disturbance cap. Alternative B would result in a larger impact on the lands and realty program than Alternative A.

Under Alternative C, ADH would be managed as exclusion areas for new BLM ROWs or Forest Service SUPs, totaling 1,761,500 acres. Within ADH, limits associated with valid existing rights would be placed on construction and maintenance, including a 3 percent disturbance cap. Alternative C would have the greatest impacts on the lands and realty program, placing exclusion restrictions on over 1.7 million acres.

Under Alternative D, there would be no additional acres managed as ROW exclusion areas. However, PHMA would be managed as avoidance area (930,500 acres), and limits would be placed on the authorization of ROWs or SUPs in PHMA, including a 5 percent disturbance cap. Additionally, under Alternative D, there would be 881,000 acres managed as exclusion area for large transmission lines (greater than 230 kilovolts), and 68,000 acres managed as avoidance area for large transmission lines (greater than 230 kilovolts). Alternative D would have greater impacts on the lands and realty program than Alternative A but fewer impacts than Alternatives B and C.

Under the Proposed LUPA, impacts would be similar to those described above for Alternative D. However, additional restrictions on land use and other authorizations would be included. Land use authorizations would be required to avoid disturbing more than 3 percent of any biologically significant unit and project analysis area in PHMA. Impacts on ROW availability are similar to those described for Alternative D, with slightly greater impacts on lands and realty due to increased restrictions on disturbance and disruption.

The TransWest Express transmission line and the segments of Energy Gateway South transmission line that are collocated with TransWest Express are not subject to or exempt from the Proposed LUPA decision to designate PHMA/GHMA as an avoidance area; however, the projects are exempt from the proposed GRSG screening criteria, RDFs, buffers, and disturbance cap requirements identified in **Chapter 2** (Alternatives).

The Obama Administration identified these transmission projects as a priority as part of the President's commitment to job creation and modernizing America's infrastructure. These transmission projects are two of seven identified for expedited permit review and federal agency coordination among the interagency Rapid Response Team for Transmission. This team was established to foster coordination, to expedite simultaneous permitting processes, and to resolve permitting challenges, while ensuring appropriate environmental reviews.

The BLM is processing the applications for the TransWest and Energy Gateway South high-voltage transmission lines, which include alternatives through this avoidance area/GRSG habitat. The BLM is analyzing conservation measures for GRSG as part of the review process.

Impacts from managing lands and realty under the Proposed LUPA are greater than those under Alternative D. There could be local impacts resulting in a reduced availability for land use authorizations in those biologically significant units that are open for large transmission lines.

The TransWest and Energy Gateway South Transmission Lines are analyzed in detail in **Chapter 5** (Cumulative Effects).

Ability to Process Land Tenure Adjustments Necessary for More Effective Management
Management actions that prioritize GRSG habitat for acquisition and limit disposal of these lands could assist the BLM and Forest Service in prioritizing future land tenure adjustments. However, these same actions could reduce the BLM and Forest Service's flexibility for consolidating public lands for effective management of other resources. Although there may be an increased emphasis to consolidate parcels within GRSG habitat across all alternatives it is not possible to identify the locations or number of acres impacted by these decisions at this time.

Under Alternative A, approximately 700 acres of PHMA and 1,100 acres of GHMA are identified for disposal in the decision area (all in the CRVFO). GRSG habitat is not considered under this alternative when identifying lands for acquisition.

Alternative B emphasizes retaining public ownership of PHMA, with exceptions to allow flexibility if a change in ownership would allow for more effective management of GRSG habitat. This alternative would provide for identification and prioritization of acres for acquisition, based on the presence of GRSG

habitat. However, some flexibility for consolidating public lands for effective management of other resources would be lost.

Alternative C would have more restrictions than Alternatives A, B, and D on the ability to complete land tenure adjustments in GRSG habitat because no disposals would be allowed in PHMA and no exceptions would be provided. Flexibility for consolidating public lands for effective management of other resources would be the least under this alternative.

Compared to the other action alternatives, Alternative D allows the most flexibility in acres available for acquisition, disposal, or exchange because there is no management action proposed to retain public ownership of PHMA.

Under the Proposed LUPA, land tenure action would be allowed in PHMA and GHMA if they can demonstrate a net conservation gain for GRSG. Land exchanges or disposal to remove low-quality habitat from BLM-administered land and National Forest System land would also increase efficiency where those lands are isolated and difficult to manage.

Impacts from Fluid Minerals Management on Lands and Realty

Impacts on the Cost of Developing and Designing ROWs and Demand for ROW Authorizations

Impacts on the lands and realty program from managing fluid minerals include a reduction in availability of locations for ROW corridors and locations for ROWs. Impacts also include the increased cost of designing and developing ROWs, due to restrictions on surface disturbance associated with no leasing or stipulations on leases.

Although land use authorizations (ROWs) are not necessary for surface occupancy of leased federal lands, ROWs are often required for developments that cross lease lines, for access roads, and for other infrastructure (e.g., pipelines and centralized facilities). In areas closed to leasing, the need for ROWs to access leases would be eliminated. In areas open to leasing, where surface occupancy restrictions would result in decreased development, overall demand for ROWs would also be decreased. In those cases, the demand would continue but may result in increased length and cost of construction of ROWs, due to the requirement to find alternative routes or sites for infrastructure to support development.

The decision area contains 2,473,000 acres of federal minerals, approximately half of which (1,296,000 acres) are currently unleased.

Under Alternative A, 100,200 acres would continue to be closed to leasing within the decision area. Additionally, there would continue to be 298,000 acres with NSO stipulations and 976,200 acres with CSU stipulations. Alternative A has the fewest acres closed to leasing and contains the fewest restrictions on

surface occupancy. This alternative would have the smallest impact on the lands and realty program and future lands and realty program actions would occur under current management.

Under Alternative B, PHMA would be closed to future leasing for fluid minerals, affecting approximately 519,300 acres of unleased federal minerals in PHMA with the potential for development. An exception would allow the BLM and Forest Service to prepare a comprehensive leasing plan for areas of "checkerboard" or other mixed federal-private surface and federal mineral estates. This could allow leasing of selected areas that can be accessed from outside the PHMA. Exploration using minimally disruptive methods would also be allowed. Additionally, leased acres within PHMA would be managed for NSO, affecting 617,500 acres.

Stipulations would be applied to development in the vicinity of GRSG leks, including a 4-mile buffer and limits on locations and number of disturbances in PHMA. Surface disturbance would be limited to 3 percent of PHMA.

Alternative B would result in greater impacts on the lands and realty program than under Alternative A. Alternative B would result in a decreased need for ROWs in areas unavailable for leasing, but surface restrictions would result in greater costs to design and construct infrastructure. Under Alternative C, all unleased GRSG habitat would be closed to leasing (1,296,000 acres of ADH), unless it could be demonstrated that a plan for the area would be beneficial to GRSG populations. Additional restrictions would apply to ADH, including a 3 percent limit on surface disturbance.

Alternative C would remove the most acres from leasing and has the most restrictions on surface occupancy for fluid minerals activity, thus reducing the need for ROWs in areas unavailable for leasing and increasing the costs to design and construct ROWs.

Under Alternative D, PHMA areas would be NSO areas for fluid mineral leasing (519,276 acres). In PHMA, if the entire lease is within the 4-mile lek perimeter, permitted disturbances (as defined in **Appendix F**, Disturbance Cap Management) would be limited to 5 percent in any Colorado MZ; additional effective mitigation would offset the resulting loss of GRSG habitat. In certain cases, the BLM Authorized Officer may authorize disturbance in excess of the 5 percent disturbance cap without requiring additional mitigation. This would be the situation where the BLM and Forest Service, with available data, would come to the following conclusions:

- GRSG populations in the applicable Colorado MZ are healthy and stable at objective levels or they are increasing.
- The development would not adversely affect GRSG populations due to habitat loss or disruptive activities.

In many cases, this exception would require project proponents to fund studies to secure the data-based documentation requirement. Alternative D would have greater impacts on the lands and realty program than Alternative A but fewer impacts than Alternatives B and C.

Under the Proposed LUPA, restrictions on surface occupancy for new fluid mineral development in PHMA could decrease the potential for new fluid mineral development in those areas. Subsequently the demand for associated ROWs and SUAs to serve those uses could also decrease. Surface-disturbing activities could be shifted, additional protective measures could be required, and extraction delays could occur.

Impacts from Solid Minerals (Coal, Locatable, Nonenergy, and Salable Minerals) Management on Lands and Realty

Impacts on the Cost of Developing and Designing ROWs and Demand for ROW Authorizations

Although land use authorizations (ROWs) are not necessary for solid mineral mining, they are often required for developments that cross lease lines, for access roads, and for other infrastructure. In areas closed to mining, the need for ROWs to access mines would be eliminated. In areas where mining is restricted, the costs for development of infrastructure associated with these mines could increase.

Under Alternative A, the BLM and Forest Service would not impose new restrictions or prohibitions on lands and realty. Therefore, there would be no new impacts on the lands and minerals program under this alternative.

Under Alternatives B and C, the BLM would prohibit new surface coal mines in PHMA, would propose PHMA for mineral withdrawal, and would close PHMA to nonenergy mineral leasing and mineral materials sales. These measures would reduce demand for ROWs necessary for developments that cross lease lines, for access roads, and for other infrastructure. Alternatives B and C would also require mitigation measures and restrictions for mineral activity, which could increase the cost of developing and designing associated ROWs.

Alternative D includes measures for protecting GRSG habitat from impacts associated with mineral activity. However, this alternative contains more flexibility to continue mineral operations. Thus, the impact of Alternative D on the lands and realty program is greater than Alternative A but less than Alternatives B and C.

Under the Proposed LUPA, closing PHMA to new salable mineral authorizations would decrease the need for new ROWs and SUAs to serve those uses. It also would require source material to maintain existing gravel roads to be obtained from sites in PHMA or existing or expanded sites in GHMA or nonhabitat. If the amount of source material is insufficient to properly maintain the road, it could

impact access via those roadways to valid ROW and SUAs (e.g., transmission lines) and leases (e.g., communication sites). Requiring existing sites to be subject to RDFs and GRSG conservation measures (e.g., buffers, disturbance mitigation, and seasonal timing restrictions) could impact the ability of the sites to remain open and the availability of source material.

4.6.4 Summary of Impacts on Lands and Realty

Under Alternative A, the five BLM field offices and the Forest Service use a combination of stipulations on ROWs. These stipulations would be used to manage lands and realty to avoid or minimize adverse impacts on other resources or resource uses, including GRSG. Under Alternative A, approximately 6.5 percent of GRSG habitat is protected by ROW exclusion or avoidance, which is the fewest restrictions on development. Alternative A has the fewest impacts on the lands and realty program.

Alternative B would limit development and surface disturbance in PHMA through ROW exclusion or avoidance on approximately 95 percent of GRSG habitat. Because of this, fewer acres would be available for land use authorizations, which would have a far greater impact on the lands and realty program than would Alternative A.

Alternative C would limit development and surface disturbance through ROW exclusion on 100 percent of GRSG habitat and would have the greatest impact on the lands and realty program. No BLM-administered or National Forest System lands within GRSG habitat would be available for land use authorizations without restrictions.

Alternative D would limit development and surface disturbance in areas capable of supporting sagebrush from identifying ROW avoidance areas on approximately 53 percent of GRSG habitat. This alternative would have greater impacts on the lands and realty program than Alternative A but fewer impacts than Alternatives B and C.

The Proposed LUPA would have greater impacts on the lands and realty program than Alternatives A and D but fewer impacts than Alternatives B and C.

4.7 VEGETATION (FOREST, RANGELANDS, RIPARIAN AND WETLANDS, AND NOXIOUS WEEDS)

4.7.1 General Description

This section discusses impacts on vegetation, forests, rangelands, riparian and wetlands and noxious weeds from proposed management actions of other resources and resource uses. Existing conditions concerning vegetation are described in **Section 3.5**, Vegetation (Forest, Rangelands, Riparian and Wetlands, and Noxious Weeds).

4.7.2 Methodology and Assumptions

General Impacts on Vegetation

Indicators of impacts on vegetation and the measurements used to describe the impacts (where available or appropriate) are described below.

- Change in vegetation cover: Complete removal of vegetation, or a reduction in composition, frequency, or canopy cover of vegetation associated with the ecological site
- Change in soil and water properties: Vegetation removal within the riparian or wetland area; the inability to meet BLM Colorado Public Land Health Standards; surface disturbances that increase soil compaction, reduce water availability within the rooting zone, or alter the native plant community; declining vegetation production within the riparian or wetland area; the site no longer meets the site potential based on ecological site conditions (i.e., vegetation type, diversity, density, and vigor)
- Change in vegetation composition: Indicators include composition, frequency, age-class structure, presences/abundance of noxious weeds, and cover
- Preservation of vegetation: Acres of intact vegetation preserved

Assumptions

- Upland vegetation resources would be managed to meet BLM Colorado Public Land Health Standard #3.
- Methods and projects that help restore watersheds, desirable vegetation communities, or wildlife habitats (including surface disturbance associated with these efforts) would benefit upland and riparian vegetation resources over the long term.
- Noxious and invasive weeds would continue to be introduced and spread by ongoing vehicle traffic in and out of the public lands, as the result of recreation, wildlife and livestock grazing, and surface-disturbing activities. Weeds and pests would be controlled in coordination with the appropriate county weed and pest control districts and with owners of adjacent property, complying with the state's plan for weed eradication and control.
- The BLM and Forest Service would implement standard operating procedures, BMPs, and mitigation measures described in LUPs, EISs, and environmental assessments to protect upland and riparian vegetation resources.
- Riparian/wetland resources would be managed to meet BLM Colorado Public Land Health Standard #2.

- The degree of impact attributed to any 1 disturbance or series of disturbances would be influenced by several factors: proximity to drainages and wetlands, location within the watershed, time and degree of disturbance, reclamation potential of the affected area, existing vegetation, precipitation, and mitigating actions applied to the disturbance.
- Climatic fluctuations would continue to influence the health and productivity of PHMA and vegetation annually.
- Increased level of roads, ROWs, and other development would negatively affect habitat quality.
- Maximum allowed disturbance under each alternative would be reached at some point in the future.

Implementing management actions for the following resources would have negligible or no impact on vegetation management and are therefore not discussed in detail: mineral split estate, and ACECs.

4.7.3 Direct and Indirect Impacts on Vegetation

Impacts from Travel Management on Vegetation

Changes in Vegetation Cover

Riparian areas and wetland concerns resulting from motorized uses include road encroachment, increased dust deposits on plants, and invasive species introduction. In recent years, cross-country travel throughout public lands has resulted in several user-created trails that directly impact riparian vegetation. Travel management actions would result in indirect beneficial impacts on riparian vegetation due to improved watershed conditions. As route density decreases, improvements to upland vegetation would increase infiltration, reduce channelized runoff reaching riparian areas, and provide upland forage, thereby reducing utilization pressures in riparian areas.

Changes in Soil and Water Properties

Roads and travel within wetlands and riparian areas can result in rutted and compacted soils and a lowering of the water table, affecting the wetland ecosystem of plant and animal communities that depend on the soil and water. Removing vegetation and litter decreases the soil's nutrient cycling and soil moisture. Compaction reduces the soil's ability to store water and can lower the water table and cause the loss of wetlands. Compacting or altering banks can ultimately increase bank erosion, lowering the water table and drying out the wetland zone. Indirect impacts on riparian vegetation (such as sedimentation) would continue to occur as the result of trails draining into riparian areas.

Restricting use to existing routes would result in continued impacts on riparian vegetation because most existing roads and trails are user created and are already impacting riparian areas. TLs could also help restrict travel during snowmelt, when soils are more likely to be saturated and easily rutted and compacted, altering runoff characteristics and potentially increasing the sediment load delivery to a wetland or riparian zone.

Summary of Impacts by Alternative

Alternative A would result in the largest amount of potential surface disturbances, including direct impacts on wetland vegetation from cross-country travel.

The action alternatives, Alternatives B, C, and D, eliminate cross-country travel, which would decrease the creation of new routes that cross or travel in wetland or riparian areas. Alternatives B, C, and D also would require the development of travel management plans, including the designation of routes for administrative use only where appropriate. These alternatives would restore and seed closed routes identified in the travel management plans. Reducing the road density improves watershed health, indirectly benefitting the riparian areas.

Although direct impacts from planned routes on wetland vegetation are generally limited to unavoidable crossings, Alternatives B and C could further reduce the potential for direct or indirect impacts within GRSG habitat. New route construction would be limited to realignments or would be made to increase motorist safety, which could reduce surface disturbances in or affecting wetlands.

Alternative D would still allow new routes where they would not adversely impact GRSG, which could result in more indirect impacts on wetland vegetation than Alternatives A and B. Where valid existing rights exist, however, new road construction could still occur under Alternatives B, C, and D if no road exists. Alternative C would require a 4-mile buffer around leks, which could result in a road alignment that has greater direct or indirect impacts on wetland vegetation than under Alternatives A, B, and D.

Although direct impacts from planned routes on wetland vegetation are generally limited to unavoidable crossings, Alternatives B and C could further reduce the potential for direct or indirect impacts within GRSG habitat. New route construction would be limited to realignments or would be made to increase motorist safety, which could reduce surface disturbances in rangeland areas. Alternative D would still allow new routes where they would not adversely impact GRSG, which could result in more indirect impacts on upland vegetation than Alternatives A and B. Where valid existing rights exist, however, new road could still be constructed under Alternatives B, C, and D if no road exists. Alternative C would require a 4-mile buffer around leks, which could result in a road alignment that has greater direct or indirect impacts on upland vegetation than under Alternatives A, B, and D.

Travel management would be the same under the Proposed LUPA as under Alternative D; impacts are therefore the same as those under Alternative D.

Impacts from Recreation Management on Vegetation

Changes in Vegetation Cover

Direct impacts on riparian and wetland vegetation communities are generally avoided in planned actions. Carefully designed and developed trails and sites can help direct users to more sustainable areas, thereby reducing impacts (compared to user-created ones). Mitigation measures could reduce the impacts on riparian vegetation on a project-specific basis (such as a boardwalk in a wetland area); however, visitor impacts often extend beyond the designed trail network and developed facilities. The increasing numbers of recreationists, especially along river corridors, can result in campsites and trails being located in the riparian area, removing the native vegetation, and introducing invasive species.

Changes in Soil and Water Properties

Recreation and visitor travel within wetlands and riparian areas can result in rutted and compacted soils and a lowered water table. This could affect the wetland ecosystem of plant and animal communities that depend on the soil and water. Removing vegetation and litter decreases the soil's nutrient cycling and soil moisture. Compaction reduces the soil's ability to store water and can lower the water table and cause the loss of wetland conditions. Compacting or altering banks can ultimately increase bank erosion, lowering the water table and drying out the wetland zone.

Concentrating use at developed sites can result in less impact on the river's adjacent riparian vegetation. Anglers accessing streams can create multiple trails to the river along steep unstable slopes. These trails increase erosion and decrease the vegetation along the stream banks. Routes within small riparian areas have resulted in braided stream channels, streambank damage, and weed introduction.

Summary of Impacts by Alternative

Recreation authorized under SRPs can result in direct and indirect negative impacts on wetland vegetation, typically through surface disturbance associated with motorized/mechanized travel and large group activities, such as hiking, biking, and camping. Alternatives B, C, and D would provide some level of indirect protection by limiting potential surface disturbance in PHMA associated with SRPs and by limiting the type and timing of use under the SRP. Alternative C, in buffering leks by 4 miles, could displace recreationists to wetland/riparian areas (or areas tributary to them), increasing direct and indirect adverse impacts.

Recreation management would be the same under the Proposed LUPA as under Alternative D; impacts are therefore the same as those under Alternative D.

Impacts from Lands and Realty Management on Vegetation

Loss of Vegetation Cover

Construction and maintenance of ROWs, pipelines, power lines, and communication sites may result in direct loss of vegetation, fragmentation, degradation, and conversion to other habitat types. Ground disturbance during construction directly removes vegetation. Certain ROWs, such as roads and communication facilities, may lead to permanent loss of vegetation. Other ROWs, such as pipelines or buried power lines, may lead to a more short-term loss of vegetation if the area is reclaimed after construction. In many cases, the reclamation results in a change in species composition and structure.

ROWs may also reduce the patch size of vegetation communities (fragmentation). This would decrease the acres of large undisturbed vegetation and increase the number of smaller patches and edge habitats.

Ground-disturbing activities may degrade plant communities by providing a niche for the invasion of noxious weeds and other undesirable species. Increased vehicular travel required for access would provide new vectors for the transport of noxious weeds into uninfested areas. If left unchecked, noxious weeds often outcompete native species and form large contiguous patches that reduce overall vegetation diversity.

The BLM classifies lands as open, avoidance, or exclusion areas for the permitting of land use authorizations (ROWs). **Table 2.2** shows the acres of ROW exclusion and avoidance areas in the decision area for each alternative, which are described in detail in **Tables 2.3** and **2.4**. Excluding, limiting, or collocating ROWs in GRSG habitats would protect sagebrush and riparian communities. Conversely, if ROW disturbances were moved into other habitat types, such as pinyon-juniper woodlands or mesic mountain shrublands, there may be a disproportionate loss of these vegetation communities.

Alternative A—This alternative would place the fewest restrictions on the development of new ROWs. Some protections would be provided for special designations, such as WSAs and ACECs, for threatened and endangered species, and for riparian areas. There would be no disturbance cap for construction of new ROWs. Possible loss of vegetation or decreases in patch size would be greatest under this alternative.

Alternative B—Under Alternative B, PHMA would be managed as an exclusion area, and GHMA would be managed as an avoidance area for new BLM ROWs or Forest Service SUPs. All new ROW authorizations would be designed to minimize the need for new ground disturbance by collocating new authorizations within existing ones and by using a minimum standard requirement, where valid existing rights require new authorizations. Additionally, a 3 percent disturbance cap would be placed on PHMA. This alternative would result in less loss and fragmentation of sagebrush and riparian

habitat (PHMA), compared to Alternative A; however, it could result in greater loss of non-GRSG habitat as ROW actions may be displaced to adjacent areas.

Alternative C—This alternative is similar to Alternative B, except that ADH would be managed as a ROW exclusion area, and the 3 percent disturbance cap would apply to ADH, not just PHMA. This alternative would result in the least amount of disturbance and loss of vegetation within GRSG habitat; however, it could displace the most new ROWs into non-sagebrush or riparian habitat, creating a disproportionate loss of mesic mountain shrubs (oakbrush and serviceberry) and forest or woodland vegetation.

Alternative D—This alternative would make PHMA and GHMA a ROW avoidance area. A 5 percent disturbance cap would apply to PHMA only. This alternative would be less restrictive than Alternatives B or C. It would issue new ROW permits only if they would not adversely affect GRSG populations, except where these limitations would make accessing valid existing rights impracticable. This alternative would result in less loss of GRSG habitat than Alternative A but more than Alternatives B or C. This alternative may result in less impact on non-sagebrush vegetation types through displacement of activities.

Proposed LUPA—All of PHMA and GHMA would be managed as ROW avoidance areas, with the exception of pending large transmission lines. Additionally, no aboveground structures would be authorized within 1 mile of active leks. Impacts on intact vegetation from managing lands and realty under the Proposed LUPA are similar to those for Alternative D, with potentially large local impacts on intact vegetation where the PHMA and GHMA are open for large transmission lines. For the description of impacts from proposed large transmission lines in northwest Colorado, see Cumulative Impacts (**Chapter 5**).

Preservation of Vegetation

Acquisition and disposal of public lands are tools to achieve such management objectives as improving management efficiency or providing more contiguous federal ownership patterns. Select lands with high resource values, such as occupied habitat for special status species, significant cultural resources, riparian areas, and important wildlife habitat, may be identified for retention or acquisition to protect these resources.

Alternative A—Existing LUPs within the planning area identify certain lands for retention, such as WSAs, ACECs, and the Roan Plateau. Acquisitions of private land inholdings and other lands with important resource values are encouraged or allowed. Few acres are specifically identified for disposal, but most plans consider disposal to achieve management objectives. Alternative A would allow for the most flexibility in conducting land tenure adjustments. Resource values such as habitat for GRSG and other special status species would be considered in evaluating the benefits of proposed land exchanges.

Alternative B—Under this alternative, PHMA would be retained in public ownership. The exception is where there is mixed ownership and a land exchange would allow for more contiguous federal ownership patterns within PHMA. Retention of additional acres of public land would generally be beneficial for preserving vegetation. Alternative B would also encourage consolidation of GRSG habitats, which would improve protection and preservation for sagebrush and riparian vegetation, compared to Alternative A.

Alternative C—This alternative is similar to Alternative B, without the exception to allow disposals in PHMA to consolidate ownership. Impacts on vegetation would be the same as or similar to Alternative B.

Alternative D—Alternative D is similar to Alternative B, except that disposal of isolated tracts of public land that would not alter GRSG populations would be allowed. Impacts on vegetation resources would be the same as or similar to Alternative B.

Proposed LUPA—See *Loss of Vegetation Cover*, above.

Public lands that are withdrawn from mineral entry to protect high resource values or to protect another land use activity, such as a military training range. Lands not withdrawn from locatable mineral entry are open to mining claim location and subject to associated surface-disturbing activates. Locatable minerals are gypsum, gold, copper, and limestone, and their development is governed under the General Mining Law of 1872.

The scale of locatable mineral development can vary tremendously, and associated disturbances can last for many years. BLM approval is not needed for locatable mineral exploration if proposed actions disturb no more than 5 acres of land per year. For exploration involving more than more than that and for actual mining operations regardless of acreage, the mining claimant must submit a plan of operations for approval by the BLM before mining can begin. Withdrawing areas from mineral development would be beneficial to vegetation, preventing impacts from surface disturbances in these areas.

Alternative A—Few lands are proposed for withdrawal under existing LUPs, except in the WRFO, where substantial acreage is withdrawn from mineral entry. In all offices, if WSAs are designated as wilderness by Congress, all mineral leasing would cease, but valid existing rights would remain. Alternative A would petition to withdraw fewer acres from consideration for mineral entry than Alternatives B and C and could result in greater loss of vegetation.

Alternatives B and C—Under Alternatives B and C, PHMA would be proposed for mineral withdrawal. This action would prohibit surface disturbances associated with locatable mineral development on all PHMA. In addition, these alternatives would not approve withdrawal proposals not associated with mineral activity unless the land management would be consistent with GRSG

conservation measures. This action would prevent other activities not compatible with GRSG conservation. These alternatives would protect more acres of vegetation than Alternative A.

Alternative D—Under this alternative, PHMA would not be withdrawn from mineral entry, and other withdrawal proposals would be considered on a case-by-case basis. Impacts on vegetation would be the same as or similar to Alternative A.

Proposed LUPA—Management of the lands program would be the same under the Proposed LUPA as under Alternative D; impacts are therefore the same as those under Alternative D.

Impacts from Wind Energy and Industrial Solar Development on Vegetation

Change in Vegetation Cover and in Soil and Water Properties

Development of solar and wind projects would remove vegetation in the short term, and solar projects would likely have long-term impacts on vegetation. For all projects, revegetation planning would be required. Wind and solar resource production is permitted via ROWs through the BLM's lands and realty program.

Construction and maintenance of wind or solar projects may result in the direct loss of vegetation, fragmentation, or conversion to other habitat types. Access roads and facility construction would remove vegetation and potentially introduce weed seeds. Solar facilities would result in habitat conversion as woody species would be removed before the solar panels were installed. The Solar Energy Programmatic EIS (BLM 2012) describes site preparation as including grading and site clearing if it is not possible to leave natural contours in place.

Anticipated threats to riparian areas would be from leaks or spills from maintenance and construction. Impacts would depend on proximity to water. No immediate threats exist as there are no wind or solar facilities nor have any been proposed within the planning area. The potential for commercial wind and solar projects in the planning area is minimal as no areas of high potential have been identified.

As stated under *Impacts from Lands and Realty Management on Vegetation*, the BLM classifies lands as open, avoidance, or exclusion areas for the permitting of land use authorizations (ROWs). **Table 2.2** shows the acres of ROW exclusion and avoidance areas in the decision area for each alternative, which are described in detail in **Tables 2.3** and **2.4**. Excluding, limiting, or collocating ROWs in GRSG habitats would protect sagebrush and riparian communities. Conversely, if ROW disturbances were moved into other habitat types, such as pinyon-juniper woodlands or mesic mountain shrublands, there may be a disproportionate loss of these vegetation communities.

Alternative A—PHMA and GHMA restrictions do not apply. Wind and solar projects could be permitted if proposed. Project design approval could be limited by ROW exclusion and avoidance stipulations, and standard vegetation BMPs would apply. Wind and solar projects could result in vegetation loss and fragmentation, which would be greatest under Alternative A. It places the fewest restrictions on wind and solar development, and projects would not be limited by a disturbance cap. While impacts on riparian areas from wind and solar projects would be minimal, Alternative A presents the greatest risk to riparian areas as it is the least restrictive.

Alternative B—While no specific limitation exists for wind and solar development, approval would be limited by disturbance limits, and GHMA would be ROW or SUA avoidance areas. ROW guidance would limit opportunities for wind and solar development, thus limiting any loss or fragmentation of vegetation. Fewer acres of vegetation would be fragmented or lost under this alternative than under Alternative A. Additionally, a 3 percent disturbance cap would be placed on PHMA. This alternative would result in less loss and fragmentation of sagebrush and riparian habitat (PHMA) compared to Alternative A, but it may result in a loss of non-GRSG habitat as ROW actions may be displaced to adjacent areas.

Alternative C—Wind and solar development would not be approved in occupied GRSG habitat, so there would be no loss or fragmentation of vegetation there. A 3 percent disturbance cap would apply to ADH. This alternative would result in the least amount of disturbance and loss of vegetation within GRSG habitat but may result in the most displacement of new ROWs into non-sagebrush or riparian habitat. This would create a disproportionate loss of mesic mountain shrubs (i.e., oakbrush and serviceberry) and forest or woodland vegetation.

Alternative D—This is similar to Alternative B, with a 5 percent disturbance cap placed on GRSG habitat.

Proposed LUPA—Wind and solar energy development would be excluded from PHMA; impacts on vegetation would therefore be similar to those under Alternative C for those species that have ranges that overlap PHMA.

Impacts from Range Management on Vegetation

Most of the GRSG habitat in northwest Colorado is used for livestock grazing. Range management does have the potential to negatively impact vegetation communities if management is not adequate. Impacts include reduced reproduction, vigor, and residual cover used to stabilize soils and provide GRSG with nesting cover. In extreme circumstances there is a risk of changes of vegetation composition, which can inhibit the ability of rangelands to meet BLM Colorado Public Land Health Standards. Impacts on sagebrush habitats specifically, can be found in *Impacts from Range Management on GRSG*.

Changes in Vegetation Cover

Livestock grazing affects the various components of a plant community differently. The timing, intensity, and duration and the class of livestock can result in different changes. The control of these variables is important in ensuring that vegetation management goals are met. As an example, heavy, repeated cattle grazing during the growing season can reduce the abundance and cover of native bunchgrasses, which can increase undesirable annual grasses. Cheatgrass, in particular, can become very abundant, inhibiting the recruitment of native herbaceous species. Eventually it would alter fire intervals in sagebrush communities, resulting in a completely new, self-sustaining community. Vital to maintaining healthy and diverse plant communities is ensuring that the variables governing grazing practices favor minimal adverse changes in frequency and abundance of the herbaceous component of sagebrush communities.

Livestock grazing in riparian areas can also have negative impacts on riparian health. Livestock often congregate in riparian areas for both water and forage. Heavy use in riparian areas can decrease the density of obligate riparian vegetation that is required to stabilize stream banks during high water flow. Livestock grazing can be compatible with riparian areas when capability, function, and potential of the site are folded in with the grazing management plan.

Management actions described in each of the alternatives for range management would aid in improving or maintaining upland and riparian vegetation health within GRSG habitat. These actions primarily revolve around prioritizing completion of land health assessments in GRSG habitat, working on integrated ranch plans to improve GRSG habitat at a landscape level, managing GRSG habitat so vegetation composition is consistent with ecological site descriptions, planning livestock management to meet seasonal GRSG needs, managing riparian areas for proper functioning condition) or forest plan standards and guidelines, and limiting development of new range improvements, except in instances where the range improvement would enhance GRSG habitat.

Alternative A—Alternative A is the least restrictive of all the alternatives. Livestock grazing is managed according to each field office's LUP or the Routt National Forest Plan. General grazing management is geared toward meeting BLM Colorado Public Land Health Standards, but there are no specific management actions specifically for GRSG habitat; however, if the BLM Colorado Public Land Health Standards are being met, vegetation composition, vigor, and seed production is adequate for maintaining healthy vegetation communities. Management for riparian areas is based on riparian proper functioning condition or forest plan standards and guidelines, but again, there are no specific management actions for GRSG habitat.

Alternative B—Alternative B has moderate restrictions on grazing management within GRSG habitat. Management primarily focuses on completing integrated

ranch planning to aid in improving GRSG habitat at a landscape level, completing land health assessments on ADH, creating livestock grazing objectives that aim at keeping vegetation composition consistent with ecological site descriptions, and managing livestock use to meet seasonal needs of GRSG. New range improvements would be authorized only when they would improve or enhance GRSG habitat. This alternative is more restrictive than Alternatives A and D but less restrictive than Alternative C. Alternative B also has the greatest restrictions on diverting water from seeps and springs. This management objective would improve riparian health by keeping water in the waterways and maintaining a water table conducive to producing healthy riparian vegetation for soil stability and water quality.

Alternative C—Alternative C has the greatest restrictions on livestock grazing, which would result in the greatest benefit to vegetation. In Alternative B, ADH would be managed as grazing exclusion areas. This would provide the greatest opportunity for improved vegetation growth, vigor, and seed production, while providing the most protection for riparian areas. Restricting grazing in ADH also reduces the probability of new weed invasions into vegetation communities.

Alternative D—Alternative D is less restrictive than Alternatives B and C but is more restrictive than Alternative A. Management objectives are primarily targeted at vegetation communities within ADH to be consistent with ecological site descriptions, similar to Alternative B and C; however, there is increased flexibility for managing public lands for other values the BLM and Forest Service find important. This extra flexibility would increase the likelihood of disturbing vegetation communities, but overall impacts on vegetation communities would be minimal.

Proposed LUPA—Livestock grazing would be managed the same as under Alternative D; impacts on vegetation are the same as those described under that alternative. The Forest Service would incorporate grazing guidelines (**Chapter 2, Table 2.5**) into term grazing permits. This would likely improve vegetation structures in GRSG seasonal habitat on grazing allotments.

Impacts of Wild Horse Management on Vegetation

Changes in Vegetation Cover

Wild horse management within the GRSG planning area generally focuses on maintaining wild horse populations within appropriate management levels. HMAs within GRSG habitat would receive first priority for wild horse gathers to maintain appropriate management levels. Maintaining HMAs within the prescribed appropriate management level would prevent overgrazing, which would benefit plant health, vigor, and seed production. Vegetation management in the HMAs would be geared toward maintaining vegetation composition that is consistent with ecological site descriptions and habitat requirements of the GRSG.

Alternative A—Alternative A would maintain the current management of HMAs as they are designated in field office LUPs. Priority for gathers would not be given to HMAs with GRSG habitat, which increases the potential for horse populations to grow in excess of appropriate management levels. Horse populations that exceed appropriate management levels would lead to increased use on vegetation within the HMA. Excess use by grazing horses could lead to decreased plant cover, composition, and vigor and in extreme circumstances could lead to changes in vegetation composition not consistent with the ecological site description.

Alternative B—Alternative B has the strictest measures on managing horses within the HMAs. Changes in vegetation cover would be maintained and or enhanced in areas where the current cover is less than described in the ecological site description. There would be potential indirect impacts on vegetation cover in HMAs that do not have GRSG habitat (e.g., Little Bookcliffs). This is because they would not be as high a priority for gathers and there is an increased potential for horse populations to exceed the appropriate management level. Sand Wash Basin HMA would be the highest priority for removal, followed by Piceance/East Douglas HMA and North Piceance and West Douglas Herd Areas. These two herd areas currently have wild horse populations but are not designated for wild horse management. To the degree that the ADH management would give priority to gathering these areas, there would be less opportunity for wild horses to overgraze and cause decreased plant cover, composition, or vigor due to overpopulation.

Alternative C—Alternative C would be the same as Alternative B.

Alternative D—Alternative D is similar to Alternatives A and B but gives more flexibility, depending on other management objectives of the BLM and Forest Service. Plant community health would still be aimed at meeting ecological site descriptions, which are beneficial to plant community health. Maintaining appropriate management levels and prioritizing gathers in HMAs within GRSG habitat would aid in maintaining health plant communities.

For the Proposed LUPA, wild horse management would be the same as Alternative D; therefore, impacts would be the same as those under Alternative D.

Impacts from Fluid Minerals Management on Vegetation

The development and maintenance of fluid minerals production facilities often impacts vegetation. Loss of vegetation through the direct disturbance of drilling and production pads, roads, compressor stations, and other structures has occurred throughout the affected area.

Unleased Fluid Minerals

Change in Vegetation Cover

For areas within PHMA that are not currently leased, vegetation loss, weed establishment, and increased human activity from fluid mineral development would not occur, resulting in no negative impacts on plant communities. Activities related to geophysical exploration are temporary, with very minor surface disturbances. The continuation of these activities would not result in adverse impacts on plant communities, particularly within the larger landscape. Closing all occupied GRSG habitat to fluid mineral leasing would expand the amount of vegetation that would not be subject to direct removal or weed invasion. Impacts under Alternative C would be similar to those described under Alternative B but over the larger areas of GRSG habitat.

Because Alternative A would allow the most development and surface-disturbing activities, it would cause the most changes in vegetation cover when compared to the action alternatives. Alternative C would place the most restrictions on development of resources and land uses, and would therefore have the smallest impact on changes in vegetation cover. Alternative B would have greater impacts on changes in vegetation cover than Alternative C and fewer impacts than Alternative D.

Change in Vegetation Composition

The development and maintenance of fluid minerals production facilities results in direct impacts on vegetation through removal and indirect impacts from increased vectors for weed invasion. Loss of vegetation through the direct disturbance related to drilling and production pads, roads, compressor stations, and other structures has impacted numerous vegetation communities throughout the affected area. Fluid mineral disturbances have also provided vectors for noxious weeds; weeds have invaded not only areas within and next to disturbances but have also resulted in weed presence in otherwise intact and healthy plant communities. The restrictions and, in some cases, elimination of new facilities associated with fluid minerals would be beneficial to plant communities.

Because Alternative A would allow the most development and surface-disturbing activities, it would cause the most changes in vegetation composition through compaction and increased risk of introduction of invasive species, when compared to the action alternatives.

Alternative B would have greater impacts on changes in vegetation composition than Alternative C and fewer impacts than Alternative D.

Alternative C would place the most restrictions on development of resources and land uses and would therefore have the smallest impact on changes in vegetation composition.

Alternative D would result in greater changes to vegetation composition than Alternatives B and C, but it would result in fewer changes to vegetation composition than Alternative A.

Under the Proposed LUPA, no new leasing would be permitted within 1 mile of active leks, and no new surface occupancy would be allowed in PHMA. No modifications or waivers would be permitted, and exceptions would be rare. The Proposed LUPA would have impacts similar to Alternatives B and C for vegetation composition. Although 1 mile around active leks would be managed as closed to leasing (224,200 acres) under the Proposed LUPA compared to all PHMA (1,315,500 acres), all of PHMA would be managed as NSO, with very rare exceptions, so the impacts on GRSG and their habitat would be similar.

Leased Fluid Minerals

Change in Vegetation Cover

For areas within PHMA that are currently leased, some level of fluid minerals development and associated impacts on plant communities would occur within PHMA, albeit at diminished levels. For PHMA, the implementation of NSO requirements would result in no losses of vegetation from fluid mineral development. Where exceptions to this would apply, the 3 percent per section disturbance cap within PHMA would effectively reduce related impacts, though they would continue to occur.

Alternative A—Under this alternative, the development of leased minerals would be under the guidance of applicable existing LUPs, which allow for more development than any of the action alternatives. This could result in the most changes in vegetation cover.

Alternative B—The emphasis on master development plans over the permitting of wells on a project-by-project basis via applications for permits to drill would result in more orderly development where it continues to occur within PHMA. Under this scenario, it would be easier to work with fluid minerals development companies and to plan coordinated reclamation activities across a lease. This would better facilitate long-term planning and assessment of plant community health. The increase in reclamation bonding would better ensure that long-term impacts on vegetation would be minimized or eliminated through increased efforts to ensure that reclamation is successful.

Alternative C—This alternative would increase the area subject to the 3 percent per section disturbance cap to new wells permitted via applications for permits to drill on all occupied habitat. This would further reduce the areas subject to vegetation loss and disturbance.

Alternative D—Whereas Alternatives B and C specify disturbances at 3 percent per section (with the understanding that not all sections are equal in size), this alternative would be more restrictive in allowing for fluid minerals-related

disturbances by using the 5 percent per MZ cap, with resulting decreases in the potential for vegetation loss or disturbance.

Proposed LUPA—Under the Proposed LUPA, disturbance would be measured at 3 percent in PHMA; impacts on vegetation would be less under the Proposed LUPA than Alternatives A and D but greater than under Alternatives B and C.

Impacts from Solid Minerals–Coal Management on Vegetation

Change in Vegetation Cover and Composition

For areas within PHMA that are currently leased, some level of coal development and associated impacts on plant communities would occur within PHMA, albeit at diminished levels. Impacts from coal management on changes in vegetation cover and changes to vegetation composition would be similar to those described under *Impacts from Fluid Minerals Management on Vegetation*.

Alternative A—Under this alternative, coal development would be under the guidance of applicable existing LUPs, which allow for more development of coal than any of the action alternatives. This could result in the greatest level of adverse changes in vegetation cover.

Alternative B—Surface mining coal removes large areas of vegetation, from the initial removal of material to the final release of bond for reclamation; this is a process that can last for many years. Since reclamation plans generally call for the restoration of the herbaceous component of the native plant community, shrubs and trees must colonize naturally. This would result in a much greater interval of return of a truly intact plant community. Minimizing surface-disturbing activities within all occupied GRSG habitat would have a beneficial effect on native vegetation communities. Closing PHMA to all surface coal mining would eliminate the potential for vegetation impacts from this activity.

Subsurface coal mining generally has no impact on livestock operations on public lands. Associated surface facilities are typically located on private lands. In the case of longwall mining, subsidence does occur, which can result in falling cliff faces and altered stream courses, but livestock operation impacts are negligible. The standards applied to subsurface operations in PHMA under this alternative would have no impacts on vegetation on public lands.

Alternative C—Impacts from this alternative would be the same as for Alternative B.

Alternative D—Existing coal leases already impact vegetation where operations are occurring. Where operations would move into new areas within those leases, the application of PDFs would not appreciably change the impact that surface or subsurface coal operations have on plant communities. Impacts from new surface and underground leases would be similar to both Alternative B and

C, except the surface disturbance from all coal mining and related activities would be limited to 5 percent.

Proposed LUPA—Management of solid minerals under the Proposed LUPA would be the same as Alternative D; impacts on vegetation cover are the same.

Impacts from Locatable Minerals, Nonenergy Leasable Minerals, and Salable Minerals Management on Vegetation

Impacts from these programs on vegetation would be the same as the impacts described under *Impacts from Fluid Minerals Management on Vegetation*.

Impacts from Fuels Management on Vegetation

Change in Vegetation Cover and Composition

In most of the planning area, fuel conditions have changed from historic conditions because of management practices and the spread of nonnative species. Fire exclusion, in the form of fire suppression, has greatly affected fuel conditions. This management practice results in increased fuel loadings because fires are more infrequent than historic fire-return intervals. Sagebrush within this habitat is also transitioning to an older age class that is more decadent, with high fuels loading that can support large severe wildfires. These increased fuel loadings are leading to higher severity fires that require more post-fire rehabilitation.

The main structural change in what were historically sagebrush shrublands is the encroachment of pinyon and juniper, other conifers, and other woody shrubs into the sagebrush. Over time the encroachment would increase the fuels loading, causing an upward shift in fire behavior. This increases the resistance to control, decreasing the effectiveness of firefighting efforts. Additionally some of the GRSG habitat is next to timbered slopes of Douglas fir and subalpine fir. These timber stands are generally in poor health, with mortality from bark beetle and other insects and disease. There is high fire potential in these stands, which are often next to sagebrush within GRSG habitat.

Fuels management has both short- and long-term impacts on vegetation. In the short term, vegetation would be lost, but in the long term, fuels management would improve vegetation health, composition, and productivity. Additionally, in the long term, fuels treatments would prevent uncharacteristically large or intense wildfires that could damage large expanses of vegetation. If fuels treatments were unsuccessful, habitat may be converted to exotic annuals and other weedy species. Assuming all fuels projects would be designed and managed to meet BLM Colorado Public Land Health Standards, there would be no negative impacts on uplands and riparian areas. Fuels treatments in riparian areas would primarily be to remove tamarisk, Russian olive trees, and noxious weeds or to protect cottonwood galleries.

Alternative A—PHMA and GHMA restrictions do not apply. Fuels projects could be implemented without disturbance limits. Project design would be limited by ESA and National Historic Preservation Act compliance. Habitat improvement and restoration projects would be implemented for livestock, wildlife, and fuels reduction. Since Alternative A would have the fewest restrictions for fuels treatments, the greatest number of acres would be available to for treatment. While Alternative A may result in the largest amount of short-term vegetation loss, long-term impacts include increases in vegetation composition and health.

Alternative B—Fuels projects could not reduce sagebrush canopy cover below 15 percent, with the exception of fuels breaks. In PHMA, seasonal restrictions would apply to fuels treatments, and prescribed fire would be excluded in sagebrush habitat where there is less than 12 inches of annual precipitation. Treatments would be to prohibit livestock grazing for two full growing seasons. Fuels treatments would use native plant seeds, with exceptions for availability and probability of success when nonnative seeds would meet GRSG objectives.

Restrictions in Alternative B would reduce the opportunity for fuels treatments and limit treatment objectives, which would lead to fewer acres treated. Under this alternative, treatments would be limited to those that benefit GRSG or the identified GRSG objectives. Restrictions would also limit the number of acres treated and potentially the effectiveness of the treatments. Fewer acres would be treated under Alternative B than Alternative A.

Alternative C—The impacts would be similar to Alternative B.

Alternative D—The impacts would be similar to Alternatives B and C. This alternative would allow for more acres treated than Alternatives B and C but would not treat as many acres as Alternative A.

Proposed LUPA—Fuels management would be the same as under Alternative D. Impacts from the Proposed LUPA; therefore, are the same as those for Alternative D, above.

Impacts from Fire Operations on Vegetation

Change in Vegetation Cover and Composition

The BLM and Forest Service management practices include the control of wildfires in some areas, the use of fire either through prescribed burning or the management of wildfires in order to meet land management goals, and the treatment of vegetation so that fires are more controllable in areas where values at risk are higher. Wildland fire management on BLM-administered and National Forest System lands is guided by federal fire policy and Land and Resource Management Plans that consider the three elements mentioned above, as well as firefighter and public safety and cost effectiveness.

Fire is an inherent component of ecosystems and historically has had an important role in promoting plant succession and the development of plant community characteristics. Control of fires and other land use practices during the last century has changed plant communities by altering the frequency, size, and severity of wildfires.

Indicators of wildland fire ecology and management is summarized through fire regime and condition class classifications. Fire regimes are used as part of the FRCC discussion to describe fire frequency (average number of years between fires) and fire severity (effect of the fire on the dominant overstory vegetation—low, mixed, or stand replacement). These regimes represent fire intervals prior to Euro-American contact and are calculated and classified by analyzing natural vegetation, known fire cycles, and fire history data. Condition class indicates the degree of departure from the historic fire regime (Hann and Bunnell 2001 [Table 3.35]).

While the fire regime of a particular area is not likely to change except in the very long term, the condition class can be changed through fire management and other vegetation management actions. Extreme departure from the historic fire regime results in changes to one or more of the following ecological components: vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern), fuel composition, fire frequency, severity, and pattern, and other associated disturbances, such as insect and disease mortality, grazing, and drought.

Depending on size, location, severity, intensity, and vegetation, wildfire would have short-term impacts on vegetation, resulting in vegetation removal and soil disturbance from suppression actions. Fire can also lead to the proliferation of cheatgrass in lower precipitation zones and subsequent habitat degradation. In the long term, wildfire can be beneficial, resulting in a mixed serial stage, greater vegetation diversity, and habitat restoration.

Changes in Soil and Water Properties

In riparian areas the loss of vegetation can increase sediment (due to erosion), water temperature, and algae levels (due to the removal of canopy cover in riparian areas) until vegetation stabilizes the uplands and banks. Fires would be suppressed in cottonwood galleries to preserve stands.

Alternative A—GHMA restrictions do not apply. Fire suppression would continue to be guided by the existing RMPs and Land and Resource Management Plans. A greater acreage of sagebrush may be burned in Alternative A since it is the least restrictive on wildland fire management. As a result, a greater loss of vegetation could occur under Alternative A. This could increase sediment loads, water temperatures in riparian areas, and algae levels in areas that have been burned and experienced heavy vegetation loss.

Alternative B—Fire in PHMA and GHMA would be suppressed to conserve habitat. Fewer acres of sagebrush habitat would be converted to an early seral stage than under Alternative A. However, there could also be a greater potential for catastrophic fire as a result of fire suppression and exclusion. As a result of habitat restrictions, more fires would be suppressed in the surrounding vegetation communities to protect sagebrush, and less habitat would be lost to fire. However, increased fire suppression could also contribute to larger catastrophic fires due to increases in fuel loading in areas outside of PHMA. Changes in soil and water properties would be more likely to occur outside of PHMA under this alternative.

Alternative C—In PHMA, fires would be suppressed to conserve GRSG habitat. Impacts would be the same as Alternative B.

Alternative D—Alternative D would also prioritize suppression in PHMA and GHMA, but suppression activities would also take into account all resource values managed by the BLM and Forest Service. Changes in soil and water properties would be more likely to occur under this alternative outside of PHMA and GHMA than under the other action alternatives.

Proposed LUPA—Management of fire suppression would be the same as Alternative D. Impacts from the Proposed LUPA, therefore, are the same as for Alternative D, above.

Impacts from Emergency Stabilization and Rehabilitation on Vegetation

Change in Vegetation Cover and Composition

ESR in burned areas is a stopgap to manage post-fire threats to human life and safety and to preclude further damages to critical natural and cultural resources as a result of wildfire damages. ESR is planned actions performed by burned area emergency response teams within a year of wildfire containment to stabilize and prevent unacceptable degradation of natural and cultural resources, to minimize threats to life or property from the impacts of a fire, or to repair, replace, or construct physical improvements to prevent degradation of land or resources.

Burned areas are rehabilitated within 3 years of wildfire containment to repair or improve fire-damaged lands unlikely to recover naturally to management approved conditions, or to repair or replace minor facilities damaged by fire (US Department of the Interior 2004).

Following a wildfire, ESR stabilizes and prevents unacceptable degradation of natural and cultural resources. Post-wildfire ESR assists in stabilizing soils, replenishing the seed bank, and addressing weed threats. These activities are typically designed to restore the vegetation cover and to assist post-fire recovery. Post-wildfire cheatgrass conversion is one of the biggest challenges across the planning area. If successful, ESR would reduce erosion, aid in reducing

cheatgrass invasion, and maintain appropriate fire return intervals. ESR benefits both upland and riparian vegetation communities.

Alternative A—PHMA and GHMA restrictions do not apply. ESR would be guided by the individual field office's fire management plans and LUPs. A greater acreage of sagebrush may be burned under this alternative and thus require ESR. More sagebrush may be removed by fire and replaced by early seral species.

Alternative B—In PHMA and GHMA, fires would be suppressed to conserve habitat. Fewer acres of sagebrush habitat would be converted to an early seral stage than under Alternative A, thus fewer acres may require ESR. The emphasis on native seed and reestablishment of species-appropriate sagebrush seed would improve habitat quality. In the absence of fire or fuels treatments, this alternative may result in more decadent sagebrush stands with depleted understories. However, the risk of catastrophic fire as a result of fire suppression or exclusion could lead to larger ESR projects for Alternatives B, C, and D.

Alternative C—In PHMA, fires would be suppressed to conserve habitat. Depending on individual field office's fire management plans, fewer acres would require full suppression under Alternative C than Alternative B, thus a greater number of acres may require ESR. In comparison to Alternative B, there would be fewer acres of decadent sagebrush. ESR guidance would be the same for both PHMA and GHMA and would require livestock exclusion from the treated areas. Under Alternative C, a greater emphasis would be placed on developing sources for native seed, potentially increasing ESR costs due to native seed costs.

Alternative D—This would be the same as Alternative C, but the reestablishment of sagebrush would not be required if GRSG habitat objectives were being met.

Proposed LUPA—Management of emergency stabilization and restoration would be the same as under Alternative D. Impacts from the Proposed LUPA, therefore, are the same as those for Alternative D, above.

Impacts on Vegetation from Habitat Restoration

Sagebrush ecosystem restoration could both protect and disturb special designation area resources. Sagebrush restoration activities that would protect the natural character are reclaiming roads, trails, and other disturbed areas, abating dust on roads and disturbed surfaces, seeding native grasses and plants, removing perennial grass seeded areas, transplanting sagebrush, burying power lines, preventing or treating invasive species, allowing clustered and unitized development on mineral leases, and reducing wildfire threats.

Change in Vegetation Composition

A concern of habitat restoration is the invasion of undesirable plant species from soil disturbance. Sagebrush-steppe communities are among the ecosystems most vulnerable to invasion and degradation by invasive weeds. Cheatgrass invasion is also a threat to some treatment areas. Invasive nonnative plants are increasing in some areas. Not only can invasive species outcompete most native plants when moisture is limited, they can also change site-specific fire ecology and result in the loss of critical shrub communities.

Change in Soil and Water Properties and Vegetation Cover

Habitat restoration projects typically have multiple objectives: increasing forage for wildlife and livestock, reducing nonnative or weedy species, reducing pinyon-juniper invasion, reducing canopy coverage of woody species, replenishing seed banks, and creating a mosaic of vegetation age classes. In riparian areas, restoration projects may include stabilizing banks, removing invasive or exotic species, restoring native vegetation, and excluding livestock or big game use. While these projects typically result in short-term vegetation removal, much like fuels projects, they are typically designed to improve habitat and result in a more diverse, vigorous, healthy plant community. Once treated, no further disturbance may be desired during the life of the project, and treatment areas could become wildfire suppression areas.

Alternative A—Sagebrush ecosystem restoration could both protect and disturb special designation area resources. Sagebrush restoration activities that would protect the natural character are reclaiming roads, trails, and other disturbed areas, abating dust on roads and disturbed surfaces, seeding native grasses and plants, removing perennial grass seeded areas, transplanting sagebrush, burying power lines, preventing or treating invasive species, allowing clustered and unitized development on mineral leases, and reducing wildfire threats.

Alternative B—In PHMA, restoration projects that benefit GRSG would be prioritized. Fewer acres of sagebrush habitat would be converted to an early seral stage than Alternative A. Treatments would be rested from livestock grazing for two full growing seasons. Treatments would use native plant seeds, with exceptions for availability and probability of success when nonnative seeds would meet GRSG objectives. Restrictions would reduce the opportunity for restoration projects and limit treatment objectives, resulting in fewer acres treated, than under Alternative A. Treatments would be implemented only for the benefit of GRSG or the identified GRSG objectives. Restrictions would also limit the amount of acres treated and potentially the effectiveness of the treatments.

Alternative C—Impacts would be similar to Alternative B but would include rehabilitating exotic seedings to recover sagebrush. Prohibitions would be placed on treatments to increase forage for livestock and big game within

occupied habitat. Compared to Alternative B, more acres of vegetation may be removed in the short term under Alternative C.

Alternative D—This is similar to Alternatives B and C, but more acres may be targeted for habitat restoration, depending on site-specific circumstances. Treatments that maintained 12 percent canopy cover of Wyoming sagebrush or 15 percent canopy cover of mountain sagebrush would not count against the total 30 percent anthropogenic disturbance cap. More vegetation may be removed than under Alternatives B and C.

Proposed LUPA—Management of habitat restoration would be the same as under Alternative D. Impacts from the Proposed LUPA, therefore, are the same as for Alternative D, above.

4.7.4 Summary of Impacts on Vegetation

Alternative A provides the least amount of protection for vegetation communities in the planning area. Alternative A puts very few restrictions on development, which could result in the most modification of the landscape and consequently the most impacts on vegetation.

Alternative B provides a greater level of protection for vegetation than Alternative A, but it would provide a lower level of protection than Alternative C. Under Alternative B, reestablishment of sagebrush and desirable understory plant cover would be the highest priority for restoration in ADH. Impacts on vegetation under Alternative B would provide a higher level of protection for vegetation than Alternative A through restrictions on surface-disturbing activities. However, Alternative B would provide less flexibility in implementing vegetation treatments that are outside of PHMA.

Alternative C would provide the most protection for vegetation. The most restrictions would be placed on surface-disturbing activities and development. Under Alternative C, treatments in occupied GRSG habitats would be avoided. Other areas outside of GRSG habitat would be a lower priority for restoration under Alternative C.

Alternative D would provide more protection through restrictions on surface-disturbing activities for vegetation than Alternative A but would provide less protection than Alternatives B and C. More flexibility for development is built into Alternative D for other resources. Alternative D would allow treatments in GRSG habitat that maintain a minimum level of cover. This would allow treatments in GRSG habitat that would benefit other species that depend on sagebrush habitats.

The Proposed LUPA would provide more protections through restrictions on surface-disturbing activities for vegetation than Alternatives A and D, but it would provide less protection than Alternatives B and C.

4.8 WILDLAND FIRE ECOLOGY AND MANAGEMENT

4.8.1 General Description

This section analyzes potential impacts on the fuels and fire operations programs within wildland fire management from the management actions of other resources and their use. Current conditions for wildland fire management are described in **Chapter 3** (see **Table 3.25**, Fire Regime Condition Classes, for a description of FRCC).

4.8.2 Methodology and Assumptions

General Impacts on Wildland Fire Ecology and Management

Indicators of impacts on wildland fire ecology and management and the measurements used to describe the impacts (where available or appropriate) are described below.

Fuels

- Increase project cost
  - Cost per acre
  - Increased costs reduce project size and type of treatment to be applied within a given location. Activities outside of fuels treatments that alter vegetation would be beneficial
- Increased planning time
  - Management actions that inhibit the use of treatments to prevent wildland fires through the NEPA process
  - Increased planning time would increase the cost and reduce the amount of area that could be treated
- Decrease in project size
  - Management actions that inhibit the use of fuel treatments to prevent wildland fires; the average size of the projects
  - Fewer acres would be treated
- Project locations shifted to non-GRSG habitats
  - Management actions that inhibit the use of fuel treatments to prevent wildland fires
  - More even-aged stands of sagebrush; more uniform fuel loading in the sagebrush
- An upward shift in FRCC
  - Condition class change

  - Increased departure from historical fire return intervals may increase the potential for a large fire as the condition class increases
- Altered project design with reduced effectiveness
  - Condition class change; cost per acre and acres disturbed within the cap
  - Any management action that limits acres or the type of treatment would inherently alter the design and method of treatment
- Increased project requests
  - Work requests
  - Increased funding for off-site mitigation work may be tied to hazardous fuels objectives; increased workload in specific areas that may deter or distract work in non-GRSG habitat

Fire Operations

- Increased fire suppression cost
  - Cost per acre increase for management actions that require a level of action to preserve habitat would require the commitment of initial resources and additional resources to ensure that the expected level is met
  - The commitment of resources may restrict the ability for a fire management unit to order additional resources for other suppression efforts
- Reduced fire management tactics
  - Human-caused disturbances
  - Reduced anthropogenic disturbances would cause a reduction in access for engines and other firefighting equipment and the ability to use a change in vegetation to manage a wildland fire
- Reduced flexibility in response to wildland fire
  - In areas that allow fire to be managed for resources benefits, there would be fewer acres available; decreased tools (retardant, heavy equipment, and access) allowed to manage the fire
  - Prioritization of suppression to conserve PHMA and GHMA; firefighter effectiveness would decrease due to reduced options to manage

- Upward shift in FRCC
  - Condition class change
  - Limiting disturbances, focusing vegetation treatments on one benefit, and prioritizing suppression to conserve PHMA and GHMA reduces the ability to keep vegetation on a more natural fire return interval
- Reduced potential for human-caused ignitions
  - Number of human-caused wildland fire occurrences
  - Fewer travel routes open for use, fewer ROWs, and a decrease in development in GRSG habitat would decrease human interaction and potentially reduce the human-caused wildland fires
- Downward shift in FRCC
  - Acres in FRCCs 2 and 3 being reduced to FRCCs 1 and 2
  - Native grasses that control invasive brome species to prevent post-fire conversion to a different vegetation community would keep the FRCC in a state of nature that is consistent with the regular fire return interval

Assumptions

The following list presents the basic assumptions related to wildland fire ecology and management that apply to the impacts assessment for Alternatives A through D in this EIS.

- All FRCCs would increase in departure if vegetation treatment actions are not taken and wildfires continue to be aggressively suppressed.
- Areas that receive vegetation treatments reduce the FRCC or maintain it at the desired level.
- Demand for fuels treatments would likely increase over the life of this plan.
- A direct relationship exists between fuel loading and potential fire intensity, severity, frequency, and size.
- Cost per acre of prescribed fire is less than mechanical treatments.
- Decreasing the size of a prescribed fire increases the cost per acre (economies of scale).
- There is an increased demand on suppression resources managing wildland fires to protect values at risk.
- Fewer options are available to manage wildland fires decreases firefighter effectiveness.

Implementing management actions for the following resources would have negligible or no impact on wildland fire ecology and management and are therefore not discussed in detail: wild horse management, solid minerals (coal), and ACECs.

4.8.3 Direct and Indirect Impacts on Wildland Fire Ecology and Management

Impacts from Travel Management on Wildland Fire Ecology and Management

Reduce Potential for Human-Caused Fires

Limiting motorized travel to existing roads, primitive roads, and trails at a minimum would reduce the potential for human-caused fires. There are well documented occurrences of motorized travel causing wildfires during off-road use. During dry times of the year, cured grass comes in contact with vehicles' mufflers or catalytic converters and starts wildfires. The extent of the reduction in human-caused ignitions depends on the degree of off-road cross-county travel. Higher elevation sites are less likely to have dry vegetation that is susceptible to wildfires from cross-country motorized travel. Weather conditions (temperature and relative humidity) at higher elevations are also not as conducive for wildfires.

Seasonal closures in GRSG habitat would have varying degrees of impacts on the human-caused wildfires. Generally, the less human use an open area has the less potential for human-caused fires. Winter habitat closures would have almost no effect since fire danger is generally low at that time of year. Seasonal closures in nesting and early brood-rearing habitat could slightly decrease human-caused wildfire risk in PHMA because closures could last until July 15. The wildland fire management program would benefit by limiting human activities that cause fires from this seasonal closure in June and the first half of July, when fire danger is higher.

Constructing new routes and upgrading existing routes would be limited to within anthropogenic caps. Reducing routes may decrease the amount of human activity in any of the MZs, which would result in slightly reduced potential for human-caused fires. However, the activity and the potential human-caused wildfire would be displaced to another location.

Reduced Fire Management Tactics

Complete decommissioning of roads limits access for fire management personnel and equipment when they are responding to wildfires. Roads that are reseeded and planted with sagebrush would no longer be a viable option for fire lines. As fires become large, the most viable tactic can be burning out from the edge of the road, thus removing the fuel between the road and the main fire.

If an area has a high road density, decommissioning some roads would have less impact than decommissioning all the roads accessing an area. Closing roads to only administrative access would have little to no impact on fire resources. Many stands of sagebrush allow for off-road cross-county use of wildland fire engines to access and suppress wildfires. The terrain, vegetation density, and vegetation height all affect whether cross-county access to wildfires is feasible.

Even if roads into an area were completely decommissioned so that they were no longer available for motorized travel, other options are available to access and suppress wildfire: aircraft, access by foot, and heavy equipment to reopen roads. There may or may not be an increase in response time due to the availability of road access. Fire personnel delivered by aircraft may actually arrive before ground forces, even in areas where roads exist, due to the higher speed of aircraft. The more aircraft is relied on in the response to wildfire, the greater the fire suppression cost. The exact response to any future wildfire depends on such factors as the fire danger, values at risk, and ignition potential.

Downward Shift of Fire Regime Condition Class

Limiting off-road motorized travel can benefit the fire management program by reducing the vectors that can spread noxious weeds, especially cheatgrass, thus altering FRCC. Nonnative cheatgrass can severely alter fire regimes, dramatically increasing fire frequency and severity and expanding the extent of wildfires. Lower elevation sites are the more susceptible to cheatgrass conversion due to lack of rainfall, which can decrease the ability of native grasses to compete.

Motor vehicles not only spread cheatgrass seeds but also disturb soils that allow cheatgrass to become established. A reduction in the number of routes would also reduce the amount of cheatgrass seeds spread. Decommissioning roads can also be beneficial in reducing cheatgrass by seeding areas with natives. Cheatgrass has a very short growing season; it dries and is available as fuel to carry wildfire much earlier than native vegetation. The extent that changes in travel management would cause a downward shift in FRCC depends largely on how vulnerable the management area is to cheatgrass infestation, the current extent of cheatgrass, and the degree to which travel management factors spread cheatgrass.

Summary of Impacts by Alternative

Travel management occurs under all of the alternatives; however, only under Alternatives B, C, and D would there be limits on new routes and decommissioning of roads in primary GRSG habitat. Anthropogenic disturbance caps in Colorado MZs vary by alternative. The impacts on wildland fire management are discussed in greater detail later in the analysis.

Alternative A—Current LUPs in GJFO and CRVFO allow for ORV use in PHMA, which slightly increases human-caused fire potential. Currently, the LSFO manages an area associated with the Sand Wash SRMA that is within PHMA. There is no cap for anthropogenic disturbance associated with these

plans. Decommissioning roads and using native seed or transplanting sagebrush is not an action in these plans.

Alternative B—Designating motorized use to existing roads, primitive road, and trails in this alternative would reduce the potential of human-caused fires and the spread of cheatgrass from cross-country vehicle travel. Seasonal closure of roads in PHMA could also reduce human activity, thus reducing the potential for human-caused fires. Decommissioning roads in PHMA under this alternative may limit tactical options during the response to wildfire, but this could reduce the potential spread of cheatgrass.

Alternative C—This alternative is similar to Alternative B in scope of impacts on wildland fire management for motorized use on designated roads and a seasonal closure. The most restrictions on route construction could further limit the potential for human-caused fires and changes in FRCC caused by the spread of cheatgrass. The requirement to decommission roads affects fire management actions in all of the alternatives and could impact fire management tactics of future wildfires.

Alternative D—This is similar to Alternative B for the impacts on wildland fire management from motorized use on designated roads and decommissioned roads. This alternative would reduce the vectors for spreading noxious weeds, including cheatgrass, that alter fire regimes. There may also be a reduction in human-caused fire potential because of the travel restrictions and route limitations. There would be fewer opportunities to use roads and trails for burnout operations, which would hinder fire management tactics. All of these impacts together would have a minor effect on fire management when looking at the wildland fire program in northwest Colorado as a whole.

Proposed LUPA—Impacts on wildfire management from travel management would be similar to those under Alternative D for all indicators.

Impacts from Recreation Management on Wildland Fire Ecology and Management

Reduce Human-caused Fires

The reduction in SRPs may slightly reduce the human-caused fire risk. Very few human wildfire ignitions are a direct result of activities associated with SRPs, which usually are highly regulated during the permit process. This reduces the risk that permitted activities could cause a wildfire. However, the general rule applies that the more human activity, the higher potential there is for human-caused ignitions.

Alternative A—Currently in the analysis area there is very little restriction on the issuing of SRPs within PHMA. There is very slight potential for the human activities associated with SRPs in this PHMA causing wildfires.

Alternative B—This alterative would limit the issuing of SRPs in PHMA unless the SRP has neutral or beneficial impacts on the habitat. This should limit SRPs that are being issued, thereby reducing human activities in these areas and very slightly reducing human-caused wildfires.

Alternative C—This alternative would have the greatest impact on reducing human-caused wildfires associated with recreation because it would prohibit camping within 4 miles of active GRSG leks. This could limit wildfires ignited from unattended or abandoned campfires. However, more than likely, it would just displace camping to another area and not reduce the overall human-caused fire potential.

Alternative D—This alternative's impacts would be similar in extent to Alternative B by slightly reducing human-caused wildfire potential.

For the Proposed LUPA, recreation management would be the same as under Alternative D; impacts are therefore the same as those described under Alternative D.

Impacts from Lands and Realty Management on Wildland Fire Ecology and Management

Reduction in the Potential for Human-caused Fires and Reduction in Fire Management Costs

Activities associated with ROWs could increase human-caused fires on the landscape. These include construction and maintenance associated with ROWs where human-caused wildfires can start from such activities as welding, smoking, and driving. Managing ROW exclusion or avoidance areas could lessen the extent of these impacts on existing ROWs instead of creating additional ROWs.

ROWs often create a value at risk on the landscape that may need protecting during a future wildfire. With more values at risk on the landscape, it generally holds true that suppression costs are greater because resources are protecting these values from the future wildfire. These increased costs usually come in the form of additional firefighting resources needed to protect the values at risk. ROWs also limit the opportunities of managing fires for multiple objectives and for capitalizing on the resource benefits attributed to the wildfire. Over time, by not capitalizing on the benefits of wildfire on the landscape, the landscape becomes more susceptible to larger and more severe wildfires, which may have a detrimental effect on the resources and are very costly to suppress.

Depending on the alternative, the impacts of ROW avoidance and exclusion has less potential for having to protect ROWs from wildfires. Restrictions in Alternatives B, C, and D would limit new ROW construction, thus lowering the frequency of ROWs intersecting with wildfires. Collocated ROWs on existing ROWs reduces the net gain of ROW corridors that would need protection from wildfire. Resources used in the protection of ROWs from a wildfire do

not vary too much from a single ROW or a cluster of multiple ROWs in the same corridor. The potential may exist that the overall net decrease in ROWs on the landscape would be minimal because they would just shift location to outside GRSG habitat.

Burying power lines would also reduce the potential of fires. Power lines could create ignitions by downed lines, birds and debris coming in contact with the lines, and trees falling on the lines. Burying lines would eliminate some of the needed resources to protect them during a wildfire. Buried lines may create new safety issues using ground-disturbing suppression resources, such as bulldozers and graders.

Summary of Impacts by Alternative

Alternative A—Currently in the analysis area there are very few ROW avoidance or exclusion areas that exist in association with any type of GRSG habitat. Under this alternative, ROWs would be allowed to be constructed, and while collocation does occur, this alternative has the least emphasis on collocation of ROWs; thus, it would produce higher suppression costs with more ROWs spread over the landscape. This increases the likelihood of ROWs intersecting future wildfires. The opportunities to bury power lines would not occur, thus any reduction of aboveground power lines from starting wildfires would not occur.

Alternative B—This alternative would make both GHMA ROWs exclusion and PHMA ROW avoidance areas. This would benefit the wildland fire program by reducing the number of ROWs on the landscape that would need protecting in a wildfire. This would help reduce wildfire suppression costs. An existing ROW corridor may have more individual ROWs within its footprint, but these would not be spread out, where the chance of intersecting with future wildfires is more likely. This would also slightly reduce the human-caused fire potential associated with ROWs. The potential of burying power lines also exists under this alternative. The anthropogenic cap would be at 3 percent, further limiting new ROWs unless offsetting mitigation occurs.

Alternative C—This alternative may have the most benefit to the wildland fire program by reducing the infrastructure associated with ROWs that needs to be protected during a wildfire. The reduction of ROW activities associated with igniting human-caused wildfires would decrease. This is due to ADH being exclusion area for ROWs. The potential exists that this may not reduce ROWs overall because ROWs would just shift outside of ADH. The anthropogenic cap would be at 3 percent, further limiting new ROWs unless offsetting mitigation occurs.

Alternative D—This alternative would have slightly less effect than Alternative B reducing human-caused wildfire potential and suppression costs associated with protecting ROWs from future wildfire. This is due to PHMA, GHMA, and LCHMA only being managed as avoidance areas. The anthropogenic cap would

be at 5 percent, further limiting new ROWs unless offsetting mitigation occurs. However, this would not be to the extent of Alternatives B and C.

Proposed LUPA—ROW management would be similar to Alternative D. In addition, avoidance areas would extend to 4 miles from active leks in GHMA. Also, under the Proposed LUPA, no aboveground structures would be authorized within 1 mile of active leks in occupied habitat. The impacts on wildfire management under the Proposed LUPA would be similar to those for Alternative D, with slightly less potential for infrastructure and associated potential for wildfire management costs.

Impacts from Wind and Solar Energy Development on Wildland Fire Ecology and Management

Increased Planning, Increased Project Cost, Increased Fire Suppression Costs, Reduced Fire Management Tactics, and Reduced Flexibility in Response to Wildland Fires

In general, moving wind and solar energy development to locations outside of ADH may increase the surface fuel loading as a result of the vegetation clearing needed for development. Areas outside of the GRSG habitat can range from mixed conifer forests, to pinyon-juniper woodlands, to mixed mountain brush vegetation. These communities in general have a heavier fuel load than the predominant GRSG sagebrush vegetation community. This would put the values at risk to wildland fire in a heavier fuel loading. If a fire were to occur, it may have a greater impact on the structures than if they were placed in a lighter fuels type.

The level of planning and the size of the project treatment are directly tied to the size and type of the fuels and the value at risk. The larger the fuel type, the greater the distance that needs to be cleared as a result of the flame length and the radiant heat associated with the fuel.

The value at risks would identify the level of vulnerability or susceptibility to damage if wildland fire were to occur next to it. The greater the fuel loading, the more planning is required to cover any vegetation treatment around any value at risk. There is either increased line construction or mechanical improvements around a value before any implementation of a prescribed fire operation. Or, if the value is too great or if not all of the risks may be mitigated, then the likelihood of the treatment being all mechanical is greatly increased.

Increased mechanical and decreased prescribed fire in general means that the cost per acre would increase due to equipment operational costs. Any increase in cost per treatment would decrease the size of the treatment, compared to using prescribed fire. Generally fuels treated through wind energy development may fragment the fuels, although the intersection of the access routes to the structures would reduce the continuity of the fuels. The breakup in continuity may give an opportunity for managing a potential incident.

Alternative A—There is no impact on the management of wildland fire and fuels treatments in this alternative.

Alternative B—Same as Alternative A.

Alternative C—This alternative has the greatest impact on wildland fire management by causing the need for increased planning, increased project and fire suppression costs, the use of reduced fire management tactics, and reduced flexibility in responding to wildland fires.

Alternative D—Same as Alternatives A and B.

Proposed LUPA—Solar energy development would be excluded from PHMA; impacts on wildland fire management would be similar to those described under Alternative B for terrestrial wildlife; the impacts would therefore be similar to those under Alternative C for those species that have ranges overlapping PHMA. The impact on terrestrial wildlife from restrictions on wind energy development is not expected to vary between alternatives because the potential for wind energy in northwest Colorado is very limited.

Impacts from Solar Energy Development on Wildland Fire Ecology and Management

Impacts would be similar to the impacts of wind energy on wildland fire ecology and management.

Impacts from Range Management on Wildland Fire Ecology and Management

Potential to Alter Fuel Loadings Increasing Fire Size and Fire Management Costs

Several actions associated with range management may influence the wildland fire program by affecting the amount of herbaceous fuels available to carry a wildfire. Overall, the actions to incorporate GRSG objectives into range management would not significantly change range impacts on wildfire, except for the action in Alternative C to retire grazing in all GRSG habitats. Grazing removes varying amounts of herbaceous material or fine fuels that can carry wildfires.

On most BLM-administered and National Forest System lands in northwestern Colorado, the main driver of fire is woody vegetation, while fine fuel is a component of fire spread. Most lands managed in the planning area have some sort of woody species, which is also a key component of fire spread for any given vegetation type.

Grazing or the lack thereof has the largest impact in grasslands, which are areas without woody vegetation; minimal lands in the planning area are grasslands. Therefore, the extent to which grazing practices are changed would only have a very minimal effect on fuel loading, fire size, and fire suppression costs.

Upward Shift in Fire Regime Condition Class

Allowing only treatments that meet GRSG objectives would reduce the total acres of treatments in the planning area. The historic fire return intervals in sagebrush vary from 35 to 450 years (Baker 2006), depending on the species of sagebrush and the site. Due to fire suppression, fire regimes in the planning area have been altered. Vegetation that has missed a fire cycle or two is decadent, with a large dead component that can increase fire intensity.

Range treatments in the past have created early seral vegetation that is less likely to support large wildfires and maintain FRCC. Reducing vegetation treatments that mimic the natural fire effects increases the FRCC of these landscapes, leaving them more prone to large intense wildfires. When vegetation treatment or fire scars are scattered across the landscape, there is a higher likelihood that, when a wildfire does occur, it would intersect these disturbances, limiting fire size. Landscapes that do not have these disturbances are more prone to fires burning more acres than historical wildfires did. As the overall age class of vegetation on the landscape increases, it creates an upward shift in FRCC.

While the treatments would still occur that meet GRSG objectives, they would more likely be mechanical, which are much more expensive than using prescribed fire as a treatment method. This is due to the necessity of GRSG treatments to have to retain minimum percent cover of sagebrush. This is more easily ensured when using mechanical treatment versus prescribed fire treatment. If treatments are more expensive, fewer acres can be treated with the same amount of funds.

Total disturbance caps under some alternatives could limit treatment in a particular zone over the life of this plan if those caps are reached. However, total disturbance caps do not include treatment where the minimum sagebrush cover standards are met for GRSG objectives.

Downward Shift in Fire Regime Condition Class

Several actions associated range management could benefit the wildland fire program by reducing FRCC. These are the actions that reduce the potential of spreading invasive species, such as cheatgrass, and actions that treat invasive species.

Summary of Impacts by Alternative

Alternative A—Currently in the analysis area, there is very little restriction on treatments in GRSG habitat. Treatments for range objectives could continue to reduce the potential for large wildfires and improve FRCC. Grazing would continue at current utilization, providing some reduction in fine fuels that spread wildfire. This reduction is hard to quantify, especially in areas where other woody species are present.

Alternative B—This alterative would limit range vegetation treatments PHMA unless the treatment conserves, enhances, or restores GRSG habitat. This may limit the total amount of treatment allowed on the landscape, potentially increasing FRCC. Monitoring invasive species and treating noxious weeds under this alternative could decrease FRCC. The potential exists to evaluate retirement of grazing allotments; this would have minimal effect on fuel loads due to the presence of woody species that are the primary causes of wildfires in most of the planning area.

Alternative C—This alternative would have the greatest impact on the wildland fire management program by retiring all grazing allotments across ADH. This would increase the fine fuels and could increase fire size, depending on the vegetation and other site-specific factors. Similar to Alternative B, only range vegetation treatments that are shown to have a demonstrated benefit to GRSG would be allowed. The big difference is that this limitation on treatment would be applied to ADH. This would further limit treatment and shift the landscape to a higher FRCC. Fewer treatments result in a landscape more prone to higher intensity and larger wildfires.

Alternative D—This alternative would have impacts similar to Alternative B. Treatments for range management would be allowed, provided there were specific objectives to safeguard a percentage of sagebrush canopy intact for GRSG habitat. This may offer more flexibility in vegetation treatments than Alternatives B and C but could still reduce the number of acres treated from the current level. As long as these GRSG objectives were met, the 30 percent cap under this objective would not include vegetation treatments. This alternative would also look to treat noxious weeds that can improve FRCC. Grazing allotment would not be retired under this alternative; instead, they would be placed in reserve as grass banks that could be used if other allotments could not be used due to wildfires.

Proposed LUPA—Livestock grazing would be managed the same as described for Alternative D; therefore, impacts on wildland fire ecology and management are the same as those described under that alternative.

Impacts from Fluid Minerals Management on Wildland Fire Ecology and Management

Altered Project Design and Reduce Effectiveness

In areas with high potential for fluid mineral development, restrictions on development disturbance would generate a greater need for off-site mitigations than in lower potential areas. These mitigation actions may range from rehabilitating existing anthropogenic disturbances to creating additional habitat by removing other vegetation to allow for less competition for sagebrush. The vegetation treatments used to create or improve sagebrush areas is where the impact on wildland fire management would occur. The placement of the

mitigation vegetation treatments would be directed toward areas where habitat improvements are necessary and may not take into consideration other values at risk. If the percent of sagebrush canopy cover by species were not met, then the action would result as a disturbance toward the total disturbance level. This would reduce the ability to treat vegetation surrounding infrastructure and other values.

Alternative A—Few restrictions on surface disturbance would allow for increased development without a need for off-site mitigations. This allows for fuels project design and location to be placed in the best location to reduce the potential loss of GRSG habitat and reduce wildland fire threat to infrastructure, thereby increasing the potential effectiveness of the project treatments. Increased development may increase surface fuels next to development, requiring specific mitigations during site-specific NEPA analysis to address the management of the fuels during development.

Alternative B— Alternative B would place a 3 percent anthropogenic surface disturbance cap in Colorado MZs in PHMA. This would increase the need for off-site mitigations to offset the anthropogenic disturbances generated through development, when compared to Alternative A. The measures that treat vegetation within the area impacted to improve habitat influencing the PHMA within the MZ would increase. Alternative B would also reduce the possible sizes and locations of fuels project vegetation treatments, which could reduce the effectiveness of the projects treatment in reducing the potential wildland fire threat to GRSG habitat.

Alternative C—This alternative proposes the most restrictions on surface-disturbing activities over the largest area (ADH). These restrictions would increase the need for off-site mitigation to offset the disturbances generated though development, compared to Alternative B, which would apply the cap to ADH. Under Alternative C there may be a greater need for off-site mitigation to compensate if the disturbance caps were exceeded.

Alternative D—This alternative proposes a moderate level of restrictions to surface-disturbing activities, as compared to Alternatives B and C. The disturbance cap would be managed at 5 percent in ecological sites that support sagebrush in PHMA (see **Figure 2-1**, Ecological Sites Supporting Sagebrush in PHMA). The need for mitigation to offset the disturbances created through development would remain, but to a lesser degree than Alternatives B and C.

Proposed LUPA—impacts would be similar to those described above for Alternative D. However, additional restrictions on land use and other authorizations would be included under the Proposed LUPA: extending the avoidance areas to 4 miles from active leks in GHMA, prohibiting aboveground structures within 1 mile of active leks, and restricting surface disturbance to 3 percent in PHMA. Impacts on wildland fire ecology and management would be similar to those described for Alternative D, for all indicators, with slightly

greater impacts on wildland fire ecology and management due to increased restrictions on disturbance and disruptive activities.

Increased Project Requests
As development occurs, the need for off-site mitigation to improve, restore, or create suitable GRSG habitat would increase as the level of disturbance approaches the anthropogenic limit. The increase in off-site mitigation could create opportunities to reduce fuel loading on the landscape. It would do this by helping to develop, plan, and place the proposed treatments where they would benefit wildland fire management. This combined effort to reduce the fuel loading and improve habitat would increase the amount of vegetation treatments possible and would reduce the impact on the overall disturbance limit of 30 percent.

Summary of Impacts by Alternative
Alternative A—This alternative does not require the use of this type of mitigation work.

Alternative B—This alternative provides more direction and limitation to the level of disturbance to 3 percent within PHMA. This would cause an increase within this habitat type but may curb or move development outside of PHMA, where the anthropogenic limit is not a factor.

Alternative C—This alternative provides the greatest opportunity for off-site mitigation work as the anthropogenic limit is 3 percent for ADH. This is a greater restriction on development within these habitat types and may move some development outside of GRSG habitat in general until the limits are mitigated.

Alternative D—This alternative is less beneficial than Alternative C but more beneficial than Alternatives A and B. In this alternative, the anthropogenic limit is 5 percent, and the disturbance generated through the off-site mitigation does not apply to the overall disturbance limit of 30 percent.

Proposed LUPA—See Altered Project Design and Reduced Effectiveness, above.

Impacts from Locatable Minerals, Nonenergy Leasable Minerals, and Salable Minerals Management on Wildland Fire Ecology and Management

Impacts would be the same as those described under *Impacts from Management of Fluid Minerals on Fuels Management*.

Impacts from Fuels Management on Wildland Fire Ecology and Management

Upward Shift in Fire Regime Condition Class
Allowing only treatments that meet GRSG objectives would reduce the total acres of treatments in the planning area. The fire return intervals in sagebrush

vary from 20 to 70 years, depending on the species of sagebrush and the site. Due to fire suppression, fire regimes in the planning area have been altered. Vegetation that his missed a fire cycle or two is decadent, with a large dead component that can increase fire intensity.

Range treatment in the past has created early seral vegetation, which is less likely to support large wildfires and that maintain FRCC. Reducing vegetation treatments that mimic the natural fire effects increases the FRCC of these landscapes, leaving them more prone to large intense wildfire. When vegetation treatment or fire scars are scattered across the landscape, there is a higher likelihood of a wildfire intersecting these disturbances and limiting fire size. Landscapes that do not have these disturbances are more prone to fires burning more acres than historical wildfires did. As the overall age class of vegetation the landscape increases, it creates an upward shift in FRCC.

While the treatments that meet GRSG objectives would still occur, they would more likely be mechanical treatments that are much more expensive than using prescribed fire as a treatment method. This is due to the necessity of GRSG treatments to retain minimum percent cover of sagebrush. It is more easily ensured when using mechanical treatment versus prescribed fire. If treatments are more expensive, fewer acres can be treated, budget being a limiting factor. Total disturbance caps in some alternatives can limit treatment in a particular zone over the life of this plan if those caps are reached.

Increased Planning Time, Decreases in Project Size, Altered Project Design with Reduced Effectiveness, Increased Project Cost

Limiting the size of treatments greatly reduces the effectiveness of the treatment's intent: to reduce the risk of large wildland fire from burning across a landscape and potentially impacting other values at risk. A limit on all general disturbances within any given area would eventually limit the ability to plan landscape projects and apply the associated treatments. In order to facilitate a set limit, there would be a need to do more extensive planning on each project and treatment to maximize a rotation, where the landscape may be treated in coordination with development, and maintaining the required percentages of sagebrush canopy cover. In order to protect GRSG habitat, aggressive suppression actions would be required to limit the size and extent of wildland fire. Aggressive suppression actions would dictate an increase in suppression resources such as engines, dozers, aircraft, and personnel, which would increase the cost of wildland fire.

Off-site mitigation to improve the habitat would also require more planning to ensure that the mitigation does not impact the ability to complete a fuels treatment. This may be beneficial if the project were able to coincide with a fuels project treatment area. Without outside contributors to projects and the need to stay within an acreage limit for allowed disturbance, the ability to use wildland fire, whether it is a planned ignition or natural, is greatly reduced.

Discouraging the use of wildland fire to treat sagebrush would move the preferred treatment from fire to mechanical. Mechanical treatment would also require an increase in planning and implementation, which would increase the cost. Any increase in cost for planning would reduce funds available for implementation. Reduced funds generally mean that treatment size is reduced.

Fuels treatments in GRSG habitat would require further implementation-level planning, as described in **Appendix O**.

Summary of Impacts by Alternative
Alternative A—This alternative has the fewest restrictions on the ability to conduct hazardous fuel treatments.

Alternative B—This alternative is more restrictive than Alternative A, in that the treatments are only to benefit or conserve habitat that is to be applied to PHMA.

Alternative C—This alternative is more restrictive then Alternatives A and B, in that the treatments must be for the benefit and conservation of ADH.

Alternative D—This is the most restrictive alternative in that treatments applied would be to improve or conserve ADH. Alternative D has additional stipulations that apply to the definition of disturbance and requirements to move areas out of disturbance to suitable GRSG habitat.

Proposed LUPA—See *Altered Project Design and Reduced Effectiveness*, above.

Impacts from Fire Operations on Wildland Fire Ecology and Management

Upward Shift in Fire Regime's Condition Class, Reduced Flexibility to Respond to Wildfires
Prioritization of wildland fire responses is based on values at risk and the ability to successfully complete any specific operation. Human life and safety would always take precedence for the wildland firefighting crews to respond to. Other things considered are improvements that, if damaged or destroyed, would have a great impact on the local area and also nationally and areas that would directly impact human activities.

GRSG is a value at risk, not unlike municipal watersheds or a watershed that feeds an endangered fish habitat or a culturally significant site. With many equally competing values at risk to wildland fire, an implementation plan must stipulate how to prioritize wildland firefighting crews' efforts (see **Appendix O**).

The ability to use wildland fire, whether planned or naturally ignited, removes one tool to manage a fire for firefighter safety: to benefit resources and return the vegetation community to a normal fire return interval. The use of such

tactics is not only based on values at risk but also the firefighting resources available to perform this and other tactics successfully and in a timely manner.

Increased Suppression Cost

The use of fire to mimic a mosaic pattern and to return the natural state of the vegetation community is a tool in resource management outside of wildland fire management. The ability to use fire to manage a wildland fire may have far-reaching impacts on the responding firefighting crews' ability to keep the wildland fire small, as well as for other resources to take advantage of a situation to help reduce vegetation cover, type, and composition. To suppress every fire takes firefighting resources, and values at risk outside of life and property also dictate what methods may be used. The use of heavy equipment in sagebrush is a successful method for constructing extensive fire lines in a comparatively short period.

The aerial application of retardant is also a good method for slowing the spread of the fire, but it must be followed up with equipment or crews to completely remove the fuels from the fire's path. These resources come at a financial cost. Transporting heavy equipment, training the operators, maintaining the equipment, and supplying the fuel are all costs associated with the equipment if agency owned. If it is contracted equipment, these are taken in as a factor when calculating the hourly operating cost.

The same is taken into account for applying retardant. Both require firefighters to ensure that the fire does not cross the line. The equipment line must be rehabilitated to correct the vegetation damage done during suppression. Holding on to resources to reduce the threat of a fire escaping the control lines is an additional cost. Holding on to crews to mop-up (extinguishing or removing burning material near control lines, felling snags, and trenching logs to prevent rolling after an area is burned, to make a fire safe, or to reduce residual smoke) black next to unburned islands is a cost above what is the normal procedure for cleanup.

All of this is a suppression cost and can add up quickly, extending the cost well beyond that of a similar fire using other methods of suppression.

Summary of Impacts by Alternative

Alternative A—This alternative provides the least restrictions on wildland fire management.

Alternative B—This is more restrictive than Alternative A in the limitation of using fire and prioritizing suppression in and near GRSG PHMA and GHMA.

Alternative C—This has the same impacts as Alternative B.

Alternative D—This alternative is more restrictive than Alternative A but less restrictive than Alternatives B and C. The prioritization of fire suppression in

and near PHMA and GHMA is taken into consideration and given a preference, in conjunction with all other resource values based on site-specific circumstances.

Proposed LUPA—see *Altered Project Design and Reduced Effectiveness*, above.

Impacts from Emergency Stabilization and Rehabilitation on Wildland Fire Ecology and Management

Potential to Increase Emergency Stabilization and Rehabilitation Costs

Across ADH, fire rehabilitation would prioritize the use of native seed under Alternatives B, C, and D. Historically native seeds are often more expensive than nonnative seed used in fire rehabilitation. This prioritization of ADH among all fire rehabilitation may limit funding and resources for ESR on wildfires outside of GRSG habitat. Depending on the severity and extent of the fire season nationwide, certain seed availability and prices can change. In years where lots of acres burn nationwide, the potential exists that some lower priority post-wildfire projects may not receive ESR funds. Also in these years the seeds needed for ESR, especially seed in high demand, may not be available. If native seed is available, the demand may be so high that seed prices would rise farther, limiting the total acres of rehabilitation on BLM-administered and National Forest System land. There may only be a short-term effect on seed prices once the market adjusts to the demand.

Downward Shift in Fire Regime Condition Class

Post wildfire rehabilitation is vital to reduce post-fire potential of noxious weed invasion, including cheatgrass. Post-fire cheatgrass infestation can alter fire regimes dramatically by increasing the fire return intervals to every 2 to 5 years. Post-wildfire cheatgrass conversion is one of the biggest challenges in wildfire rehabilitation across the Great Basin, not just in northwest Colorado. The ESR actions in these alternatives would help reduce the potential for cheatgrass invasion, thus maintaining FRCC. This not only includes seeding but those management actions that help areas achieve and maintain desired conditions of ESR projects to benefit GRSG.

Summary of Impacts by Alternative

Alternative A—Currently, there is variability in the degree, extent, and seed type of wildfire rehabilitation within GRSG habitat. Under this alternative, the current way of a case by case determination of ESR after wildfire would continue. Some post-wildfire temporary land management changes do occur to improve the probability of seedling establishment.

Alternative B—This alternative has the use of preferred native seed the priority for use in ESR project in ADH. Additionally, Alternative B may require the temporary or long-term changes in grazing, wild horse management, or travel management to ensure that the desired conditions of ESR projects meet GRSG

objectives. This would, overall, improve the success of seeding to protect post-burn areas from cheatgrass infestations, thus maintaining or improving FRCC.

Alternative C—This alternative would have the greatest impact on the potential success of post-fire ESR by even further limiting grazing until the conditions meet GRSG habitat objectives. The priority to use native seed would be the same as under Alternative B. This would prevent cheatgrass infestation to improve FRCC.

Alternative D—This alternative has impacts similar to Alternative B in prioritizing use of native seed during ESR on GRSG habitats. Alternative D also looks to design post-fire land management to ensure persistence of seeded species or pre-burn natives. However, these post-burn changes in land management practices do not go to the extent that they do in Alternative C to ensure rehabilitation success. FRCC again would benefit from the emphasis on ESR to prevent conversion to cheatgrass and other invasive plant species.

Proposed LUPA—See *Altered Project Design and Reduced Effectiveness*, above.

Impacts from Habitat Restoration on Wildland Fire Ecology and Management

Downward Shift in Fire Regime Condition Class

Creating landscapes that benefit GRSG through the use of restoration projects would improve FRCC. The several aspects of restoration may create this benefit by reducing the infestation of cheatgrass and other nonnatives that can alter fire frequency. Restoration may also reduce mid- to late seral encroachment of pinyon-juniper on sage steppe. Removing encroaching conifer could reduce fire intensity and fire potential and improve FRCC.

While GRSG restoration would affect FRCC, the areas most likely to benefit GRSG might not relate to the areas that would most likely benefit FRCC and hazardous fuels reduction. Furthermore, landscape patterns that most benefit GRSG may be more prone to wildfire due to lack of disturbance and early seral areas. Completed restoration projects may further increase the suppression priority of that area, increasing demands for fire suppression resources.

Much like ESR, restoration project areas would have greater potential for success in seeding by changing the post-treatment land management use. This may include long-term or temporary changes in livestock grazing, wild horse management, and travel management. This could reduce cheatgrass introduction and spread in these project areas, benefiting FRCC. Evaluating ecological site descriptions in relation to native herbaceous plant potential would also help protect against invasive plants.

Upward Shift in Fire Regime Condition Class

Alternative C avoids the use of sagebrush treatments to increase the livestock or big game forage. While this is already the case in other actions analyzed in this EIS, limitation on treatment could limit creation of early seral stages on the landscape, making it more prone to large fires.

Summary of Impacts by Alternative

Alternative A—Currently in the analysis area there are multiple efforts based on a variety of resources and resource uses to restore Colorado MZs. The combined effect of these projects on the wildland fire management is usually a reduction of FRCC. There is also the ability of the fuels program to match funds or other resources to jointly work on these types of projects that, in part, achieve hazardous fuels reduction. Much of this habitat type work is focused on big game winter range and is jointly funded with external partners, such as the CPW Habitat Partnership Program, Rocky Mountain Elk Foundation, and Mule Deer Foundation. These joint funded projects allow the fuel program within the wildland fire program to treat more acres.

Alternative B—This alterative prioritizes restoration projects on 1,744,108 acres of ADH in the planning area on environmental variables that are most likely to benefit GRSG. By limiting the objectives of restoration projects to this focus, there may be less total treatment of vegetation across the landscape. While some vegetation to improve GRSG habitat may benefit FRCC, some may have little to no effect, depending on design and treatment method. Once restoration has occurred, there is likely to be a higher emphasis for suppression of future wildfires in that area, creating further demand for fire suppression resources.

Alternative C—This alternative is similar to Alternative B prioritizing restoration projects to those most likely to benefit GRSG; therefore, the impacts would be similar. There are additional actions in this alternative limiting treatment designed to increase livestock or big game forage. This may exclude some treatment that could restore FRCC.

Alternative D—This alternative has impacts similar to Alternatives B and C; however, there would be more flexibility to have treatments, as long as they meet the percent canopy cover objectives for sagebrush.

Additionally, flexibility is built into this alternative to consider all resource values managed by the BLM and Forest Service in conjunction with GRSG objectives. This includes exemptions, as site-specific circumstances warrant. This may grant the ability to design restoration treatments that are more effective in reducing fire potential and hazardous fuels than Alternatives B and C. Besides Alternative A, this alternative has the greatest potential to build some hazardous fuel objectives into restoration project design to benefit the wildland fire program. It would accomplish this by reducing large fire potential and improving FRCC, in conjunction with meeting GRSG objectives.

Proposed LUPA—See *Altered Project Design and Reduced Effectiveness*, above.

4.8.4 Summary of Impacts on Wildland Fire Ecology and Management

Alternative A—Overall, this alternative provides the least level of restriction and impacts on wildland fire management. The current spectrum of fire management opportunities would still be available for use.

Alternative B—This alternative is moderately restrictive in that there are some actions that would be in PHMA, but the remaining habitat areas have few restrictions to wildland fire management.

Alternative C—This alternative is the most restrictive to wildland fire management, as all of the restrictions apply to ADH, and there is no flexibility to use opportunities during the course of managing a wildland fire or in the development of a vegetation treatment.

Alternative D—This alternative is more restrictive than Alternative B as it is applied to AHD and not just PHMA. However, this alternative is less restrictive to wildland fire management than Alternative C in that the level of impacts would be the same, but it allows for increased flexibility of how wildland fires and fuels are managed.

Proposed LUPA—Impacts on wildland fire ecology and management from the Proposed LUPA would be greater than Alternatives A and D but less than Alternatives B and C.

4.9 MINERALS (LEASABLE)

This section describes impacts on leasable minerals including oil and gas, oil shale, and coal. Impacts on nonenergy leasable minerals would be the same as those described for salable minerals (see **Section 4.10**, Minerals—Salable).

4.9.1 Fluid Leasable Minerals

Decisions for fluid leasable minerals also apply to oil shale (see **Chapter 2**). As such, impacts described in this section are also applicable to those resources; no separate discussion for oil shale is included.

General Description

A total of 2.8 million acres of federal mineral estate underlie federal, state, and private lands within the decision area. Of this total area, 1.7 million acres are associated with BLM-administered and Routt National Forest surface lands. Current federal oil and gas leases are 653,700 acres, or 26 percent of the total federal mineral estate in the planning area. Unleased federal mineral estate within areas of high potential for oil and gas are 521,600 acres, or 21 percent of the total federal mineral estate within the planning area.

Table 3.39 summarizes this information for the planning area.

Methodology and Assumptions

General Impacts on Fluid Leasable Minerals
Indicators of impacts on fluid leasable minerals and the measurements used to describe the impacts (where available or appropriate) are described below.

- Reduced availability of federal fluid minerals for new oil and gas leases

  Specific Measure: Closure of Federal Mineral Estate Lands to Leasing

  - Amount of federal minerals available versus closed to leasing (fewer new leases)
  - Indirect impacts include loss of production of oil and gas for the public use and generation of sale revenues, federal royalties from production, and tax revenues

- Reduced access to new and existing oil and gas leases

  Specific Measure: NSO Stipulations on All or Parts of New Leases

  - Fewer leases (large or contiguous small leases with no nearby private land), fewer potential downhole targets reachable (fewer applications for permits to drill per lease)
  - Indirect impacts include reduced production of oil and gas for the public use and for the generation of lease sale revenues, federal royalties from production, and tax revenues; possible adverse impact on lessee of higher cost of accessing portion of lease from nearby private land

  Specific Measure: ROW Exclusions on Lands Needed for Road and Utility Access

  - Fewer new leases, fewer wells on lands where pads permissible but ROW access across adjacent lands not permissible (ROW exclusion area)
  - Indirect impacts include reduced production of oil and gas for the public use and for the generation of lease sale revenues, federal royalties from production, and tax revenues; possible adverse impact on lessee of higher cost of accessing portion of lease via more circuitous route for access road, pipelines, electric utility lines

  Specific Measure: Restrictions on Amount, or Location of Surface-Disturbing Activities (Well Pads, Access Roads, Pipelines, Power Lines) on New or Existing Leases

  - Fewer potential downhole targets reachable (fewer applications for permits to drill per lease or per section)

  - Indirect impacts include reduced production of oil and gas for public use and for the generation of lease sale revenues, federal royalties from production, and tax revenues; adverse financial impact on lessee of reduced revenues from lease in relation to sale price (mostly an issue for existing leases); adverse financial impact on lessee of accessing a portion of mineral estate from nearby private land

- Increased costs and decreased efficiency of oil and gas development

  Specific Measures (Examples): Seasonal Closures, Undergrounding of Electric Distribution Lines, Noise Abatement, Visual Screening, Higher Reclamation Costs, Specialized Fencing)

  - Reduced development in otherwise permissible areas (fewer leases, fewer applications for permits to drill per lease or section), particularly in areas of more marginal production potential and during periods of low market prices of oil and gas
  - Indirect impacts include reduced production of oil and gas for public use and for the generation of lease sale revenues, federal royalties from production, and tax revenues; adverse financial impact on lessee (especially for restrictions on existing leases)

For all of these types of impacts, it is impossible to state with certainty in this EIS the degree to which they would result in the adverse impacts noted above. Only the following would allow a definitive estimate of the impacts on fluid mineral production: planning for specific lease sales, the outcomes of those lease sales, and the number of potential downhole targets accessible within each lease as identified during project-specific NEPA analysis.

For example, leases only partially within GRSG habitat and smaller leases interspersed with private lands may be mostly developable from allowable surface locations on BLM-administered lands, National Forest System lands, or nearby private lands. In contrast, leases mostly or entirely within GRSG habitat and larger leases or contiguous smaller leases with no intervening private lands may be mostly undevelopable in terms of reachable downhole targets and increased cost of operations. These considerations, along with potential advances in technology, changes in economics (e.g., wellhead prices for oil and natural gas), and geopolitical factors are likely to profoundly affect how each alternative analyzed in this EIS impacts oil and gas leasing and development for the foreseeable future.

Assumptions

The following list presents basic assumptions related to oil and gas leasing and development that apply to the impacts assessment for Alternatives A through the Proposed LUPA:

- Fluid minerals are not evenly distributed across the landscape
- Oil and gas operations are sensitive to costs, especially when prices are depressed
- Operators need predictable continuity of operations before acquiring or developing a lease
- The ability to drill or construct roads and pipelines on private lands to access federal minerals subject to landowner approval is not guaranteed
- Development techniques are highly technical and not uniformly applicable
- Seasonal closures on multi-well pads may make full development over many years infeasible
- Clustering more wells on fewer pads increases size of each pad but reduces total disturbance
- Maximum lateral reach of normal directional wells is.6 mile; maximum lateral reach of horizontal wells is 2 miles
- Practicability of pipelines instead of trucks for hauling liquids depends on distance and the number of wells
- Interim reclamation reduces pad size by about 50 percent
- Original pad footprint subject to periodic redisturbance unless pad fully drilled out
- Minimum of 5 years needed for restoration of self-sustaining native grass/forb cover on pad, pipeline, and roadway reclamation
- Minimum of 10 years needed for successful establishment or colonization by sagebrush on pad, pipeline, and roadway reclamation

Implementing management actions for the following resources would have negligible or no impact on fluid minerals; therefore, these impacts are not discussed in detail: recreation, wind energy development, industrial solar development, range management, wild horse management, ESR, and habitat restoration.

Direct and Indirect Impacts on Fluid Minerals

Impacts from Travel Management on Fluid Minerals

A variety of management actions affecting travel and transportation are being applied or are proposed to be applied under Alternatives B through D to reduce adverse impacts on GRSG and its habitats. These have varying degrees of potential adverse impacts on leasing and development of fluid minerals (oil and gas). In general, management actions for resources and resource uses could affect oil and gas production when they result in reduced availability of federal

mineral estate for leasing, reduced access to new or existing leases due to restrictions on use of the overlying surface lands, and reduced efficiency and increased operational costs that make a potentially developable site economically infeasible.

Reduced Availability of Federal Mineral Estate for New Oil and Gas Leases

Alternative A—None of the five field offices currently manages areas as closed to fluid minerals leasing because of travel management considerations, and new or existing leases are not subject to closures or other travel limitations. Current management by field office is discussed below.

Colorado River Valley Field Office—Current management identifies 2,800 acres of PHMA as open to OHV travel, 200 acres as closed, and 21,600 acres as limited. Within GHMA, 3,000 are inventoried as open, 2,300 as closed, and 11,200 as limited. The area closed to OHV travel is extremely small in respect to PHMA lands available for fluid mineral leasing, representing only 0.1 percent of 22,800 total acres. Furthermore, most of these lands are mapped as low potential for oil and gas development. In relation to GHMA, the area closed to OHV travel represents 14 percent of 16,200 total acres. Closures would not apply to authorized oil and gas exploration and development.

Grand Junction Field Office—The mapped GRSG habitat is largely accessible via an extensive network of roads and trails in the area. Travel surfaces range from paved roads to primitive dirt roads only accessible by high clearance, four-wheel-drive vehicles, OHVs, foot, or horseback.

Currently, all of the BLM-administered lands within PHMA are managed as open to cross-country travel for all modes of transportation. Within PHMA, 17 miles of travel routes have been inventoried on BLM-managed lands. In GHMA, some 6,300 acres of BLM lands are managed as open to cross-country travel, and 2,500 acres are managed with a seasonal closure (December 1 to May 1) to motorized use to protect wintering big game. During the rest of the year, motorized travel in that area is limited to existing routes. Within GHMA, 32 miles of travel routes have been inventoried. Vehicular traffic within the mapped GRSG habitat is generally very light. Traffic temporarily increases during oil and gas drilling and completion operations. Slight seasonal increases in traffic also result during fall hunting seasons.

Kremmling Field Office—Under Alternative A, a small portion of PHMA in Zones 11 and 13 would be closed to OHV travel. Areas closed to OHV travel total 8,700 acres, or 0.02 percent of total BLM surface estate within the KFO; a vast majority of these lands is outside of PHMA and GHMA. The potential impacts on leasing and development of fluid minerals from travel management closures would be negligible, if any. Overall, most areas are open to OHV travel (307,300 acres, or approximately 81 percent of BLM land within the KFO), or limited to existing routes (7,300 acres, or 0.019 percent) or designated routes (54,500 acres, or 14.4 percent).

Exception criteria also apply that would allow administrative access with BLM authorization when travel is approved in areas closed or limited to existing or designated routes. For instance, exceptions may be granted when OHV travel is necessary for valid existing rights or to access mineral and energy sites in areas where travel is not designated as open. Travel restrictions would primarily have an objective other than reducing adverse impacts on GRSG and its habitats. Routes could be constructed in PHMA and GHMA. A 3 percent disturbance cap would not be applied or affect construction of new roads.

Little Snake Field Office—Current management under the 2011 RMP includes designating areas as open, limited, or closed to vehicle use, consistent with the following guidelines:

- Enables access where needed
- Limits points of access to reduce the number of redundant roads and trails
- Reroutes, rehabilitates, or eliminates existing roads and trails that are damaging cultural or natural resources
- Reroutes roads and trails that are landlocked by private parcels
- Restricts access to meet resource objectives, such as imposing seasonal road closures and installing gates
- Concentrates stream and riparian crossings
- Reduces habitat fragmentation
- Considers new construction and reconstruction of roads and trails
- Pursues access to specific parcels to improve access to public lands for land management purposes

As an outcome of that process, the LSFO has made travel management designations for Colorado MZs within its boundaries. For both PHMA and GHMA, most lands are designated as limited (552,000 acres in PHMA, 451,200 acres in GHMA); closed areas include 18,400 acres in PHMA and 8,700 acres in GHMA, while open areas are 31 acres of PHMA and 19,700 acres of GHMA.

White River Field Office—Under current management, no restrictions on travel in PHMA are proposed. BLM roads within the WRFO are open to public travel at all times, subject to any limitations or restrictions outlined in the 1997 White River RMP. Travel restrictions would primarily have an objective other than reducing adverse impacts on GRSG and its habitats. Existing routes in PHMA could be upgraded to a higher use category (e.g., from trail to primitive road or from primitive road to road). Routes could be constructed in PHMA. Restrictions on public vehicle access could be applied, as outlined in the 1997 White River RMP. Methods restricting access may include installing lockable

gates, barricades, and other deterrents, installing signs, or reclaiming and abandoning roads or trails.

Within the WRFO, 1,070 miles of routes are designated as limited and 17 miles are designated as closed in mapped PHMA. This translates to a total of 288,000 acres of BLM-administered lands designated as limited and 7,500 acres designated as closed to motorized use in the PHMA. Within mapped GHMA, a total of 1,324 miles are designated as limited and 9 miles designated as closed. This translates to approximately 322,300 acres of BLM-administered land designated as limited and 3,300 acres as closed to motorized use in GHMA. No areas within the WRFO are designated as open.

Alternative B—None of the travel restrictions under this alternative would preclude leasing currently unleased federal fluid mineral estate. However, any new leases would have a lease stipulation stating that no new roads could be constructed in PHMA or existing routes upgraded to a higher use category in PHMA. Limitations on new or upgraded roads could adversely impact whether a specific parcel is suitable for development in terms of access. This could result in a de facto limitation on new leases, although the scale of such impact, if it were to occur, cannot be quantified at this time.

Alternative C—As under Alternative B, none of the measures related to travel management would preclude leasing currently unleased federal fluid minerals. However, Alternative C would apply limits on realigning or upgrading routes within ADH, and not only PHMA, and would prohibit new roads within 4 miles of a lek. As with Alternative B, it is possible that the travel restrictions could reduce industry interest in nominating or bidding on future leases in certain areas, although the degree to which this would result in a de facto limitation on new leases cannot be quantified.

Alternative D—This alternative is less restrictive than Alternatives B and C in that no consideration would be given to permanent closures, and road realignments and upgrades would be less severely constrained; therefore, it is unlikely that travel management would result in a de facto closure to future leasing under Alternative D.

Proposed LUPA—Impacts on fluid minerals from travel management would be similar to those described above under Alternative D.

<u>Reduced Access to New or Existing Federal Oil and Gas Leases</u>

Alternative A—See the discussion of current management and associated impacts for Alternative A under *Reduced Availability of Federal Mineral Estate for New Oil and Gas Leases*. None of the restrictions under current management would apply to leasing and development of federal oil and gas resources but could guide project-specific planning.

Alternative B—Under this alternative, restrictions on travel would be implemented in PHMA to reduce disturbance of GRSG from movement, noise, dust, and incidental human activity associated with vehicular travel. Motorized travel would be restricted to existing routes. No routes in PHMA could be upgraded to a higher use category (e.g., from trail to primitive road or from primitive road to road) unless necessary. This would include for motorist safety or to avoid constructing a new road outside the PHMA, and then only if impacts on GRSG would be minimal.

Similarly, no new routes could be constructed in PHMA, although portions of existing routes may be rerouted for the same reasons. An exception to the prohibition on new routes, except for realignments, is in the case of valid existing rights (current leases). To access current leases, new routes could be constructed; however, this would be allowed only to the minimum standard necessary for safe travel by the required types of vehicles and intensity of use, and only to the extent permissible, with a 3 percent disturbance cap. Where existing routes are no longer needed, Alternative B would require that the area be restored with seed mixes appropriate for use in GRSG habitat and potentially including transplanted sagebrush.

Travel management planning under Alternative B would also consider the need for seasonal or permanent closures or for limiting routes to administrative use. This would entail completing an activity-level travel plan within 5 years of the ROD for the EIS. Any permanent or seasonal closures resulting from an activity-level travel plan required to be developed within 5 years of the ROD could further reduce development potential by restricting access to affected leases.

Compared to Alternative A, restricting travel to existing routes and limitations on upgrading or realigning existing routes under Alternative B could affect approximately 1.25 million acres of federal mineral estate lands in the planning area. This represents slightly more than 50 percent of the federal minerals within the 2.47 million acres of federal minerals in the decision area.

Because the timing, size, and location of projects subject to these restrictions are unknown at this time, any impacts of travel restrictions under this Alternative B on future access to oil and gas leases and numbers of wells cannot be quantified, except in conjunction with specific project proposals. Estimates of areas that would have travel restricted to existing routes and limitations on upgrading or realigning existing routes, by field office, are as follows:

- Colorado River Valley Field Office—0 acres
- Grand Junction Field Office—5,500 acres
- Kremmling Field Office—591,800 acres
- Little Snake Field Office—458,600 acres

- White River Field Office—197,300 acres
- Routt National Forest—5,200 acres

Alternative C—In terms of travel management, this alternative is similar to Alternative B. For existing leases, the accommodation for new roads would be more restrictive, with no construction within a 4-mile buffer of a lek. Four other types of restrictions under Alternative B—for example, allowing realignments or route upgrades only in certain specified situations and closing and revegetating unneeded routes to restore GRSG habitat—would apply to ADH instead of PHMA. Other measures would be the same as under Alternative B.

Based on the above, Alternative C would be more restrictive than Alternative B, with greater potential for making leasing or development infeasible in terms of acres of federal leases accessible. Based on current lek locations within the planning area, approximately 1.34 million acres would be closed to new route construction and realignment or upgrading. This is 7 percent more area than under Alternative B and approximately 54 percent of the total federal fluid mineral estate in the decision area. However, it is not possible to estimate the impacts on oil and gas development in terms of numbers of wells due to reduced access. This is because the exact size and location of potentially affected projects are unknown.

Estimates of areas that would have travel restricted to existing routes and limitations on upgrading or realigning existing routes, by field office, are as follows:

- Colorado River Valley Field Office—29,800 acres
- Grand Junction Field Office—14,400 acres
- Kremmling Field Office—109,100 acres
- Little Snake Field Office—922,100 acres
- White River Field Office—297,300 acres
- Routt National Forest—20,000 acres

Alternative D—This alternative is generally similar to Alternative B, although it is more restrictive in some aspects and less restrictive in others. For example, the consideration for seasonal closures on travel would apply to ADH instead of PHMA. On the other hand, no consideration would be given to permanent closures. New roads needed to access valid existing rights (current leases) would abide by the Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development, also known as the Gold Book, and would be limited to a 5 percent instead of 3 percent disturbance cap.

In addition, an exception could be granted for the 5 percent disturbance cap under certain circumstances. One circumstance would be if GRSG populations

within the MZ were healthy and stable or increasing and the construction would not adversely affect GRSG due to habitat loss or disruptive activities. Similarly, road reroutes and upgrades would be less severely restricted. The evaluation would be based on adverse impacts on GRSG populations instead of a requirement for a benefit in terms of safety or to avoid new construction.

In general, impacts would be somewhat less than under Alternative B in severity and extent, and the BLM and Forest Service would have greater flexibility to evaluate and approve projects on a case-by-case basis. Impacts would be substantially less than under Alternative C, which prohibits new road construction within 4 miles of a lek.

Alternative D would apply more widely but have greater flexibility for the BLM and Forest Service to approve projects based on site-specific conditions, mitigation, and other considerations. Because of this, a quantitative estimate of area to which the alternative applies would not be a meaningful number in terms of impacts on fluid minerals.

Proposed LUPA—Impacts on fluid minerals from travel management would be similar to those described above under Alternative D.

Increased Costs and Decreased Efficiency of Oil and Gas Development

The restrictions under Alternatives B, C, and D and the Proposed LUPA on new road construction, realigning or upgrading existing roads, giving consideration to seasonal or permanent closures, and the 3 percent or 5 percent disturbance caps have the potential to make small or marginal projects economically nonviable due to increased costs.

The degree to which increased costs and decreased efficiency, such as from longer or more difficult access routes or from seasonal closures would affect the scale and location of future development, and would depend on several factors: the increased cost of complying with the restriction and the number of wells potentially lost in relation to the volume and market value of the commodity being produced (oil, natural gas, or associated hydrocarbons).

For small or economically marginal projects, and areas where the restrictions would greatly increase costs, the result could be to reduce fluid minerals development at a scale that would be considered significant at the local (field office) and potentially larger (state and regional) levels.

Impacts from Lands and Realty Management on Fluid Minerals

Management actions related to lands and realty in conjunction with protection of GRSG and its habitats and use area could adversely impact fluid minerals leasing and development. This potential includes all three types of impacts on oil and gas described previously: reduced availability, reduced accessibility, and increased costs.

Reduced availability is the least significant impact from lands and realty actions. This is because the BLM does not require a lands action (i.e., issuance of a ROW grant) for surface occupancy of federal lands to drill into federal minerals. However, accessibility to federal minerals with new leases could be significantly reduced or precluded when management of specific areas as ROW exclusion areas would prohibit access roads or pipelines into those areas.

Identification of ROW avoidance areas, while not creating absolute barriers to their use for access roads or pipelines—or for locating surface facilities on federal lands for the purpose of accessing private minerals—could make permissible facilities infeasible for technical or economic reasons. Some other potential management actions or BMPs could also affect cost sufficiently to make a project infeasible, for example, collocating a new pipeline along an existing road that follows a long, indirect, or topographically difficult route.

Other types of lands and realty actions, such as identifying areas for withdrawals and land tenure adjustments (disposal/acquisition/retention) would not significantly affect fluid minerals leasing or development, although analysis of outcomes of land tenure adjustment and withdrawals cannot be accessed until specific proposals are submitted to the BLM and Forest Service for review.

The expected outcomes of lands-related management actions and BMPs on oil and gas leasing and development under the four alternatives analyzed in this EIS are summarized below.

<u>Reduced Availability of Federal Fluid Mineral Estate for New Oil and Gas Leases</u>
Alternative A—In general, lands and realty actions do not affect availability of lands for leasing for oil and gas development. This is because ROWs and associated exclusion and avoidance area management applies to surface rather than subsurface estates. Therefore, this management would affect primarily the access to oil and gas leases across off-lease lands via ROW grants. Exceptions in the GJFO are 700 acres of PHMA and 1,100 acres of GHMA identified for disposal under the 1997 RMP.

A major exception is in the LSFO, for which the 2011 RMP manages as ROW exclusion areas 13,700 acres of PHMA and 53,200 acres of GHMA, and as ROW avoidance areas 20,900 acres of PHMA and 28,700 acres of GHMA. Under the RMP, none of the ROW exclusion or avoidance areas, totaling 116,500 acres of mapped GRSG habitat, would be available for fluid minerals leasing.

For the remaining field offices, ROW exclusion areas and, to a lesser extent, ROW avoidance areas could affect the practicability of new fluid minerals leases if they would present an absolute barrier to access (see the analysis for Alternative A in the subsection below on reduced access to fluid minerals). Current management by field office is summarized below.

Colorado River Valley Field Office—Under current management, a total of 8,300 acres of existing ROWs are in PHMA and 4,700 acres are in GHMA. Future ROWs would be allowed within either habitat area, barring criteria established by the current RMP. Additionally, no ROW exclusion or avoidance areas are identified within PHMA or GHMA lands under Alternative A.

Grand Junction Field Office—Numerous ROWs for roads and natural gas pipelines are within mapped PHMA and GHMA in the GJFO. Portions of the mapped habitat are on small, isolated public land parcels classified for disposal in the 1987 RMP. These include 700 acres of PHMA and 1,100 acres of GHMA. In addition, ROW exclusion areas include 100 acres of GHMA, while ROW avoidance areas include 200 acres of PHMA and 3,900 acres of GHMA. Existing ROWs include 1,100 acres in PHMA and 600 acres in GHMA.

Kremmling Field Office—Land use authorizations would focus on concentrating linear facilities (i.e., pipelines, transmission lines, and routes) within or contiguous with existing corridors where possible. Authorizations would be avoided in locations that would harass livestock or wildlife or that would impact fragile areas, such as threatened and endangered species habitats. When considering land tenure adjustments, the KFO would retain all BLM-administered lands or interests in land (such as easements) that enhance multiple-use and sustained-yield management and would acquire lands or interests in land that complement important resource values and further management objectives. As standard practice, abandoned ROWs are required to be reclaimed on BLM-administered lands. Under this alternative KFO would not manage any areas as exclusion or avoidance areas, so there would be no impact on oil and gas leasing and development.

Little Snake Field Office—A total of 99,800 acres of ROWs are in PHMA and 91,100 acres in GHMA. Under this alternative, LSFO would allow for appropriate ROW routes and development sites (e.g., renewable energy and communication), while identifying areas that would not be compatible with such use. Objectives for achieving this goal include providing access for roads, utilities, transmission lines, communication sites, and access for the development of oil and gas pipeline routes and other uses associated with oil and gas development in an environmentally responsible manner. The LSFO would also encourage ROWs in existing corridors, such as major roads, electric transmission lines, and oil and gas pipelines. ROW exclusion areas in unleased high-potential areas for oil and gas total 12,700 acres, while ROW avoidance areas include 22,400 acres of mapped habitat.

White River Field Office—Under this alternative, land use authorizations would be denied in exclusion areas, as defined in the 1997 White River RMP. The exception would be for short-term land use permits involving no development and projects that are consistent with management objectives for the area. Under current management, areas identified as ROW exclusion are not

identified as such for GRSG habitat; however, ROW exclusion areas do overlap PHMA and GHMA. New access roads, pipelines, electric distribution lines, and other utilities would be precluded in these exclusion areas. Under this alternative, areas identified as exclusion areas could affect availability for leasing or accessibility for development of approximately 11,700 acres.

Avoidance areas would require that impacts be avoided. Nevertheless, the ROW could be allowed, subject to COAs (see Appendix B of the 1997 White River RMP), all applicable surface use stipulations (see Appendix A of the 1997 White River RMP), and any site-specific stipulations identified through the NEPA process. Avoidance areas are defined in the 1997 White River RMP and include GRSG leks and areas managed to meet other objectives. Under this alternative, avoidance areas could affect availability or access for approximately 47,200 acres.

Alternative B—This alternative includes no measures that would specifically preclude new leasing of federal fluid mineral resources. However, such restrictions as managing PHMA as ROW exclusion areas and a 3 percent disturbance cap could render some currently unleased parcels impracticable to lease because of impossible or impracticable access across off-lease lands. It is not possible to quantify this potential impact; however, see the analysis under Alternative B in the subsection below.

Alternative C—This is similar to Alternative B, except that managing all GRSG habitat as ROW exclusion areas would increase the total area of unleased lands potentially precluded from future leasing due to impossible or impracticable access. See the discussion under Alternative C in the subsection below.

Alternative D—This alternative would be less restrictive than Alternatives B or C by identifying PHMA as ROW avoidance areas. Consequently, this alternative is less likely than Alternatives B and C to result in de facto restrictions of future leasing.

Proposed LUPA—The reduction in the availability of Federal Fluid Mineral Estate for New Oil and Gas Leases would be similar to Alternative D.

Reduced Access to New or Existing Federal Oil and Gas Leases

Alternative A—See the discussion of current management and associated impacts in the analysis of reduced availability of fluid mineral from lands and realty management, above.

Alternative B—Under this alternative, PHMA would be identified as ROW exclusion areas, precluding new access roads and pipelines, electric distribution lines, or other utilities. Exceptions would be considered in the case of a valid existing right not yet developed, where a new ROW could be completed entirely within the disturbance footprint of an existing ROW (e.g., locating a pipeline beneath a power line or along an existing road); or, in the case of a

valid existing right already developed, where the new ROWs could be collocated with an existing ROW. If a new access road or other ROW could not be collocated with an existing ROW, it may be constructed only if impacts were minimized and disturbance were to remain within a 3 percent cap. If the cap would be avoided, mitigation would be required.

Compared to Alternative A, identifying PHMA as ROW exclusion areas could affect availability or access for federal mineral estate lands that do not currently have such restrictions. This could delay or make more difficult ROW projects that overlap existing leases on which new or additional development is likely, due to the limited number of acres left under the 3 percent anthropogenic disturbance cap. For some Colorado MZs, new access roads or other ROWs could not be constructed outside existing ROWs if the zone were over the 3 percent disturbance cap. However, specific impacts on leasing and development of currently unleased minerals cannot be quantified without project-specific information on the size and configuration of such leases, in relation to adjacent federal or private surface lands and existing or feasible new access routes.

Other actions or BMPs in PHMA under Alternative B to increase protections for GRSG and its habitats are to remove, bury, or modify existing power lines and remove and restore unused surface facilities associated with ROW grants.

Additional measures to be applied in GHMA include managing GHMA as ROW avoidance areas, which would require that impacts on GRSG and its habitats be avoided, where practicable, or minimized and mitigated and collocating necessary new ROW features with existing features. These could add to the costs of new oil and gas projects, and, where very long and indirect alignments are involved, burying existing power lines would be required. These requirements could make a potential project economically infeasible.

Also among land tenure measures, requirements for PHMA under Alternative B include a prohibition against disposal of BLM-administered or National Forest System lands and a goal of acquiring certain private lands. Without project-specific information, it is not possible to assess this impact fully. Nevertheless, it could prevent some otherwise accessible private lands from being used for fluid mineral development and keep some lands in federal ownership that might otherwise be disposed of and hence available for access to fluid minerals.

Not all restrictions applicable under Alternative B would have the effect of precluding development or of making future leasing impracticable due to access limitations. The total area to which these restrictions would apply is approximately 631,700 acres, or 47 percent of BLM surface lands in the 21 Colorado MZs. Note, however, that ROW actions do not apply to lands with private surface. However, an exact assessment of the impact of these restrictions on access to new or future leases sufficient to preclude or significantly impede development is not possible. Estimates of areas to which the restrictions apply, by field office, are as follows:

- Colorado River Valley Field Office—0 acres
- Grand Junction Field Office—14,400 acres
- Kremmling Field Office—203,500 acres
- Little Snake Field Office—116,500 acres
- White River Field Office—297,300 acres

Alternative C—Under this alternative, the measures related to PHMA in Alternative B would be applied to ADH areas. This is therefore likely to result in greater impacts on oil and gas leasing and development since more lands would be affected. Specifically, compared to Alternative A, managing ADH as ROW exclusion areas could affect availability or access for federal mineral estate lands that do not currently have such restrictions.

The requirements under Alternative B for removing, burying, or modifying power lines and for removing and restoring any unused ROW corridors would also be applied under Alternative C. This alternative would require relocating unbuilt ROW corridors outside PHMA and also the measures under Alternative B related to land tenure adjustments. However, the actions related to GHMA—management as ROW avoidance areas and requiring collocation of new ROW alignments with existing alignments—would not be applied under this alternative, reducing somewhat the impacts on oil and gas development in GHMA.

The total area to which these restrictions would apply is approximately 1.34 million acres, or 99 percent of BLM-administered surface lands in the 21 Colorado MZs. However, an exact assessment of the impact of these restrictions on access to new or future leases sufficient to preclude or significantly impede development is not possible. Estimates of areas to which the restrictions apply, by field office, are as follows:

- Colorado River Valley Field Office—29,900 acres
- Grand Junction Field Office—14,400 acres
- Kremmling Field Office—203,500 acres
- Little Snake Field Office—793,700 acres
- White River Field Office—297,300 acres

Alternative D—This alternative would be less restricting than Alternatives B and C by making PHMA avoidance rather than exclusion areas for ROWs. Also within PHMA, new ROWs may be collocated in existing corridors without the need for staying within the existing disturbance footprint. New ROWs for valid existing lease rights would also be less difficult to implement, including accepting impacts where access would otherwise be inaccessible. The associated

disturbance cap for access to valid existing rights would be 5 percent, compared to 3 percent in Alternative B, although mitigation would be required.

Alternative D would require only raptor perch deterrents instead of burying power lines in PHMA. In addition, unused ROWs would be required to be reclaimed only where mandated by regulation. Furthermore, new ROWs would be allowed where a compelling reason exists and GRSG populations would not be adversely affected by habitat loss or disruptive actives. The Alternative B and C requirements for relocating unbuilt corridors from inside to outside PHMA would also not be applied under Alternative D. Actions related to GHMA and to land tenure adjustments would be the same as those under Alternatives B and D or, where different, would have the same relative impact on oil and gas development compared to current management.

The Proposed LUPA would manage all PHMA and GHMA as ROW avoidance areas with exceptions for pending large transmission lines. Additionally, no aboveground structures would be authorized within 1 mile of active leks. Impacts on access for fluid minerals from management of lands and realty under the Proposed LUPA would be greater than those described under Alternative D with potentially large local impacts on access of fluid minerals where the PHMA and GHMA are open for large transmission lines. Areas open to large transmission lines could preclude development of facilities required for access to fluid minerals. For the description of impacts from proposed large transmission lines in northwest Colorado, see Cumulative Impacts (Chapter 5).

Impacts from Fluid Minerals Management on Fluid Minerals (Oil and Gas)

In the Rocky Mountains, habitat loss or modification, surface infrastructure, associated vehicular travel, and disturbance from equipment to develop federal fluid mineral resources have been identified as key threats to GRSG populations and seasonally critical habitat uses. Consequently, the alternatives analyzed in this EIS include a number of management actions and mandatory mitigations to reduce the scale, frequency, and severity of impacts from oil and gas.

The *General Description* section presents information on the general fluid minerals program as administered by the BLM and the extent of fluid minerals in the planning area. The *Methodology and Assumptions* section summarizes the types of impacts likely to result for fluid minerals leasing and development and the tools available to the BLM and Forest Service for avoiding, minimizing, or offsetting those impacts.

The following paragraphs compare the management actions and key BMPs incorporated into the alternatives analyzed in detail in this EIS. They also compare the result of impacts on the availability of federal fluid minerals for development, access to those resources, and economic viability of development based on increased costs to the oil and gas operator.

Reduced Availability of Federal Fluid Minerals for New Oil and Gas Leases

Alternative A—Colorado River Valley Field Office—The CRVFO planning area and the Roan Plateau planning area have approximately 40,300 acres of PHMA and 56,000 acres of GHMA. However, 17,400 acres of PHMA and 11,500 acres of GHMA are split-estate lands (private surface, federal minerals). Most lands that fall within PHMA are mapped as low potential for development of oil and gas resources. Conversely, most lands that fall within GHMA, namely the Roan Plateau planning area, are mapped as high potential for oil and gas development.

Grand Junction Field Office—The GJFO planning area contains approximately 78,700 acres of lands within GRSG habitat, 14,500 acres of which are BLM-administered lands with federal surface, and an additional 8,600 acres are split-estate. Potential for oil and gas development occurs within all mapped GRSG habitat, most of which (55,600 acres) has no federal mineral interest. Of the total acres available for leasing in GRSG habitat, approximately 5,500 acres are mapped as PHMA and 8,900 acres are mapped as GHMA. No acres within the planning area are managed as unavailable to fluid mineral leasing.

Kremmling Field Office—Current restrictions on use prohibit surface occupancy and surface-disturbing activities within a 0.25-mile radius of an active lek. A total of 642,900 acres of federal mineral estate would be open to oil and gas leasing, 114,000 acres of which are considered to have high potential for oil and gas development; approximately 10,600 acres would be closed to oil and gas leasing and geophysical development, none of which has high potential for development.

Little Snake Field Office—The 2011 RMP identified 92,000 acres of GRSG habitat as closed to leasing for fluid minerals. Other restrictions in PHMA and GHMA under the 2011 RMP would not preclude leasing but could affect accessibility or economic viability of future leasing and development for Alternative A in the subsection below on reduced access to fluid minerals. In addition, a total of 92,000 acres of NSO stipulations and 12,800 acres of ROW exclusion areas are in GRSG habitat. This could result in a de facto limit on future leasing due to no access or difficult access. Exceptions, modifications, and waivers could be provided, as detailed in the 2011 RMP.

For new leases in high priority GRSG habitat, a lease stipulation would be attached to comply with two criteria: a 1 percent disturbance limitation and preparation of a plan of development illustrating a strategy for leaving large blocks of undisturbed habitat. These criteria would be mandatory, with exceptions considered on case-by-case basis. An exception to the 1 percent threshold requires the operator to demonstrate extraordinary means to mitigate or improve high-priority habitats. This could include enlisting surrounding leaseholders into a plan to protect even larger blocks of habitat or performing BLM-approved compensatory mitigation.

White River Field Office—Under current management, areas closed to fluid mineral leasing as described in the 1997 White River RMP are the six WSAs and

the National Park Service's Harper's Corner Road withdrawal. While these areas are closed to fluid mineral leasing for reasons other than protecting GRSG habitat, there is overlap between these areas and GRSG PHMA and GHMA, particularly with the Harper's Corner Road withdrawal and Bull Canyon and Willow Creek WSAs. Under this alternative 3,000 acres in PHMA and 1,700 acres in GHMA are unavailable for fluid mineral leasing. Most acreage unavailable to leasing is in areas of low potential for oil and gas development, with a small amount of area having high potential for developments in the southern portions of the Harper's Corner Road withdrawal and Bull Canyon and Willow Creek WSAs.

Alternative B—Under this alternative, PHMA would be closed to future leasing for fluid minerals. An exception would allow the BLM and Forest Service to prepare a comprehensive leasing plan for areas of checkerboard or other mixed federal-private surface and mineral estates. This could allow leasing of selected areas that could be accessed from outside the PHMA. Exploration using minimally disruptive methods would also be allowed.

Closing all PHMA to future leasing would remove 447,000 acres of currently unleased federal minerals in high-potential areas for oil and gas within PHMA from future oil and gas leasing and a total of 1,300,000 acres regardless of potential Estimates of affected acres (high potential) by field office are as follows:

- Colorado River Valley Field Office—0 acres
- Grand Junction Field Office—1,600 acres
- Kremmling Field Office—52,200 acres
- Little Snake Field Office—337,700 acres
- White River Field Office—59,500 acres

Note that all estimates for the CRVFO in this analysis assume that the existing leases atop the Roan Plateau (mapped as GHMA) remain valid.

Alternative C—Under this alternative, the prohibition against future fluid minerals leasing, or reissuing of expired leases, would apply to ADH instead of PHMA, with the same potential exceptions as described above. Because of the broader application of the closure to leasing, this alternative would remove a greater area of federal fluid mineral estate lands than Alternative B. Estimates of high potential acres by field office are as follows:

- Colorado River Valley Field Office—500 acres
- Grand Junction Field Office—14,400 acres
- Kremmling Field Office—64,200 acres

- Little Snake Field Office—521,000 acres
- White River Field Office—132,800 acres

The total acres affected within the planning area, regardless of potential is more than 2,300,000.

Alternative D—Under this alternative, the prohibition against future fluid minerals leasing, or reissuing of expired leases, would not be applied. Also, no acres of unleased, high-potential, federal fluid mineral estate would be closed to leasing. Instead, PHMA would be leased with an NSO stipulation for fluid minerals. The NSO would allow an exception if GRSG populations were stable or increasing and GRSG populations would not be adversely affected by habitat loss or disruptive activities. In the event that development is allowed under an exception, mitigation would be required for impacts beyond a 5 percent disturbance cap.

The degree to which this measure would affect availability of new leases would depend on whether a particular parcel being considered is sufficiently small and located close enough to private lands or non-NSO federal lands to allow directional drilling into minerals underlying the NSO area. It would also depend on whether site-specific conditions would warrant granting an exception to the NSO. Because these situations cannot be quantified at present, it is not possible to estimate the degree to which Alternative D would result in a de facto limit on new leasing due to impossibility or impracticability.

Proposed LUPA—New leasing would be prohibited within 1 mile of all active leks, affecting approximately 224,000 acres across the planning area. This alternative would have a greater effect on the fluid minerals program, closing leasing on more acres than Alternatives A and D, but less impact on the fluid minerals program than Alternatives B and C, closing 1,300,000 acres and 2,300,000 acres, respectively.

Reduced Access to New or Existing Oil and Gas Leases

Alternative A—Colorado River Valley Field Office—Under its current RMP, the CRVFO does not have restrictions on access to federal fluid minerals in unleased areas of high potential for oil and gas development. An exception is the Roan Plateau planning area, which is fully leased (29,800 acres of mapped GHMA). The area has a variety of NSO, CSU, and TL stipulations to protect sensitive resources but not specifically related to GRSG.

Grand Junction Field Office—Under its current RMP, the GJFO has just over 12,000 acres leased in GRSG habitat. Approximately half of the leased acres within GRSG habitat are managed for restricted surface disturbance (3,800 acres of NSO and 1,400 acres of CSU).

Kremmling Field Office—A TL stipulation would restrict surface occupancy and surface-disturbing activities during crucial winter habitat and nesting habitat time frames; these are December 16 to March 15 and March 1 to June 30, respectively. All mitigation and conservation measures not already required as stipulations would be analyzed in a site-specific environmental analysis document and would be incorporated, as appropriate, into COAs of permits, plans of development, or other use authorizations. The BLM has the discretion to modify surface operations to change or to add specific mitigation measures when supported by scientific analysis.

Little Snake Field Office—Current management under the 2011 RMP includes a total of 992,800 acres of mapped GRSG habitat. This includes TL stipulations to protect seasonally critical periods of use, 1,023,100 acres with CSU stipulations to provide BLM with the ability to place special restrictions on location and design of projects, and 151,100 acres of NSO stipulations to prohibit surface occupancy and surface disturbance.

White River Field Office—Restrictions under this alternative include a TL for wintering concentrations of GRSG from December 16 to March 15. Another TL for April 15 to July 7 would be applied in GRSG nesting habitat once a threshold of 10 percent of habitat available within 2 miles of identified leks has been affected, either directly and indirectly impacted. A total 115,000 acres of NSOs and 455,500 acres of TLs, in addition to CSU stipulations, could tend to make some unleased areas undesirable for future leasing because of the impracticability of accessing the federal fluid mineral resources.

Alternative B—For valid existing rights (existing leases), Alternative B would apply a number of restrictions on surface use in PHMA, subject to an evaluation of whether the restrictions are reasonable and in conformance with the approved RMP. These include the following:

- No new surface occupancy in PHMA during any time of year
- If the lease is entirely within PHMA, no new surface occupancy within 4 miles of a lek and permitted surface disturbance limited to one per section (1 square mile, 640 acres), including the well pad and associated access road and collocated pipelines, with no more than 3 percent surface disturbance in that section
- If a lease in PHMA is entirely within 4 miles of a lek, limit new surface disturbance to one per section (pad plus road/pipeline) with, surface disturbance of no more than 3 percent of that section, and require new development to be placed farthest from the lease or other portion with the least impact on GRSG use
- Apply a 3 percent cap to applications for permits to drill on existing leases in PHMA that are not yet developed. An exception to the 3 percent cap would be considered where effective mitigation can be

demonstrated to offset the resultant impact on GRSG. Priority would be on conducting the mitigation first in PHMA or second in GHMA, and first where it would benefit the impacted GRSG population or second in the same MZ

- Apply a seasonal restriction on exploratory drilling that prohibits surface-disturbing activities in PHMA during the nesting and early brood-rearing season

The first four bullets above have a significant potential for reducing the ability of an operator to access fully the potential downhole targets (wells) included within a given federal oil and gas lease. However, the magnitude of those impacts cannot be assessed without project-specific information on where an affected lease is located, its size, and its spatial relationship to other leases. It would also require information on private surface lands, existing utility and road corridors that the new corridors would intersect, and one or more GRSG leks and other seasonally critical habitats that facilities are required to avoid. The particular downhole geology of a specific lease is also important in relation to the potential number of wells reachable from a single well pad. The last bullet, application of a seasonal restriction on exploratory drilling, is more difficult to assess.

Exploratory drilling of a single well can normally be timed to avoid such a seasonal restriction. However, if exploratory drilling is interpreted to mean any new wells not in a developed field, applying the seasonal restriction to multiple exploratory pads and wells within the same lease or other geographic areas could effectively limit accessibility to the resource. This is particularly true if the same area is subject to another TL restriction, such as big game winter range, potentially leaving too small a period within which to conduct the exploratory drilling.

Although it is not possible to fully quantify these impacts (i.e., determine the number of leases that are entirely within PHMA and subject to a limit of 1 disturbance per 640 acres and what portions of how many leases are within 4 miles of a lek) the approximate extent to which these restrictions could apply is estimated at 616,100 acres. This amounts to 61 percent of the 1.01 million acres of leased federal mineral estate in GRSG habitat in the planning area.

If new well pads were reduced from a typical current average of four per section to one per section, but with the same number of wells per pad, it could reduce future development on existing leases by 75 percent. However, this impact level would decrease in proportion to the greater numbers of wells per pad. Although the reduction could be less than this—depending on specific situations of geology, directional drilling technology, economics, other applicable surface-use constraints, and the degree to which the leases are already developed—it is clear that a substantial reduction in production of oil and gas would be the outcome.

Estimates of affected acres by field office are as follows:

- Colorado River Valley Field Office—0 acres
- Grand Junction Field Office—3,900 acres
- Kremmling Field Office—118,100 acres
- Little Snake Field Office—358,900 acres
- White River Field Office—135,100 acres

Alternative C—For valid existing rights (existing leases), Alternative C would apply the restrictions on surface use in PHMA listed under Alternative B, with some applied instead to ADH areas or worded more restrictively.

Alternative C would be the same as Alternative B in the following manner:

- No new surface occupancy in PHMA during any time of year
- If the lease is entirely within PHMA, no new surface occupancy within 4 miles of a lek and permitted surface disturbance limited to one per section (which is 1 square mile, 640 acres), including the well pad and associated access road and collocated pipelines, with no more than 3 percent surface disturbance in that section
- If a lease in PHMA is entirely within 4 miles of a lek, limit new surface disturbance to one per section (pad plus road/pipeline), with surface disturbance of no more than 3 percent of that section, and require new development to be placed farthest from the lease or other portion with the least impact on GRSG use

The following, under Alternative C, would be the same as Alternative B but applied to ADH, with or without additional wording changes:

- Apply a 3 percent cap to applications for permits to drill on existing leases in ADH that are not yet developed. An exception to the 3 percent cap would be considered where effective mitigation can be demonstrated to offset the resultant impact on GRSG. Priority would be on conducting the mitigation first in PHMA or second in GHMA, and first where it would benefit the impacted GRSG population or second in the same MZ
- Apply a seasonal restriction in ADH areas on exploratory drilling that prohibits surface-disturbing activities in PHMA during the nesting and early brood-rearing season

The following aspects of Alternative C are not included under Alternative B:

- In ADH areas, explore options to amend or cancel leases in ACECs or occupied habitats

- In ADH areas, require relinquishment of leases/authorizations where necessary to mitigate the impacts of a proposed or approved development

As described for Alternative B, the magnitude of impacts associated with Alternative C cannot be assessed without project-specific information. This information includes where an affected lease is located, its size, and its spatial relationship to other leases, private surface lands, existing utility and road corridors that the new corridors would intersect, and one or more GRSG leks and other seasonally critical habitats that facilities are required to avoid. The particular downhole geology of a specific lease is also important in relation to the potential number of wells reachable from a single well pad. Moreover, the last two bullets above for this alternative could more significantly restrict access to valid existing rights and in fact would make those leases unavailable for development in all or in part.

In general, however, applying some restrictions to ADH areas would affect a greater number and area of federal leases than under Alternative B. These restrictions are canceling leases in ADH areas that are in ACECs or occupied habitat and requiring potential additional leases in ADH areas to be relinquished. The language of the last two bullets above, potentially cancelling or requiring relinquishment of existing leases and authorizations, would further increase adverse impacts on oil and gas development under this alternative.

Although not all of the restrictions would apply to all areas of PHMA or ADH in high potential lands for oil and gas in the planning area, the total of potentially affected lands is the entire 1.01 million acres of currently leased. Because of the complex combination of constraints on development under this alternative and the many site-specific and project-specific variables for a given situation, it is difficult to estimate the amount to which development could be reduced under Alternative C. However, with some constraints applying to ADH instead of PHMA and with the limit of one pad per section (compared to a current average on four per section) applying within 4 miles of a lek, it is possible that the result would be the same level of reduction in future development as under Alternative B (75 percent). The actual impact could vary substantially, depending on the many variables described for Alternative B; these are specific situations of geology, directional drilling technology, economics, other applicable surface-use constraints, and the degree to which the leases are already developed.

Estimates of affected acres by field office are as follows:

- Colorado River Valley Field Office—29,800 acres
- Grand Junction Field Office—12,300 acres
- Kremmling Field Office—124,400 acres

- Little Snake Field Office—446,600 acres
- White River Field Office—289,500 acres

Alternative D—For valid existing leases, Alternative D would replace some of the more absolute restrictions of Alternatives B and C with greater flexibility to assess individual projects, based on site-specific conditions and project-specific design. Based on the site-specific and project-specific considerations, the BLM and Forest Service could approve the action with COAs identified during project review. The COAs would be necessary and appropriate for avoiding, minimizing, or offsetting potential impacts on GRSG and its habitats. Examples include the following:

- In PHMA, prohibit surface occupancy or disturbance during lek and early brood-rearing seasons. Require mitigation for disturbance in excess of 5 percent. Certain exception criteria would be applied to accommodate the surface occupancy when needed for continuing multi-year directional drilling programs or when the GRSG populations would not be adversely affected
- In PHMA, apply a seasonal restriction on exploratory drilling that prohibits surface-disturbing activities during the nesting and early brood-rearing season, the same as Alternative B
- Apply a 5 percent (instead of 3 percent) cap to applications for permits to drill on existing leases in PHMA that are not yet developed. An exception to the 5 percent cap would be considered where effective mitigation could be demonstrated to offset the resultant impact on GRSG or where additional disturbance would not adversely affect GRSG populations. Any mitigation would be conducted with priority first in PHMA or second in GHMA, in occupied habitat. It would also prioritize first those areas where it would benefit the impacted GRSG population or second areas in the same MZ.

As with Alternatives B and C, the magnitude of impacts associated with Alternative D cannot be assessed without project-specific information. This information is where an affected lease is located, its size, and its spatial relationship to other leases, private surface lands, existing utility and road corridors that the new corridors would intersect, and one or more GRSG leks and other seasonally critical habitats that facilities are required to avoid. The particular downhole geology of a specific lease is also important in relation to the potential number of wells reachable from a single well pad.

In general, the greater flexibility available to the BLM and Forest Service under this alternative would reduce impacts on fluid minerals leasing and development. Applying a 5 percent cap restriction instead of 3 percent cap and limiting the cap to PHMA instead of ADH would result in fewer constraints on oil and gas

activities than under either Alternative B or C. For example, a 5 percent cap could allow 60 percent more surface disturbance than with a 3 percent cap in PHMA.

Because this alternative would apply more widely but with less stringent restrictions and greater flexibility to approve projects, the number of acres potentially affected is not a meaningful number because the impacts could be minimal across much of the area. Therefore, it is not possible at this time to estimate the percent reduction.

Proposed LUPA—No new leasing would be permitted within 1 mile of active leks and no new surface occupancy would be allowed in PHMA. No modifications or waivers would be permitted. The BLM Authorized Officer may grant an exception to this NSO stipulation only where the proposed action:

1. Would not have direct, indirect, or cumulative effects on GRSG or its habitat
2. Is proposed to be undertaken as an alternative to a similar action occurring on a nearby parcel, and would provide a clear conservation gain to GRSG

Exceptions based on conservation gain (2, above) may only be considered in PHMA of mixed ownership where federal minerals underlie less than fifty percent of the total surface, or areas of the public lands where the proposed exception is an alternative to an action occurring on a nearby parcel subject to a valid federal fluid mineral lease existing as of the date of this RMP. Exceptions based on conservation gain must also include measures, such as enforceable institutional controls and buffers, sufficient to allow the BLM to conclude that such benefits would endure for the duration of the proposed action's impacts.

Any exceptions to this lease stipulation may be approved by the BLM Authorized Officer only with the concurrence of the State Director. The BLM Authorized Officer may not grant an exception unless the applicable state wildlife agency, the USFWS, and the BLM unanimously find that the proposed action satisfies 1 or 2, above. Such finding would be made initially by a team of one field biologist or other GRSG expert from each respective agency. In the event the initial finding is not unanimous, the finding may be elevated to the appropriate BLM State Director, USFWS State Ecological Services Director, and state wildlife agency head for final resolution. In the event their finding is not unanimous, the exception would not be granted.

Approved exceptions would be made publically available at least quarterly. Because all of PHMA would be managed as NSO with very rare potential for exceptions, impacts would be similar to those described for Alternative B for access, increased costs, and decreased efficiency of oil and gas development.

Under the Proposed LUPA, no new leasing would be permitted within 1 mile of active leks, and no new surface occupancy would be allowed in PHMA (see exception criteria below) and within 2 miles of active leks in GHMA (see **Appendix D**).

Increased Costs and Decreased Efficiency of Oil and Gas Development

Alternative A—All of the field offices apply a variety of mitigation measures and BMPs as COAs for oil and gas projects. This is done under the BLM and Forest Service regulatory authority and is a matter of routine during the NEPA process for specific projects and areas.

Alternative B—Among the representative measures described in **Chapter 2** as mandatory BMPs, relatively few could significantly affect the economic feasibility of individual oil and gas projects. Those with the greatest potential for affecting future developments are the following:

- Place liquid gathering and storage facilities outside PHMA—Potentially cost prohibitive where a well pad would be located several miles from the storage tanks due to the additional piping costs when water or liquid condensates are produced in very small quantities from a natural gas well and more efficiently hauled off-site with trucks
- Place new utility developments in existing utility or road corridors—Potentially cost prohibitive where the road follows a long and topographically complex route, thereby lengthening the utility and potentially requiring one or more lift stations for liquids
- Bury electric distribution lines—Potentially cost-prohibitive where a well pad would be located a long distance from the nearest utility tie-in, compared to constructing an aboveground line fitted with raptor deterrents
- Limit noise to less than 10 decibels above ambient levels at sunrise at a lek perimeter during the lek season and require noise shields during the lek, brood-rearing, and winter-use seasons—This could be cost prohibitive if it were to require erecting expensive, site-specific, acoustical barriers for only one or a few wells
- Locate all new compressors outside PHMA—This could be cost prohibitive in certain situations, depending on the topography over which gas-gathering pipelines are installed, the pressure of the natural gas at the wellhead, and the location and availability of a permissible compressor in relation to commercial pipelines, access roads, and other utilities
- Incorporate GRSG habitat requirements in reclamation—This is unlikely to be an issue for well pad reclamation. However, very long road or pipeline corridors could be prohibitively expensive if they

require including GRSG components if planting or transplanting sagebrush is required instead of including sagebrush in a seed mix with native perennial bunchgrasses and forbs.

It is not possible to assess quantitatively the potential for these impacts to affect individual projects. This is because of the lack of specificity concerning where the projects would occur and how substantially these would affect the project's economic feasibility. For example, elevated costs in conjunction with a single well pad with a few wells would be more likely to affect feasibility than the same costs in conjunction with multiple well pads or with a single pad from which numerous wells are drilled.

Overall, a determination of the extent to which increased costs and decreased efficiency would affect fluid minerals development is a function of project- and site-specific considerations and of market forces at the time. However, it is possible that some well pads, access roads, pipelines, and other facilities would be affected to the extent that marginal projects are economically nonviable, reducing the number of future oil and gas wells to an extent that may be considered significant at the local, state, or regional levels.

Alternative C—This would be the same as Alternative B with regard to mandatory BMPs with the greatest potential to affect economic viability of an oil and gas project.

Alternative D—This would be the same as Alternative B with regard to mandatory BMPs with the greatest potential to affect economic viability of an oil and gas project.

Proposed LUPA—See *Reduced Access to New or Existing Oil and Gas Leases*, above.

Impacts from Coal Management on Fluid Minerals

Alternatives B and C include management actions to protect GRSG and its habitats in relation to surface and subsurface coal mining projects and would prohibit new surface mines in PHMA. Another measure under these alternatives would prohibit new subsurface mine leases in PHMA, unless surface facilities would be located entirely outside PHMA. This measure also would limit expansion of existing leases, unless new surface facilities were either located outside PHMA or, if that is not possible, collocated with existing disturbances or otherwise kept to a minimum.

Alternative D includes additional measures but is also aimed at limiting impacts on GRSG populations in both PHMA and ADH by minimizing habitat loss and disruption. The potential impacts of these measures on fluid minerals leasing and development are summarized below. (Note that only the KFO has overlap between potentially developable coal and fluid minerals MZ 11 of that field office.)

Reduced Availability of Federal Fluid Minerals for New Oil and Gas Leases due to Coal Management

Alternative A—No significant adverse impacts anticipated due to lack of resource overlap.

Alternative B—Under this alternative, the field offices would find unsuitable all leasing for surface mining of coal in PHMA. This could significantly reduce the amount of potential coal development in the KFO compared to Alternative A. This is because of the large area of high potentially developable resources not yet leased and the spatial relationship of those to unleased areas to PHMA. No adverse impacts on oil and gas leasing and development are anticipated. However, these restrictions on coal could benefit oil and gas leasing and development if some future coal and fluid minerals projects were to compete for allowable surface impacts.

Alternative C—This would be the same as Alternative B.

Alternative D—As with the other alternatives, no direct adverse impacts on oil and gas are expected from the prohibition against new surface coal mines and the limitations on new or expanded subsurface mines. However, this alternative differs from Alternatives B and C by providing greater opportunity for new or expanded mines, subject to restrictions on the amount of surface disturbance in PHMA and ADH areas.

Indirectly, this alternative could increase the amount of surface disturbance from coal development, thereby reducing the amount available under the 5 percent cap for future oil and gas activities. It would do this by potentially allowing additional habitat loss from surface mining and surface facilities associated with subsurface mining. Depending on the timing and location of future coal mines or expansion of existing mines in relation to future oil and gas projects, this could reduce the amount of fluid minerals development in the zone of overlap with developable coal.

Proposed LUPA—Under this alternative impacts from restrictions on coal leasing and development would be similar to those described under Alternative D.

Reduced Access to New or Existing Oil and Gas Leases

Impacts would be the same as those described under the impacts from management of coal on fluid minerals.

Impacts from Locatable Minerals Management on Fluid Minerals

Alternatives analyzed in this EIS protect GRSG from developing locatable minerals are aimed at avoiding or minimizing new habitat loss and additional disruption of GRSG activities by prohibiting or limiting future mining in PHMA. The potential impacts of these measures on fluid minerals leasing and development are summarized below. (Note that only the LSFO contains known

locatable minerals resources, including uranium, gold, copper, and pharmaceutical limestone.)

Reduced Availability of Federal Fluid Minerals for New Oil and Gas Leases

Alternative A—There are no significant adverse impacts anticipated due to lack of overlap between locatable minerals resources and high potential areas for oil and gas.

Alternative B—This alternative includes proposing withdrawal from mineral entry in PHMA and making existing claims subject to validity exams. In addition, before any surface-disturbing activities, plans of operation would be required to include additional effective mitigation in perpetuity, such as purchasing private land and mineral rights or severing subsurface mineral rights in PHMA and deeding them to the United States government. This alternative also specifies that seasonal restrictions be considered if deemed likely to be effective in reducing impacts on GRSG use of seasonally critical habitats. The mandatory BMPs described in **Chapter 2** would also be required as COAs. No significant adverse impacts on fluid minerals leasing or development are anticipated.

Alternative C—This would be the same as Alternative B except that RDFs for locatable minerals projects (**Chapter 2**) would instead be applied as applicable and technically feasible. No significant adverse impacts on fluid minerals leasing or development are anticipated.

Alternative D—This alternative does not include proposing withdrawal from mineral entry in PHMA, potentially accommodating future development, subject to other restrictions. These include a requirement (also under Alternatives B and C) for requiring appropriate mitigation in plans of development and consideration of seasonal restrictions. Overall, the restrictions on locatable minerals development under Alternative D would not cause direct adverse impacts on leasing or development of federal fluid minerals.

Indirectly, this alternative could increase the amount of surface disturbance from developing these minerals, thereby reducing the amount available under the 5 percent cap for potential future fluid minerals development. It would do this by potentially allowing additional habitat loss from development of locatable minerals, which would be largely precluded by Alternatives B and C. At present, however, no overlap of potentially developable locatable minerals and areas with high potential for oil and gas are known within the planning area.

Proposed LUPA—Impacts from the management of locatable minerals under this alternative would be similar to those described for Alternative D, above.

Reduced Access to New or Existing Oil and Gas Leases

Impacts would be the same as those described under the impacts from management of locatable minerals on fluid minerals.

Impacts from Nonenergy Leasable Minerals Management on Fluid Leasable Minerals
Measures to protect GRSG and its habitat from the development of nonenergy leasable minerals (nahcolite) under the alternatives analyzed in this EIS are aimed at avoiding or minimizing new habitat loss and additional disruption of GRSG activities by prohibiting or limiting future mining activities in PHMA.

None of the field offices have overlap between known nonenergy leasable minerals and areas of high potential for oil and gas development.

Reduced Availability of Federal Fluid Minerals for New Oil and Gas Leases
Alternative A—No significant adverse impacts are anticipated due to lack of overlap between nonenergy leasable minerals resources and high potential areas for oil and gas.

Alternative B—This alternative includes closing PHMA to nonenergy leasable mineral entry and not permitting expansion of existing mines. The BMPs described in **Chapter 2** would be mandatory, including fluid minerals BMPs for solution mining operations. No significant adverse impacts on fluid minerals leasing or development are anticipated.

Alternative C—This would be the same as Alternative B, except that mandatory BMPs for nonenergy leasable projects would instead be applied as applicable and technically feasible (see **Chapter 2**). No significant adverse impacts on fluid minerals leasing or development are anticipated.

Alternative D—This alternative would allow the BLM and Forest Service to consider expanding nonenergy leasable minerals leases in PHMA. No significant adverse impacts on fluid minerals leasing or development are anticipated.

Proposed LUPA—Under the Proposed LUPA, PHMA would be closed to new nonenergy mineral leasing. Impacts from the management of nonenergy leasable minerals under this alternative would be similar to those described for Alternative B, above.

Reduced Access to New or Existing Oil and Gas Leases
Impacts would be the same as those described under the impacts from management of locatable minerals on fluid minerals.

Impacts from Salable Minerals Management on Fluid Minerals
As with the solid minerals addressed above, the measures to protect GRSG in from developing salable minerals under the alternatives are aimed at avoiding or minimizing new habitat loss and additional disruption of GRSG activities by prohibiting or limiting future mining in PHMA. (Note that only the KFO contains commercial quantities of salable materials on BLM-administered lands, regulated under 43 CFR, Part 3600. However, these lands do not overlap high potential areas for oil and gas.)

Reduced Availability of Federal Fluid Minerals for New Oil and Gas Leases

Alternative A—The KFO would apply COAs and BMPs to disposal of salable minerals. Salable minerals on BLM-administered lands are regulated under 43 CFR, Part 3600. Disposal of salable minerals occurs primarily from established common use areas. No future mining is proposed, and these lands do not overlap high potential areas for oil and gas. Therefore, no significant adverse impacts on oil and gas leasing and development are anticipated.

Alternative B—This alternative would close PHMA to minerals material sales and would require restoration of salable minerals pits no longer in use to meet GRSG habitat conservation objectives for PHMA. No significant adverse impacts on oil and gas leasing and development are anticipated.

Alternative C—This would be the same as Alternative B.

Alternative D—This alternative would allow the BLM and Forest Service to consider expanding existing salable minerals sites. No significant adverse impacts on fluid minerals leasing and development are anticipated.

Proposed LUPA—Under this alternative, PHMA would be closed to salable minerals; impacts from the management of salable minerals under this alternative are therefore the same as those described for Alternative B, above.

Reduced Access to New or Existing Oil and Gas Leases

Impacts would be the same as those described under the impacts from management of locatable minerals on fluid minerals.

Increased Costs and Decreased Efficiency of Oil and Gas Developments

Impacts would be the same as those described under the impacts from management of locatable minerals on fluid minerals.

Impacts from Fuels Management on Fluid Minerals

Management actions to protect GRSG and its habitats from fuels management are described in detail in **Section 4.7**, Wildland Fire Ecology and Management, and are presented in **Chapter 2**. These measures focus on ensuring that fuels reduction to reduce the risk of future catastrophic fires does not significantly affect GRSG populations either through disruption of GRSG activities or destruction of occupied or suitable habitat. Results of the analysis of potential impacts from fuels management on oil and gas activities are summarized below by alternative.

Reduced Access to New or Existing Oil and Gas Leases

Impacts would be the same as those described under the impacts from fuels management on fluid minerals.

Increased Costs and Decreased Efficiency of Oil and Gas Developments
Impacts would be the same as those described under the impacts from fuels management on fluid minerals.

Impacts from Fire Operations on Fluid Minerals
Management actions to protect GRSG and its habitats from fire operations are described in detail in **Section 4.7**, Wildland Fire Ecology and Management, and are presented in **Chapter 2**. Results of the analysis of potential impacts from fuels management on oil and gas activities are summarized below.

Reduced Availability of Federal Fluid Minerals for New Oil and Gas Leases
Alternative A—No significant adverse impacts are anticipated. The priority placed on fire suppression in GRSG habitat could benefit oil and gas operations by reducing the potential for fire damage to surface facilities in those areas.

Alternative B—This would be the same as Alternative A.

Alternative C—This would be the same as Alternative A.

Alternative D—This would be the same as Alternative A.

Proposed LUPA—This would be the same as Alternative A. Impacts would be the same as those described under *Reduced Availability of Federal Fluid Minerals for New Oil and Gas Leases*.

Increased Costs and Decreased Efficiency of Oil and Gas Developments
Impacts would be the same as those described under *Reduced Availability of Federal Fluid Minerals for New Oil and Gas Leases*.

Impacts from ACEC/Zoological Area Management on Fluid Minerals

Reduced Availability of Federal Mineral Estate for New Oil and Gas Leases
Alternative A—Colorado River Valley Field Office—Under Alternative A, approximately 300 acres of PHMA and 10,200 acres of GHMA overlap lands managed as ACECs. Three of these are within the currently leased Roan Plateau management area, while the remaining two are in areas with low potential for oil and gas development.

Grand Junction Field Office—No ACECs are located in PHMA or GHMA.

Kremmling Field Office—Current ACECs are the North Park Natural Area (300 acres) and the Kremmling Cretaceous Ammonite RNA (200 acres), both with NSO stipulations to protect sensitive resource values. Of these, the North Park ACEC is located in PHMA.

Little Snake Field Office—ACECs would be closed to oil and gas operations. This includes 2,800 acres in PHMA and 2,900 acres in GHMA.

White River Field Office—Seventeen ACECs are designated under Alternative A. Although there are no NSO, CSU, or ROW exclusion or avoidance areas to protect the resource values on which the ACECs are based, none of the ACECs is closed to leasing. The acreages for exclusion and avoidance areas are the same as those discussed under *Impacts of Lands and Realty Management from Reduced Availability of Fluid Minerals under Alternative A* (see above): 7,200 acres in PHMA and 9,900 acres in GHMA.

Alternative B—Impacts would be the same as those described under Alternative A.

Alternative C—This alternative includes a requirement to designate all PHMA as a GRSG habitat ACEC. This designation emphasizes management for GRSG populations, seasonal activity areas, and other crucial needs; however, it does not, in and of itself, carry any special restrictions on leasing or development of fluid minerals. There are no additional impacts expected beyond those already described in the discussion of impacts of fluid minerals management on access to fluid minerals under Alternative A.

Alternative D—Impacts would be the same as those described under the *Reduced Availability of Fluid Minerals Due to Designation of ACECs*.

Proposed LUPA—Impacts would be the same as described under the *Reduced Availability of Fluid Minerals Due to Designation of ACECs*.

Reduced Access to New or Existing Oil and Gas Leases

Impacts would be the same as those described under *Reduced Availability of Federal Fluid Minerals for New Oil and Gas Leases*.

Increased Costs and Decreased Efficiency of Oil and Gas Developments

No significant impacts on fluid minerals from increased costs related to ACEC designations are anticipated, except as related to other restrictions associated with the ACECs and addressed previously (e.g., restrictions on travel management, lands and realty, and fluid minerals) applied to the various ACECs.

Summary of Impacts on Fluid Leasable Minerals

Alternative A—Under current management, the five field offices use a combination of management (e.g., closed to leasing), lease stipulations (NSO, CSU, and TL), and project-specific COAs to manage fluid mineral leasing and development. These management measures are a way to avoid or minimize adverse impacts on other resources and resource uses, especially sensitive resources, such as GRSG and its habitat.

The LSFO, which published its current RMP in 2011, has identified 7,000 acres of unleased minerals in GRSG habitat as closed to leasing for fluid minerals. The WRFO, which published its current plan in 1997, has identified 4,700 acres of GRSG habitat as closed to leasing. For other high potential areas for oil and gas

in these field offices and for the three remaining field offices with older plans (CRVFO, GJFO, and KFO), protections for GRSG and its habitats consist of lease stipulations and, especially, COAs applied under the BLM and Forest Service's regulatory authority.

In terms of total fluid mineral estate within the planning area, 100,200 acres are closed to fluid mineral leasing under current RMPs. This represents 7.7 percent of the total of currently unleased fluid minerals in the 21 Colorado MZs. In addition, 298,000 acres of leased or unleased lands in the 21 MZs are protected with NSO stipulations, and 24,200 acres are managed as ROW exclusion areas. Both of these restrictions prohibit surface-disturbing and long-term surface occupancy. Although these restrictions are mostly related to resources and uses other than GRSG, and while they relate to surface use without precluding leasing of the underlying fluid minerals, their combined 522,200 acres represent 7.8 percent of the 4.15 million acres of all lands within the Colorado MZs.

Alternative B—Under Alternative B, the 447,000 acres of unleased fluid minerals in areas with high potential for oil and gas and in areas of PHMA would be closed to leasing.

Additional measures under Alternative B would apply to currently leased lands, with the objective of greatly reducing the amount and density of surface disturbance. The total area affected—estimated at 616,100 acres of existing leases—would be subject to reducing well pad density to 1 per 640 acres instead of the current typical density in some parts of the planning area of 4 per 640 acres. The actual impact could vary substantially, depending on site-specific geology, directional drilling technology, economics, other applicable surface-use constraints, and the degree to which the leases are already developed.

Other constraints on fluid minerals under Alternative B are restrictions on new, realigned, or upgraded roads in PHMA and a requirement for PHMA lands to be managed as ROW exclusion areas. Although these measures would not preclude new leasing per se, they could make access to new or existing leases difficult or potentially impossible by prohibiting use of BLM and Forest Service surface lands to access the leases.

While the impact on the amount of future development cannot be calculated because of the many variables affecting a given site or project—for example, availability of alternative access across private lands or across non-PHMA areas—it is noteworthy that an estimated 1.25 million acres of federal mineral estate in the planning area would come under the road restrictions under this alternative; 631,700 acres would come under the requirement for ROW exclusion areas. These are potentially substantial impediments to future development, even if they do not result in a de facto constraint on leasing.

Constraints associated with the other resources and uses analyzed above would generally have only a minor impact on future leasing of federal fluid minerals and additional development of existing leases.

The 3 percent disturbance cap applicable to a variety of potential ground-disturbing activities under Alternative B could be the determinative measure, notwithstanding the various other constraints summarized above. For example, while anthropogenic disturbance accounts for only 86,400 acres (2 percent) of the 4.1 million acres of federal lands within the 21 Colorado MZs, that total is two-thirds of the way toward the 3 percent disturbance cap. Indeed, 3 of the 21 zones are already above the 3 percent cap, and 10 more are more than halfway to that level of disturbance.

Based on the above, Alternative B would have significantly greater impacts on fluid minerals than Alternative A.

Alternative C—Under Alternative C, 733,600 acres of currently unleased fluid minerals in areas with high potential for oil and gas and in ADH would be closed to leasing.

Additional measures under Alternative C would apply to currently leased lands with the objective of greatly reducing the amount and density of surface disturbance. The total area affected—more than 1.01 million acres of existing leases—would be subject to a 75 percent reduction in well pad density, to 1 per 640 acres. The actual impact could vary substantially, depending on site-specific geology, directional drilling technology, economics, other applicable surface-use constraints, and the degree to which the leases are already developed. This is a 63 percent greater loss of future wells due to reduction in pad density than under Alternative B.

Other constraints on fluid minerals under Alternative C include restrictions on new, realigned, or upgraded roads in ADH and a requirement for ADH as ROW exclusion areas. Although these measures would not preclude new leasing per se, they could make access to new or existing leases difficult or potentially impossible by prohibiting use of BLM and Forest Service surface lands to access the leases.

Although the impact on the amount of future development cannot be calculated because of the many variables affecting a given site or project (e.g., availability of alternative access across private lands or across non-PHMA areas), it is noteworthy that an estimated 1.34 million acres of federal mineral estate in the planning area would come under the road restrictions and would be managed as ROW exclusion areas. These are potentially substantial impediments to future development, even if they do not result in a de facto constraint on leasing.

The constraints summarized above are in addition to limits based on the 3 percent disturbance cap applicable to a number of activities under this

alternative. Three of the 21 MZs already above that threshold, and 10 more zones are more than halfway to that cap.

Based on the above, Alternative C would have significantly greater impacts of fluid minerals than Alternative B.

Alternative D—This alternative generally gives the BLM and Forest Service more flexibility in decisions about issuing new leases and approving additional development of existing leases. For example, PHMA would not be closed to leasing but could be leased with an NSO stipulation, with exception criteria. In addition, any approved projects would be subject to a 5 percent disturbance cap instead of a 3 percent disturbance cap. Greater flexibility in applying constraints on development includes measures related to travel management and lands (ROW) actions.

These and other measures for which greater flexibility is available under Alternative D make it less subject to such wholesale reductions in the amount of future development as in Alternatives B and C. However, it is not possible to quantify the reductions because the flexibility built into this alternative would be highly variable, depending on site-specific and project-specific conditions. Furthermore, while the 5 percent disturbance cap is less restrictive than the 3 percent cap of Alternatives B and C, 1 of the 21 MZs is already above that amount, another is at 4.6 percent, and 4 more are nearly halfway to 5 percent with the current level of development.

Although the impacts under this alternative are not easily quantified, the large areas across which they would apply indicates that even these less onerous restrictions would result in significantly greater protections for GRSG and significantly fewer and lesser adverse impacts than under Alternative A.

Proposed LUPA—Under this alternative, management would be similar to Alternative D with the additional restrictions of a 3 percent disturbance cap and no leasing within 1 mile of active leks. Impacts on fluid minerals would therefore be greater under this alternative than Alternatives A and D, but slightly less than Alternative B and C.

4.9.2 Coal

General Description

Federal coal resources are administered by the BLM, regardless of surface estate ownership, through lease sales under the Mineral Leasing Act.

Current federal coal leases comprise 11,000 acres of GRSG habitat, or 0.4 percent of the total federal mineral estate in the planning area. Unleased areas of federal mineral estate found to be suitable for coal leasing or managed as open for leasing comprise 518,600 acres of GRSG habitat, or 21 percent of the total federal mineral estate within the planning area.

Table 3.43 summarizes this information for the five BLM field offices.

Methodology and Assumptions

General Impacts on Coal
Indicators of impacts on coal and the measurements used to describe the impacts (where available or appropriate) are as follows:

- Reduced availability of coal resources to new coal leases

  Specific measure: Closure of federal mineral estate lands to leasing

  - Amount of federal minerals available versus closed to leasing (fewer new leases)
  - Indirect impacts include loss of coal production for public use and for generating sales and tax revenues and federal royalties from production

- Reduced access to existing coal leases

  Specific measure: NSO or equivalent on all or parts of new leases

  - Fewer leases (large or contiguous small leases with no nearby private land)
  - Indirect impacts include reduced coal production for public use and for generating lease sales and tax revenues and federal royalties from production

  Specific measure: ROW exclusions on lands needed for road and utility access

  - Fewer new leases, fewer leases on lands with ROW restrictions
  - Indirect impacts include reduced coal production for public use and for generating lease sales and tax revenues and federal royalties from production

  Specific measure: Restrictions on amount or location of surface-disturbing activities (mine areas, ancillary facilities, air ventilation facilities for subsurface mines, access roads, conveyors, power lines, and railroad lines) on new or existing leases

  - Fewer potential exploration targets reachable; fewer locations for ancillary facilities available.
  - Indirect impacts include higher cost of location of surface facilities and adverse financial impact on lessee to accessing a portion of mineral estate from nearby private land.

- Increased costs and reduced efficiency of coal development

Specific measures (examples): Seasonal closures, undergrounding of electric distribution lines, noise abatement, visual screening, higher reclamation costs, and specialized fencing)

- Reduced development in otherwise permissible areas (fewer leases, fewer or smaller expansions of existing mines), particular for marginal coal resource areas or during periods of low market prices for coal.
- Indirect impacts include reduced production of coal for public use and for generating lease sale and tax revenues and federal royalties from production; adverse financial impact on lessee (especially for restrictions on existing leases)

For all of these types of impacts, it is impossible to state with certainty in the context of this LUPA/EIS the degree to which they would result in the adverse impacts noted above. Only the following, as identified during project-specific NEPA analysis, would allow a definitive estimate of the impacts on coal production

- Planning for specific lease sales
- The outcomes of those lease sales
- The locations and scales of new or expanded mines

These considerations, along with changes in coal prices, suitability of specific coal deposits for specific industrial or commercial uses (e.g., electrical generation), and geopolitical factors, are likely to profoundly affect how each alternative analyzed in this EIS impacts coal leasing and development for the foreseeable future.

Assumptions

- Coal resources are not evenly distributed across the landscape
- Coal mining operations are sensitive to costs, especially when prices are depressed
- Coal operators need to understand potential for future lease expansion at the time of lease acquisition or development
- Ability to construct facilities or roads and pipelines on private lands to access federal minerals is subject to landowner approval, not guaranteed
- Mining techniques are highly technical and not uniformly applicable
- Seasonal closures on travel may make development infeasible
- Spacing of surface facilities for subsurface mines (e.g., air vents) is mandated by regulations for worker safety

- Practicability of conveyors instead of trucks for hauling depends on distance and production rate
- Minimum 5 years needed for restoring self-sustaining native grass and forb cover on reclaimed mine surface and roadway alignment
- Minimum of 10 years needed for successfully sagebrush becoming established or colonizing reclaimed mine surface and roadway alignment

Implementing management actions for the following resources would have negligible or no impact on coal management; therefore, these impacts are not discussed in detail: wind energy development, industrial solar development, range management, wild horses, recreation, nonenergy leasable minerals, salable minerals, ESR, and habitat restoration.

Additionally, only those indicators that are affected by a management action are discussed in detail below.

Direct and Indirect Impacts on Coal

Impacts from Travel Management on Coal
A variety of management actions affecting travel and transportation are being applied or are proposed to be applied under Alternatives B, C, and D to reduce adverse impacts on GRSG and its habitats. These have varying degrees of potential adverse impacts on leasing and development of coal resources.

In general, management actions for resources and resource uses could affect potential coal development when they result in any of the following:

- Reduced availability of identified potentially developable coal resources for leasing
- Reduced access to new or existing leases or mines due to restrictions on use of the overlying surface lands
- Reduced efficiency and increased operational costs that make a potential coal development economically infeasible

<u>Reduced Availability of Federal Mineral Estate for New Coal Leases</u>
Alternative A—None of the five field offices currently manages areas as closed to coal leasing. This is because travel management considerations and new or existing leases are not subject to closures or other travel limitations. Current management is summarized below.

<u>Colorado River Valley Field Office</u>—Current management in the CRVFO protects coal resources with restrictions on oil and gas development. The NSO, detailed under Alternative A in the current LUP, prohibits surface occupancy and surface-disturbing activities within the area of an approved surface coal

mine. No travel management designations apply to coal resources identified under the current LUP.

Grand Junction Field Office—The mapped GRSG habitat is largely accessible via an extensive network of roads and trails in the area. Travel surfaces range from paved roads to primitive dirt roads, accessible only by high clearance four-wheel-drive vehicles, OHVs, or on foot or horseback. Currently, all of the BLM lands within PHMA are managed as open to cross-country travel for all modes of transportation. Within PHMA, 17 miles of travel routes have been inventoried on BLM-managed lands. In GHMA, 6,300 acres of BLM lands are managed as open to cross-country travel, and 2,500 acres are managed with a seasonal closure (December 1 to May 1) to motorized use to protect wintering big game. During the rest of the year, motorized travel in that area is limited to existing routes. Within GHMA, 32 miles of travel routes have been inventoried; vehicular traffic within the mapped habitat is generally very light. Traffic temporarily increases during oil and gas drilling and completion. Traffic also increases during fall hunting seasons.

Kremmling Field Office—Approximately 45,000 acres of the federal mineral estate within the KFO planning area would be open to further consideration for coal leasing. Current travel restrictions primarily have an objective other than reducing adverse impacts on GRSG and its habitats; most of these closures are outside of PHMA and GHMA and outside of areas identified as having potential for coal leasing and development. Travel restrictions and site-specific TLs could be applied as design criteria that would prohibit surface occupancy and surface-disturbing activities during specified times of the year. These restrictions and prohibitions would be in GRSG crucial winter habitat and nesting habitat and within or up to a 2-mile radius of an active lek. Where these areas coincide with sites that have potential coal resource development, design features and COAs could limit, prevent, or require relocation of coal exploration and development.

Overall, most areas are open to OHV travel (307,300 acres; approximately 81 percent of BLM land within the KFO) or are limited to existing (7,300 acres; approximately 0.019 percent) or designated routes (54,500 acres; approximately 14.4 percent). Administrative access would be available for permitted coal exploration actions and for coal development, with BLM authorization. Exception criteria allow for travel in areas otherwise closed or limited to existing or designated routes within leased coal lands. Routes could also be constructed in PHMA and GHMA. A 3 percent disturbance cap would not be applied and would not affect new road construction. Consequently, road closures and other travel management restrictions should result in only minor impacts on coal resource exploration and development.

Little Snake Field Office—A comprehensive transportation plan is underway to designate roads and trails as open, closed, or limited, in order to meet management needs and minimize impacts on resources and habitats. The

number of unmanaged roads and trails would be reduced. Vehicle closures do not apply to BLM ROWs, county or state roads, or other valid existing rights, including permitted mining operations. Other permitted uses may be allowed under special authorization on a case-by-case basis.

White River Field Office—Travel restrictions to existing routes and limitations on upgrading or realigning existing routes affect approximately 33,400 acres of federal coal resources. BLM roads within the WRFO are open to public travel at all times, subject to any limitations or restrictions outlined in the 1997 White River RMP. Travel restrictions would primarily have an objective other than reducing adverse impacts on GRSG and its habitats. Existing routes in PHMA could be upgraded to a higher use category (e.g., from trail to primitive road or from primitive road to road). Routes could be constructed in PHMA.

Public vehicle access could be restricted, as outlined in the 1997 White River RMP. Limitations on new or upgraded roads could adversely impact whether a specific area is suitable in terms of access. Even where access is available to a portion of a lease or to nearby private lands, where federal minerals could be accessed by underground mining, the technical and economic feasibility of coal development may be significantly reduced. An activity-level travel plan would have to be developed within 5 years of the ROD. Any permanent or seasonal closures resulting from the travel plan could further reduce development potential by restricting access or reducing feasibility and economic viability of any affected lease.

Alternative B—None of the actions related to travel management under this alternative would preclude leasing federal mineral estate for coal mining. However, limitations on new or upgraded roads could adversely impact whether a specific area of resource is suitable in terms of access. Even where access is available to a portion of a lease or to nearby private lands, where federal minerals could be accessed by underground mining, the technical and economic feasibility of coal development may be significantly reduced. An activity-level travel plan would have to be developed within 5 years of the ROD. Any permanent or seasonal closures resulting from the travel plan could further reduce development potential by restricting access or reducing feasibility and economic viability of any affected lease.

Alternative C—In terms of travel management, this alternative is similar to Alternative B in that none of the measures would preclude future coal leasing. However, some of the travel management restrictions on new, realigned, or upgraded routes would apply to ADH instead of PHMA. Consequently, Alternative C would be more restrictive than Alternative B, with greater potential for making coal leasing or development infeasible, thereby resulting in a de facto closure of some areas to future leasing.

Alternative D—Like the other alternatives, Alternative D would not preclude leasing for coal mining. Consideration of seasonal closures on travel would apply

to ADH instead of only to PHMA lands, but no consideration would be given to permanent closures. New road construction would be permitted if it would not adversely affect GRSG due to habitat loss or disruption. On balance, this alternative would be less likely than the other alternatives to result in a de facto closure of some areas to future leasing.

Proposed LUPA—Under this alternative, travel management would be the same as under Alternative D. Impacts from travel management on coal are therefore similar to those described under Alternative D, above.

Reduced Access to New or Existing Coal Leases

Alternative A—See the discussion of current management and associated impacts above under *Reduced Availability of Federal Mineral Estate for New Coal Leases*. None of the restrictions under current management would apply to leasing and development of federal coal resources but could guide project-specific planning.

Alternative B—Under this alternative, restrictions on travel would be implemented in PHMA to reduce disturbance of GRSG from movement, noise, dust, and incidental human activity associated with vehicular travel. Motorized travel would be restricted to existing routes. No exiting routes in PHMA could be upgraded to a higher use category (e.g., from trail to primitive road or from primitive road to road). The exception would be if the upgrading were necessary for motorist safety or to avoid constructing a new road outside the PHMA, and then only if impacts on GRSG would be minimal.

Similarly, no new routes could be constructed in PHMA, although portions of existing routes may be rerouted to allow for motorist safety or to avoid constructing a new route outside the PHMA and only if impacts on GRSG would be minimal. An exception to the prohibition on new routes, except for realignments, is in the case of valid existing rights (current leases). To access current leases, new routes could be constructed, but only to the minimum standard necessary for safe travel by the required types of vehicles and intensity of use, and only to the extent permissible with a 3 percent disturbance cap.

Where existing routes are no longer needed, Alternative B would require that they be restored using seed mixes appropriate for use in GRSG habitat and potentially transplanted sagebrush. Travel management planning under Alternative B would also include the need for seasonal or permanent closures or for limiting routes to administrative use. This would entail completing an activity-level travel plan within 5 years of the ROD for the EIS.

Under Alternative B, restricting travel to existing routes and limiting their upgrading or realignment could limit access to federal coal resources. However, impacts could be negligible when existing routes are designated as closed or open with restrictions. Although the limitations on upgraded or realigned routes are not absolute—for example, they could be permitted where needed for

safety—this requires a determination that impacts on GRSG would be minimal. Because exact numbers and locations of projects where these limitations would be applied are unknown at this time, the availability of a variance has not been assumed for this impact assessment. However, by definition, any variance that may be granted would not have significant adverse impacts on GRSG.

Without site-specific and project-specific information (e.g., practicability of other routes), it is not possible to quantify the degree to which the restrictions on access under Alternative B would preclude further leasing and development. Nevertheless, 668,900 acres of potentially developable coal resources could be affected by closures to road construction, realignment, and upgrading. Estimates of affected acres by field office are as follows:

- Colorado River Valley Field Office—0 acres
- Grand Junction Field Office—0 acres
- Kremmling Field Office—45,000 acres
- Little Snake Field Office—219,200 acres
- White River Field Office—10 acres

Alternative C—In terms of travel management, this alternative is similar to Alternative B. For existing leases and mines, the accommodation for new roads would be more restrictive, with no construction within 4 miles of a lek. Four other types of restrictions under Alternative B would apply to ADH as well as PHMA, as follows:

- Limiting route construction to realignments of existing routes
- Allowing realignments only where impacts on GRSG habitat would be minimal, where it avoids a new road, or when needed for motorist safety
- Allowing no upgrades of existing routes that would change the route category or capacity unless it avoids a new road or is necessary for motorist safety
- Requiring the use of transplanted sagebrush in addition to native seeds in reseeding roads

Other measures would be the same as under Alternative B. Consequently, Alternative C would be somewhat more restrictive than Alternative B, with greater potential for making coal leasing or development infeasible or, at a minimum, reducing the amount of development and increasing costs. Based on currently identifiable lek locations, an estimated 711,500 acres of potentially developable coal resources would be closed to road construction, realignment, or upgrading. Estimates of affected acres by field office are as follows:

- Colorado River Valley Field Office—0 acres

- Grand Junction Field Office—0 acres
- Kremmling Field Office—45,000 acres
- Little Snake Field Office—225,600 acres
- White River Field Office—28,100 acres

Alternative D—This alternative is also similar to Alternative B, although it is more restrictive in some aspects and less restrictive in others. For example, the consideration for seasonal closures on travel would apply to ADH instead of only to PHMA. On the other hand, permanent closures would not be considered. New roads needed to access current leases or existing mines would be build using the Gold Book standard and would be limited to a 5 percent instead of 3 percent disturbance cap. In addition, an exception could be granted for the 5 percent disturbance cap. This would be the case if GRSG populations in the MZ were healthy and stable or increasing and that the construction would not adversely affect GRSG due to habitat loss or disruption. Similarly, road reroutes and upgrades would be less severely restricted, with the evaluation based on adverse impacts on GRSG populations instead of a requirement for a benefit in terms of safety or to avoid new construction.

On balance, this alternative would place fewer impediments on coal leasing and development from travel management than Alternative B. This consists of new travel restrictions that could affect accessibility, feasibility, and costs of development of federal coal resources in areas that do not currently have such restrictions. Impacts would be substantially fewer than under Alternative C, which would prohibit new road construction within 4 miles of a lek.

It is not possible to quantify impacts precisely under this alternative. This is because the more accommodating restrictions would result in substantial portions of potentially affected acres not being effectively closed or constrained, relative to future coal development.

Proposed LUPA—Under this alternative, travel management would be the same as under Alternative D; Impacts from travel management on coal are therefore similar to those described under Alternative D, above.

Impacts from Lands and Realty Management on Coal

Management actions related to lands and realty in conjunction with protection of GRSG and its habitats and use area could adversely impact coal leasing and development. This potential includes all three types of impacts on coal resources described previously: reduced availability, reduced accessibility, and increased costs.

<u>Reduced Availability of Federal Mineral Estate for New Coal Leases</u>

Alternative A—In the KFO, land use authorizations would focus on concentrating linear facilities in or contiguous with existing corridors, where

possible. Authorizations would be avoided in locations that would harass livestock or wildlife or that would impact fragile areas, such as threatened and endangered habitats. When considering land tenure adjustments, the KFO would retain all public lands or interests in land (such as easements) that enhance multiple-use and sustained-yield management. It would acquire lands or interests in land that complement important resource values and further management objectives. As standard practice, abandoned ROWs are required to be reclaimed on BLM-administered and National Forest System lands. Under this alternative, the KFO would not identify any areas as exclusion or avoidance areas, so there would be no impact on the leasing and development of federal coal resources.

None of the existing LUPs for field offices in the planning area include specific closures to leasing potentially developable coal resources. However, areas managed as ROW exclusion or avoidance areas could restrict surface use sufficient to make leasing infeasible for projects requiring a ROW to access coal leases or facilities. For example, LSFO's current RMP (2011) identifies ROW exclusion areas that would preclude or constrain access to 11,700 acres of potentially developable coal resources. It also would preclude or constrain access to ROW avoidance areas, which would affect access to approximately 47,200 acres of this resource. (See the analysis of constraints on access under *Reduced Access to New or Existing Coal Leases* below.)

Alternative B—Under this alternative, PHMA would be managed as ROW exclusion areas, precluding new access roads and electric distribution lines, conveyors, or other surface facilities. Depending on the specific site and project design, this could impede access sufficient to make leasing impracticable.

Alternative C—Under this alternative, the same measures related to PHMA in Alternative B would be applied to ADH areas. This is therefore likely to result in greater impacts on access to coal resources sufficient to make leasing impracticable.

Alternative D—This alternative would be less restrictive than Alternatives B and C by managing PHMA as ROW avoidance areas rather than exclusion areas. Consequently, Alternative D is less likely to result in constraints on access sufficient to make coal leasing impracticable.

Proposed LUPA—impacts would be similar to those described above for Alternative D. However, additional restrictions on land use authorizations would be included under the Proposed LUPA including: managing both PHMA and GHMA as avoidance areas and prohibiting aboveground structures within 1 mile of active leks. Impacts on coal would be similar to those described for Alternative B, with slightly greater impacts for all indicators described below, due to increased restrictions on disturbance and disruptive activities.

Reduced Access to New or Existing Coal Leases

Alternative A—Impacts would be the same as those under *Reduced Availability of Federal Mineral Estate for New Coal Leases*.

Alternative B—Under this alternative, PHMA would be managed as ROW exclusion areas, precluding new access roads and electric distribution lines, conveyors, or other surface facilities. Two exceptions would be considered: In the case of an existing lease not yet developed, where a new ROW could be completed entirely within the disturbance footprint of an existing ROW (e.g., locating a power line along an existing road); in the case of an existing mine, ROWs could be collocated with an existing ROW. If a new access road or other ROW could not be collocated with an existing ROW, it could be constructed only if impacts were minimized and disturbance were to remain within a 3 percent cap. If the cap were exceeded, mitigation would then be required.

Managing PHMA as ROW exclusion areas could affect the availability or access to 264,200 acres of potentially developable coal resources that do not currently have such restrictions. However, specific impacts on leasing and developing currently unleased coal cannot be quantified without project-specific information on the size and configuration of potential future leases, in relation to adjacent federal or private surface lands and existing or feasible new access routes.

Other actions or BMPs in PHMA under Alternative B to increase protection of GRSG and its habitats include removing, burying, or modifying power lines and removing and restoring the locations of unused surface facilities associated with ROW grants.

Additional measures to be applied in GHMA are as follows:

- Managing GHMA as ROW avoidance areas, which would require that impacts on GRSG and its habitats be avoided where practicable or minimized and mitigated
- Collocating necessary new ROW features with existing features

These measures could add to the costs of new coal leases and new or expanded coal mines. Where very long and indirect alignments are involved, existing power lines would have to be buried, which could make a potential project economically infeasible.

Among land tenure measures, requirements for PHMA under Alternative B include a prohibition against disposal of BLM-administered and National Forest System lands and a goal of acquiring certain private lands. Without project-specific information, it is not possible to assess this impact fully, but it could make some otherwise accessible private lands from being used for coal

development and keep some lands in federal ownership that might otherwise be disposed of and hence available for access to potentially developable coal resources. Estimates of affected acres by field office are as follows:

- Colorado River Valley Field Office—0 acres
- Grand Junction Field Office—0 acres
- Kremmling Field Office—45,000 acres (approximate)
- Little Snake Field Office—219,200 acres
- White River Field Office—10 acres

Alternative C—Under this alternative, the measures related to PHMA in Alternative B would be applied to ADH areas. This is therefore likely to result in greater impacts on coal leasing and development, since more lands would be affected. Managing ADH as ROW exclusion areas could affect the availability or access for approximately 517,900 acres of federal coal resources that do not currently have such restrictions.

The requirements under Alternative B for removing, burying, or modifying power lines and for removing and restoring any unused ROWs corridors would also be applied under Alternative C, as the requirement for relocating unbuilt ROW corridors outside PHMA, as would measures under Alternative B related to land tenure adjustments. However, the actions related to GHMA—management as ROW avoidance areas and requiring collocation of new ROW alignments with existing alignments—would not be applied under this alternative, reducing somewhat the impacts on coal leasing and development in GHMA. Estimates of affected acres by field office are as follows:

- Colorado River Valley Field Office—0 acres
- Grand Junction Field Office—0 acres
- Kremmling Field Office—45,000 acres (approximate)
- Little Snake Field Office—444,800 acres
- White River Field Office—28,100 acres

Alternative D—This alternative would be less restrictive than Alternatives B and C by managing PHMA as ROW avoidance rather than ROW exclusion. Also within PHMA, new ROWs may be collocated within existing corridors without the need for staying within the existing footprint. New ROWs in relation with existing leases or mines would also be less difficult to implement, including accepting impacts where access would otherwise be inaccessible. The associated disturbance cap for access to valid existing rights would be 5 percent, compared to 3 percent under Alternative B, although mitigation would be required.

Alternative D would also require only raptor perch deterrents instead of burying existing power lines in PHMA. In addition, unused ROWs would be required to be reclaimed only where mandated by regulation. Furthermore, new ROWs would be allowed where a compelling reason exists and GRSG populations would not be adversely affected by habitat loss or disruptive activities. The Alternative B and C requirements for relocating unbuilt corridors from inside to outside PHMA would also not be applied under Alternative D. Actions related to GHMA and to land tenure adjustments would be the same as those under Alternatives B and D or, where different, would have the same relative impact on coal leasing and development compared to current management.

The likely outcomes of lands-related management actions and BMPs on leasing and development of federal coal resources under Alternative D cannot be quantified. However, because it represents fewer and less stringent constraints on development, it is likely that most projects could be developed with appropriate planning and design and adequate mitigation.

Proposed LUPA—See *Reduced Availability of Federal Mineral Estate for New Coal Leases*, above.

Increased Costs and Decreased Efficiency of Coal Mining Operations

No significant adverse impacts are anticipated under any of the four alternatives.

Impacts from Fluid Minerals (Oil and Gas) Management on Coal

In the Rocky Mountain region, habitat loss or modification, surface infrastructure, associated vehicle travel, and disturbance from equipment operations associated with federal fluid mineral development have been identified as key threats to GRSG populations and habitat. Consequently, the alternatives analyzed in this EIS include a number of management actions and mandatory mitigations to reduce the scale, frequency, and severity of impacts from oil and gas. (See **Section 4.8.1**, Fluid Leasable Minerals.) Note that to a large extent, management actions variously prohibiting or restricting fluid minerals projects under the alternatives analyzed do not affect the potential for new or expanded coal leases and developments.

Exceptions include the extent to which measures that either restrict or accommodate oil and gas leasing and development may increase or decrease future development of coal resources by affecting the amount of new surface disturbance allowable for coal projects under applicable disturbance caps.

Reduced Availability of Federal Mineral Estate for New Coal Leases

No management actions for fluid minerals in any of the field offices specifically preclude leasing to develop coal resources. However, in areas of overlap between potentially developable coal and high-potential for oil and gas, leasing and development for fluid minerals could consume the allowable surface disturbance caps under the various alternatives, precluding some coal projects in

areas of overlap. The only current area of known overlap is in Zone 11 of the KFO.

Alternative A—No significant adverse impacts are anticipated. In the KFO, approximately 45,000 acres of the federal mineral estate would be open to further consideration for coal leasing. Within the area of federally leased coal lands, surface occupancy and surface-disturbing activities from oil and gas operations would be restricted, such as with NSO and CSU stipulations. This would benefit coal resource. Future coal mining is considered to have low potential.

Alternative B—This alternative closes PHMA areas to new leases for oil and gas and places stringent constraints on existing leases, including a 3 percent disturbance cap. This alternative therefore has less potential than Alternative A to preclude future coal development in Zone 11 of the KFO.

Alternative C—Impacts would be the same as under Alternative B, with more stringent restrictions on fluid minerals and therefore lesser potential to preclude future coal development in Zone 11 of the KFO.

Alternative D—Impacts would be the same as under Alternative B, but with less stringent restrictions on fluid minerals and therefore somewhat greater potential for precluding future coal development in Zone 11 of the KFO.

Proposed LUPA—See *Reduced Availability of Federal Mineral Estate for New Coal Leases*, above.

<u>Reduced Access to New or Existing Coal Leases</u>
Impacts would be the same as under *Reduced Availability of Federal Mineral Estate for New Coal Leases*.

<u>Increased Costs and Reduced Efficiency of Coal Developments</u>
No significant adverse impacts are anticipated under any of the four alternatives.

Impacts from Coal Management on Coal
The WRFO and LSFO include existing coal leases, and both of these field offices plus KFO include lands acceptable for further consideration of coal leasing (see below). Surface mines represent significant areas of habitat loss, along with associated vehicular traffic, noise and dust generation, electrical distribution lines, and light pollution. Subsurface mines, while resulting in less habitat loss, also have surface facilities and most of the other sources of impacts associated with surface mines.

The *General Description* section presents information on the coal program as administered by the BLM and the extent of coal resources in the planning area; *Methodology and Assumptions* summarizes the types of impacts likely to result

from coal leasing and development and the tools available to the BLM and Forest Service for avoiding, minimizing, or offsetting those impacts.

The following paragraphs compare the management actions and key BMPs of coal mining and are incorporated into the alternatives analyzed in detail. Impacts are grouped into three categories for each alternative: impacts on the availability of federal coal resources for development, on the access to those resources, and on the economic viability of development projects, based on increased costs to the mine operator.

Reduced Availability of Federal Mineral Estate for New Coal Leases

Alternative A—Colorado River Valley Field Office—The current LUP identifies 28,500 acres as open to consideration for coal leasing. However, a more recent analysis has concluded that none of the resources, located of the anti-dip slope of the Grand Hogback, are potentially developable using current mining technologies and based on the quantity and quality of the coal. Coal unsuitability criteria at 43 CFR, Part 3461, would be applied to any future coal applications that may be received.

Grand Junction Field Office—Coal is found in the subsurface in GRSG habitat areas, but at depths greater than 3,000 feet, making it uneconomical to mine with today's methods and economics. Some coals of the Mesaverde Group are exposed in the Book Cliffs north of Grand Junction. The coals in the GJFO planning area vary, from semibituminous to bituminous B and C in apparent rank. The coal is non-coking, non-agglomerating. A moderate potential exists for underground mining in these areas within the next 20 years, but this mining would not affect GRSG habitat.

Kremmling Field Office—Under Alternative A, approximately 45,000 acres of the federal mineral estate within the KFO would be open to further consideration for coal leasing. Within the area of federally leased coal lands, surface occupancy and surface-disturbing activities related to oil and gas operations would be restricted. Coal mining would result in surface-disturbing activities and mitigation, and design features would be applied to proposed coal operations in order to reduce or mitigate impacts on other resources. No coal mines are currently active in the KFO due to the lack of reasonable cost transportation, and the potential for future coal development is relatively low.

Little Snake Field Office—A total of 623,900 acres are deemed acceptable for further consideration for leasing for either surface or underground development (coal planning area). Site-specific activity planning, including additional environmental analysis, would be needed before a decision to lease specific tracts can be made. Exploratory drilling would be allowed in order to obtain sufficient data for resource management decisions and to make fair market value determinations.

White River Field Office—The management of coal resources developed in the 1981 Coal Amendment was carried forward into the 1997 White River RMP. The coal unsuitability criteria at 43 CFR, Part 3461, were not reapplied at the time the 1997 RMP was developed. The unsuitability criteria would be reapplied at the time an application is received. The acreage identified as unsuitable for further coal leasing based on wildlife issues would be modified with updated wildlife information as coal lease applications are received. Reapplication of the coal unsuitability criteria would be completed in coordination with CPW. No existing coal leases overlap mapped PHMA for GRSG, but 5,300 acres of existing leases are within mapped GHMA. Five acres of PHMA and 28,100 acres of GHMA are identified as acceptable for further coal leasing and no acres are identified as unsuitable.

Alternative B—Under this alternative, the field offices would find unsuitable all leasing for surface mining of coal in PHMA, using the criteria set forth in 43 CFR, Part 3461.5. This would close all PHMA to future surface coal mining, affecting 264,200 acres of potentially developable coal in the planning area. This is 51 percent of the combined 518,600 acres of potentially developable coal. Estimates of areas of coal resources affected, by field office, are as follows:

- Colorado River Valley Field Office—0 acres
- Grand Junction Field Office—0 acres
- Kremmling Field Office—45,000 acres
- Little Snake Field Office—219,200 acres
- White River Field Office—10 acres

Alternative C—Impacts would be the same as those under Alternative B.

Alternative D—Under Alternative D, the requirement for a finding of unsuitability for future leasing of coal for surface mining is replaced with a requirement for a finding of unsuitability where GRSG cannot be adequately protected. In addition, any disturbances that may be permitted in ADH areas as a consequence of this provision would have a limit on surface disturbance of 5 percent of the particular MZ. Where the 5 percent cap cannot be achieved, additional mitigation is required. The language of the provision under this alternative prevents it from being a de facto bar to leasing.

The degree to which this measure would affect the availability of new leases depends on whether a particular parcel being considered contains or is within 4 miles of a GRSG lek or could be developed within a 5 percent disturbance cap. Based on mapping of currently known leks, with associated 4-mile buffers, this could affect more potentially developable coal resources than under the other alternatives. Estimates of affected acres are not a reliable indicator of impacts on future coal development. This is because the restrictions under Alternative D

would not be applied absolutely but only when GRSG could not be adequately protected through project location, design, and other mitigations.

Proposed LUPA—Under this alternative, management of coal would be similar to Alternative D with the additional restrictions of 3 percent cap on surface disturbance in PHMA. Impacts on the coal program for all indicators would be greater than those described under Alternatives A and D, but less than Alternatives B and C. Reduced Access to New or Existing Coal Leases

Alternative A—There are no significant adverse impacts anticipated under Alternative A.

Alternative B—Under this alternative, new leases for coal subsurface mines would be granted in PHMA if all associated surface facilities are located outside PHMA. In the case of existing leases in PHMA, any new surface facilities must be collocated with existing surface disturbances or, if that is not possible, kept to the absolute minimum. Although not prohibiting new or expanded coal development in PHMA, this measure could reduce access to those resources if portions of a subsurface resource could not be fully developed owing to a lack of sufficient surface features, such as ventilation fans overlying the belowground workings. Estimates of affected acres by field office are as follows:

- Colorado River Valley Field Office—0 acres
- Grand Junction Field Office—0 acres
- Kremmling Field Office—45,000 acres
- Little Snake Field Office—219,200 acres
- White River Field Office—10 acres

Alternative C—The impacts would be the same as those under Alternative B.

Alternative D—For subsurface mines, Alternative D would be the same as Alternatives B and C by allowing new coal leases if all surface facilities are placed outside any PHMA area. However, Alternative C differs by applying a 5 percent disturbance cap per Colorado MZ to any approved projects, with additional mitigation required for disturbance in excess of 5 percent.

Unlike Alternatives B and C, this alternative includes two potential bases for exemption from this provision: in conformance with federal coal leasing regulations, federal lands with coal deposits are not assessed as unsuitable when they would be mined entirely by underground methods; alternatively, where surface impacts would accompany the subsurface mine, it would be assessed as unsuitable if one or more unsuitability criteria apply, unless a relevant exception or exemption applies. In the latter case, disturbance would be limited to 5 percent in any Colorado MZ, and additional mitigation would be required to offset unavoidable impacts.

The magnitude of impacts associated with Alternative D cannot be assessed without project-specific information on where an affected lease is located and the spatial relationship of any surface facilities to GRSG habitat. Because the restrictions under this alternative would not be applied absolutely but only when GRSG could not be adequately protected through project location, design, and other mitigations, estimates of affected acres are not a reliable indicator of potential impacts on future coal development.

Proposed LUPA—see Reduced Availability of Federal Mineral Estate for New Coal Leases, above.

Increased Costs and Reduced Efficiency of Coal Developments

Alternative A—No significant adverse impacts are anticipated under Alternative A.

Alternative B—In general, **Chapter 2** does not list "mandatory BMPs" for coal projects under Alternative B as it does for some other resources and uses. However, Alternative B includes the following management action for ADH areas: Require minimization of surface-disturbing or disruptive activities (including operations and maintenance) where needed to reduce impacts on important seasonal GRSG habitats (e.g., leks). These would be applied as COAs during project-specific planning. The measure also includes a requirement for additional mitigation to offset unavoidable impacts.

It is not possible to assess quantitatively the potential for COAs and additional mitigation under this measure to affect individual projects. This is because of lack of specificity concerning where the projects would occur and how substantially these would affect the project's economic feasibility. However, it should be noted that by applying some of the measures under Alternatives B and C to ADH instead of PHMA, much larger areas are included than shown under *Reduced Availability of Federal Mineral Estate for New Coal Leases* and *Reduced Access to New or Existing Coal Leases*. For example, including ADH adds 225,600 acres in the LSFO and 28,100 acres in the WRFO to which these restrictions would apply. Nonetheless, it is important to note that these restrictions are not absolute and would not apply uniformly across the entire area of coal lands.

Based on the above, these measures would significantly reduce the economic viability of most coal projects, and such minimization is already incorporated into the BLM and Forest Service project screening process under NEPA.

Alternative C—The impacts would be the same as those under Alternative B.

Alternative D—Under Alternatives B and C, surface disturbance and disruptive activities would be minimized in ADH areas to protect seasonally important GRSG habitats. In addition, Alternative D includes the following measures not included in Alternatives B and C that represent potentially increased costs and

decreased operational efficiencies that could affect the economic viability of a project:

- Ensure that exploration does not adversely affect GRSG populations through habitat loss or disruptive activities and, where practicable, limit the disturbance to 5 percent in the affected Colorado MZ.
- For renewals of existing subsurface coal leases, require that any new surface facilities be placed outside PHMA or, if that is not technically feasible, require minimal footprint and attach COAs for protecting GRSG and its habitats.
- For renewals or readjustments of existing surface coal leases in ADH, apply COAs for protecting GRSG.
- For new leases and authorizations, require minimization of surface-disturbing or disruptive activities (including operations and maintenance) during activity level planning.
- For existing leases, encourage the lessee to voluntarily apply BMPs and mitigate impacts on GRSG during the term of the lease.

It is not possible to assess quantitatively the potential for COAs and additional mitigation to affect individual projects. This is because of a lack of specificity concerning where the projects would occur and how substantially these would affect the project's economic feasibility. However, these measures would not significantly reduce the economic viability of most coal projects, and such minimization is already incorporated into the BLM and Forest Service project review during the NEPA process.

Proposed LUPA—see *Reduced Availability of Federal Mineral Estate for New Coal Leases*, above.

Impacts from Locatable Minerals Management on Coal

Alternative measures analyzed for protecting GRSG in relation to developing locatable minerals are aimed at avoiding or minimizing new habitat loss and additional disruption of GRSG activities. They would accomplish this by prohibiting or limiting future mining in PHMA. The potential impacts of these measures on coal leasing and development are summarized below by alternative. Note that only the LSFO contains locatable minerals resources, including uranium, gold, copper, and pharmaceutical limestone.

<u>Reduced Availability of Federal Mineral Estate for New Coal Leases</u>

Alternative A—The LSFO includes overlap between known locatable mineral resources and coal resources, across 623,900 acres in its coal MZ. At present, the potential for conflicts between locatable minerals and future coal leasing and development cannot be quantified. This is because the impact would depend on specific locations, timing, and project designs.

Alternatives B, C, and D and the Proposed LUPA—Indirectly, by potentially allowing additional habitat loss from development of locatable minerals, this alternative could increase the amount of surface disturbance that would result by developing these minerals. This would reduce the amount available under the 5 percent cap for potential future coal mining under this alternative.

This impact cannot be quantified in conjunction with this EIS due to the lack of specific information on the timing, location, and extent of future coal mines or expansion of existing mines in relation to future locatable mineral developments. If such conflict were to arise, the result could be to reduce the amount of coal development in zones that also contain existing locatable minerals mining as well as current coal leases or existing coal mines. In the LSFO, the only field office with overlap between locatable minerals resources and federal coal resources, this could adversely affect coal leasing and development in the 623,900 acres of developable coal.

Reduced Access New and Existing Coal Leases

Impacts would be the same as under *Reduced Availability of Federal Mineral Estate for New Coal Leases*.

Increased Costs and Decreased Efficiency of Coal Developments

No significant adverse impacts are anticipated.

Impacts from Fuels Management on Coal

Management actions for protecting GRSG and its habitats in relation to fuels management are described in detail in **Section 4.7**, Wildland Fire Ecology and Management, and are presented in **Chapter 2**. These measures focus on ensuring that fuels reduction activities to reduce the risk of future catastrophic fires do not significantly affect GRSG populations, either through disruption of GRSG activities or destruction of occupied or suitable habitat. Potential impacts from fuels management on coal leasing and development is negligible or beneficial, as summarized below.

Reduced Availability of Federal Fluid Minerals for New Coal Leases

Alternative A—No significant adverse impacts are anticipated. Fuels management under this alternative could benefit coal development operations by reducing the risk of fire damage to surface facilities in those areas.

Alternative B—The impacts would be the same as those under Alternative A.

Alternative C—The impacts would be the same as those under Alternative A.

Alternative D—The impacts would be the same as those under Alternative A.

Proposed LUPA—The impacts would be the same as those under Alternative A.
Reduced Access to New or Existing Coal Leases

The impacts would be the same as under *Reduced Availability of Federal Minerals for New Coal Leases*.

Increased Costs and Decreased Efficiency of Coal Developments
The impacts would be the same as under *Reduced Availability of Federal Minerals for New Coal Leases*.

Impacts from Fire Operations on Coal
Management actions for protecting GRSG and its habitats from fire operations are described in detail in **Section 4.7**, Wildland Fire Ecology and Management, and are presented in **Chapter 2**. Impacts of fire operations on coal projects would be negligible or beneficial, as summarized below.

Reduced Availability of Federal Fluid Minerals for New Coal Leases
Alternative A—No significant adverse impacts are anticipated. The priority placed on fire suppression in GRSG habitat could benefit coal development operations by reducing the potential for fire damage of surface facilities in those areas.

Alternative B—The impacts would be the same as those under Alternative A.

Alternative C—The impacts would be the same as those under Alternative A.

Alternative D—The impacts would be the same as those under Alternative A.

Proposed LUPA—The impacts would be the same as those under Alternative A.

Reduced Access to New or Existing Coal Leases
The impacts would be the same under *Reduced Availability of Federal Minerals for New Coal Leases*.

Increased Costs and Decreased Efficiency of Coal Developments
The impacts would be the same as under *Reduced Availability of Federal Minerals for New Coal Leases*.

Impacts from ACEC/Zoological Area Management on Coal

Reduced Availability of Federal Mineral Estate for New Coal Leases
Alternative A—Colorado River Valley Field Office—Under Alternative A, approximately 300 acres of PHMA and 10,200 acres of GHMA overlap lands managed as ACECs. None of these is in an area of potentially developable coal resources.

Grand Junction Field Office—There are no ACECs in PHMA or GHMA.

Kremmling Field Office—Current ACECs within the KFO are the North Park Natural Area (300 acres) and the Kremmling Cretaceous Ammonite RNA (198

acres), both with NSO stipulations to protect sensitive resource values. Of these, the North Park ACEC is in PHMA.

Little Snake Field Office—ACECs would be closed to oil and gas operations. This includes 2,800 acres in PHMA and 2,900 acres in GHMA.

White River Field Office—Seventeen ACECs are designated under Alternative A. Although they have NSO, CSU, or ROW exclusion or avoidance area management to protect the resource values on which the ACECs are based, none of the ACECs is closed to leasing. The acreages for exclusion and avoidance areas are the same as discussed under *Reduced Availability of Federal Mineral Estate for New Coal Leases* in *Impacts from Lands and Realty Management on Coal*, namely 7,200 acres in PHMA and 9,900 acres in GHMA.

Alternative B—No adverse impacts are anticipated.

Alternative C—This alternative would designate all PHMA as a GRSG habitat ACEC. This designation emphasizes management for GRSG populations, seasonal activity areas, and other crucial needs; however, it does not, in and of itself, carry any special restrictions on leasing or development of fluid minerals.

Alternative D— No adverse impacts are anticipated.

Proposed LUPA—No adverse impacts are anticipated.

Reduced Access to New or Existing Oil and Gas Leases
The impacts would be the same as under *Reduced Availability of Federal Mineral Estate for New Coal Leases*.

Increased Costs and Decreased Efficiency of Oil and Gas Developments
The impacts would be the same as under *Reduced Availability of Federal Mineral Estate for New Coal Leases*.

Summary of Impacts on Coal
Alternative A—Under current management, the field offices use a combination of leasing terms and conditions and project-specific COAs to manage coal leasing and development. The goal is to avoid or minimize adverse impacts on other resources and resource uses, especially sensitive resources such as GRSG and its habitat. The LSFO and WRFO contain existing leases, while these and the KFO include substantial areas of unleased lands potentially suitable for leasing: 264,200 acres in PHMA and 254,500 acres in GHMA. Existing leases include 5,300 acres in GHMA in the WRFO. Existing leases in the LSFO for underground mines are 1,600 acres in PHMA and 4,100 acres in GHMA.

Alternative B—Under Alternative B, field offices would find unsuitable all leasing for surface coal mining in PHMA using the criteria set forth in 43 CFR, Part 3461.5. This would close all PHMA to future surface coal mining, affecting

264,200 acres of potentially developable coal in the planning area. This is 51 percent of the combined 518,700 acres of potentially developable coal.

Additional measures under Alternative B would apply to currently leased and unleased coal resources, with the objective of reducing the amount of surface disturbance. The total area affected could significantly reduce access to coal resources or could increase the cost of accessing and developing the resource. The actual impact cannot be quantified and could vary substantially. This would depend on site-specific geology, mining technology, economics, other applicable surface-use constraints, and the availability of private surface or unaffected federal surface in the vicinity.

Other constraints on coal under Alternative B include restrictions on new, realigned, or upgraded roads in PHMA and a requirement for PHMA lands as ROW exclusion areas. Although these measures would not preclude new leasing or development per se, they could make access to new or existing leases difficult or potentially impossible by prohibiting use of BLM and Forest Service surface lands to access coal leases. While the impact on the amount of future development cannot be meaningfully calculated because of the many variables affecting a given site or project (e.g., availability of alternative access across private lands or across non-PHMA areas) more than half a million acres of coal resource in the planning area would come under the road restrictions, as well as the requirement for ROW exclusion areas. These are potentially substantial impediments to future development, even if they do not result in a de facto constraint on leasing.

Constraints associated with the other resources and uses analyzed above would generally have only a minor impact on future leasing of federal coal resources. The 3 percent disturbance cap applicable to a variety of potential ground-disturbing activities under Alternative B could be the determinative measure, notwithstanding the various other constraints summarized above. For example, while anthropogenic disturbance accounts for only 86,400 acres (2 percent) of the 4.1 million acres of federal lands in the 21 Colorado MZs, that total is two-thirds of the way toward the 3 percent disturbance cap. Indeed, 3 of the 21 zones are already above the 3 percent cap, and 10 more are more than halfway to that amount of disturbance. By its nature, surface coal mining is much more consumptive of surface lands than many other types of resource developments, such as oil and gas.

Based on the above, Alternative B would have significantly greater impacts on coal resources than Alternative A.

Alternative C—Under Alternative C, field offices would also find unsuitable all leasing for surface mining of coal in PHMA, using the criteria set forth in 43 CFR, Part 3461.5. As with Alternative B, this would close all PHMA to future surface mining of coal, affecting 264,200 acres of potentially developable coal in

the planning area. This is 51 percent of the combined 518,600 acres of potentially developable coal.

The measures under Alternative B would also apply to currently leased and unleased coal resources to reduce the amount surface disturbance, significantly reducing access to coal resources or increasing the cost of accessing and developing the resource. The actual impact cannot be quantified and could vary substantially, depending on site-specific geology, mining technology, economics, other applicable surface-use constraints, and the availability of private surface or unaffected federal surface in the vicinity.

Also, as under Alternative B, this alternative includes restrictions on new, realigned, or upgraded roads in PHMA and a requirement for PHMA lands as ROW exclusion areas. This could make access to new or existing leases difficult or potentially impossible by prohibiting use of BLM-administered and National Forest System surface lands to access coal leases. These are potentially substantial impediments to future development, even if they do not result in a de facto constraint on leasing. Constraints associated with the other resources and uses analyzed above would generally have only a minor impact on future leasing of federal coal resources.

Based on the above, Alternative C would have approximately the same impacts on coal leasing and development as under Alternative B but greater than under Alternative.

Alternative D—Under this alternative, the requirement to find all coal resources unsuitable for future leasing is replaced with a requirement of a finding of unsuitability when GRSG cannot be adequately protected. In addition, the BLM and Forest Service would have greater flexibility in approving projects with adequate design and mitigation, subject to a 5 percent disturbance cap. At present, 1 of the 21 MZs is already above that amount, and 5 more are approaching it.

Because of this greater flexibility for approving projects, it is not possible to quantify the degree to which the restrictions would be applied absent site-specific and project-specific information. However, because of the large areas across which the restrictions on coal under Alternative D would be applied, impacts on coal leasing and development would be significantly greater than under Alternative A but significantly less than under Alternatives B and C.

Proposed LUPA—Impacts would be similar to those described above for Alternative D. However, additional restrictions on land use and other authorizations would be included under the Proposed LUPA, as follows:

- Managing both PHMA and GHMA as avoidance areas
- Prohibiting aboveground structures within 1 mile of active leks

- Restricting surface disturbance to 3 percent in PHMA

Impacts on coal would be similar to those described for Alternative D, with slightly greater impacts on the coal program for all indicators described below, due to increased restrictions on disturbance and disruptive activities.

4.10 MINERALS (LOCATABLE)

4.10.1 General Description

Unlike leasable minerals (e.g., oil and gas or coal) or salable minerals (e.g., sand and gravel), where issuing a lease or permit is at the BLM's discretion, the discovery and location of a locatable mineral claim is initiated by the mining claimant. Surface-disturbing activities on mining claims are regulated per 43 CFR, Part 3809.

For exploration that would disturb 5 acres or fewer, the claimant is required to submit a notice to the BLM. For exploration involving more than 5 acres and for actual mining operations regardless of acreage, the claimant must submit a plan of operations for approval by the BLM before mining can begin.

These regulations do not apply to lands in the National Forest System acquired lands, or on BLM-administered WSAs. If a mining claimant's operation is on lands patented under the Stock Raising Homestead Act and no written surface owner consent exists, then a plan of operations must be submitted for BLM approval. Where the surface owner's consent has been obtained, the claimant does not need to submit a notice or obtain plan of operations approval.

Mining on NFS lands is covered by regulations at 36 CFR, Part 228, Subpart A. A mining claim may operate on public domain lands under a notice when surface impacts would not be "significant." For operations that would create a significant surface disturbance, operators must have a Plan of Operations approved by a line officer. In general, hard rocks minerals on acquired lands are leasable.

Actions that could occur through implementing an alternative could affect the availability and opportunity for development of a locatable mineral resource when areas are withdrawn from locatable mineral entry. Other actions could increase costs of development by adding additional limits on the ability of a claimant to efficiently develop these types of locatable minerals or reduce a claimant's ability to access minerals.

4.10.2 Methodology and Assumptions

General Impacts on Locatable Minerals

Indicators of impacts on locatable minerals and the measurements used to describe the impacts (where available or appropriate) are as follows:

- Actions that reduce availability and opportunity for development of a resource (e.g., mineral withdrawal)
  - Amount of federal minerals available versus closed to development
  - Indirect impacts include loss of production of mineral resource for the public use and for the generation of sale revenues, federal royalties from production, and tax revenues
- Actions placing restrictions or requirements that reduce efficiency and increase operational costs that could make development infeasible
  - Amount of federal lands with restrictions (e.g., RDFs, PDFs, and TLs)
  - Indirect impacts include reduced production of mineral resources for the public use and for the generation of revenues, federal royalties, and tax revenues; possible adverse impact of higher cost of accessing portion of lease via more circuitous route for access road, electric utility lines, seasonal limitations to road use, or additional restrictions/requirements on development activities
- Actions that affect the ability to access minerals
  - Amount of acres or miles that would affect the ability to access mining claims (e.g., ROW exclusions and disturbance caps)
  - Adverse impact of restrictions affecting the ability to access minerals that would otherwise be available, including limits to road construction, permanent road closures, avoidance, and exclusion areas

Assumptions

- Any alternative that limits locatable mineral development (i.e., reduces the area available for development) would have some adverse impact on locatable minerals.
- The 43 CFR, Part 3809, and 36 CFR, Part 228, Subpart A, regulations manage surface-disturbing activities on mining claims.
- Mineral operations are sensitive to costs, especially when prices are depressed.
- Validity of mining claims is based on profitability.
- Ability to construct roads and pipelines on private lands to access federal minerals is subject to landowner approval, which is not guaranteed.

- Mineral resources are not evenly distributed across the landscape.
- Operators need predictable continuity of operations before acquiring or developing.
- Development techniques are highly technical and not uniformly applicable.
- Seasonal closures on travel may make full development over many years infeasible.
- A minimum of 5 years is needed for restoration of self-sustaining native grass/forb cover on reclamation.
- A minimum of 10 years is needed for successful establishment or colonization by sagebrush on reclamation.

Implementing management actions for the following resources or resource uses would have negligible or no impact on locatable minerals and are, therefore, not discussed in detail: recreation management, range management, wind energy development, industrial solar, wild horse management, fluid minerals and solid minerals, nonenergy leasable minerals, salable minerals, fuels management, fire operations, ESR, and habitat restoration.

4.10.3 Direct and Indirect Impacts on Locatable Minerals

Impacts from Travel Management on Locatable Minerals

Management actions for resources and resource uses could affect potential locatable mineral development when they result in the following:

- Reduced availability of identified potentially developable locatable mineral resources
- Reduced access to new or existing mines due to restrictions on use of the overlying surface lands
- Reduced efficiency and increased operational costs that make potential locatable mineral development economically infeasible

Alternative A—A total of 574,100 acres of PHMA and 412,100 acres of GHMA would continue to be managed as open to cross-country travel. A similar amount of acres would continue to be managed as limited to designated routes. Compared to Alternatives B, C, and D, Alternative A has the most acres of open travel designation and the fewest restrictions on upgrades to routes; therefore, it has the fewest impacts on locatable minerals.

Alternative B—Under Alternative B, restrictions on travel would be implemented in PHMA, including changing 574,100 acres from open to limited in PHMA. Motorized travel would be restricted to existing routes. No existing routes in PHMA could be upgraded to a higher use category (e.g., from trail to primitive road or from primitive road to road) unless necessary for motorist

safety or to avoid constructing a new road outside the PHMA, and then only if impacts on GRSG would be minimal.

Similarly, no new routes could be constructed in PHMA, although portions of existing routes may be rerouted to allow for motorist safety or to avoid constructing a new route outside the PHMA, and only if impacts on GRSG would be minimal. An exception to the prohibition on new routes, except for realignments, is in the case of valid existing rights (current mining claims).

To access current mining claims, new routes could be constructed but only to the minimum standard necessary for safe travel by the required types of vehicles and intensity of use, and only to the extent permissible with a 3 percent disturbance cap. Requirements for mitigation could result in increased difficulty of access and increased cost for locatable minerals.

Restricting travel to existing routes and limiting upgrading or realigning existing routes would adversely affect locatable minerals. None of the actions related to travel management would preclude locating mining claims on federal mineral estate. However, limitations on new or upgraded roads could adversely impact whether a specific area of resource is suitable in terms of access. Even where access is available to a portion of a claim, or to nearby private lands from which the federal minerals could be accessed, the value of the claim may be significantly reduced.

Any permanent or seasonal closures resulting from an activity-level travel plan required to be developed within 5 years of the ROD could further reduce development potential by restricting access or reducing economic feasibility and economic viability of any affected claim or mine.

Alternative C—In terms of travel management, this alternative is similar to Alternative B. For existing claims and mines, the accommodation for new roads would be more restrictive, with no construction within a 4-mile buffer of a lek. Other types of restrictions under Alternative B, such as allowing realignments or route upgrades only in certain specified situations and closing and revegetating unneeded routes to restore GRSG habitat, would apply to ADH as well as PHMA areas. Other measures would be the same as under Alternative B.

Based on the above, Alternative C would be somewhat more restrictive than Alternative B, due to greater overlap with locatable minerals, with greater potential for making location of mining claims or development infeasible or, at a minimum, reducing the amount of development and increasing costs.

Alternative D—This alternative is also similar to Alternative B, although more restrictive in some aspects and less restrictive in others. For example, the consideration for seasonal closures on travel would apply to ADH instead of only to PHMA lands. On the other hand, no consideration would be given to

permanent closures. New roads needed to access current claims or existing mines would use the Gold Book standard and would be limited to a 5 percent instead of 3 percent disturbance cap. In addition, an exception could be granted for the 5 percent disturbance cap if GRSG populations within the MZ are healthy and stable or increasing and that the construction would not adversely affect GRSG due to habitat loss or disruptive activities.

Road reroutes and upgrades would be less severely restricted, with the evaluation based on adverse impacts on GRSG populations instead of a requirement for a benefit in terms of safety or to avoid construction. On balance, this alternative would place fewer impediments to mining claims and development from travel management than Alternatives B and C.

Proposed LUPA—Travel management under the Proposed LUPA would be the same as Alternative D; Impacts on locatable minerals from travel management would be the same as described for Alternative D, above.

Impacts from Lands and Realty Management on Locatable Minerals

Management actions related to lands and realty actions in relation to protection of GRSG and its habitats and use area could adversely impact locatable minerals. This potential includes all three types of impacts on locatable mineral resources described previously: reduced availability, reduced accessibility, and increased costs.

Reduced availability is the least significant impact from lands and realty actions. This is because the BLM does not require a lands action (i.e., issuance of a ROW grant) for surface occupancy of federal lands to develop mining claims. However, accessibility to new mining claims could be more difficult if management of specific areas as ROW exclusion areas makes access more restricted into those areas.

ROW avoidance areas, while not creating absolute barriers to their use for access roads or utilities, or for locating surface facilities on federal lands for the purpose of accessing private minerals, could make permissible facilities infeasible for technical or economic reasons. Some other potential management actions or BMPs could also affect costs sufficiently to make a project infeasible, such as collocating utilities along an existing road that follows a long, indirect, or topographically difficult route.

Other types of lands and realty actions, such as land tenure adjustments (disposal, acquisition, or retention), could affect locatable minerals. Nevertheless, the outcomes of land tenure adjustment cannot be assessed until specific proposals are submitted to the BLM and Forest Service for review.

The expected outcomes of lands-related management actions and BMPs on locatable minerals and development of locatable minerals under the four alternatives analyzed in this EIS are summarized below.

Alternative A—A total of 24,200 acres are currently managed as exclusion area and 90,700 acres are currently managed as avoidance areas within GRSG habitat (ADH). This alternative includes the fewest restrictions to locations of ROW corridors and ROWs and the fewest restrictions for construction. There is no disturbance cap for construction of new ROWs. Under this alternative, limits to access and the potential for increased costs for the locatable mineral development would be minimal.

Alternative B—Under this alternative, PHMA areas would be managed as ROW exclusion areas, precluding new access roads and electricity distribution lines, conveyors, or other surface facilities. ROW exclusion would apply to 926,200 acres of PHMA. Exceptions would be considered in the case of an existing mining claim not yet developed, where a new ROW could be completed entirely within the disturbance footprint of an existing ROW (e.g., locating a power line along an existing road), or in the case of an existing mine, where ROWs could be collocated with an existing ROW. If a new access road or other ROW could not be collocated with an existing ROW, it may be constructed only if impacts are minimized and disturbance remains within a 3 percent cap. If the cap would be avoided, mitigation would be required.

Other actions in PHMA under Alternative B for increased protection of GRSG and its habitats include removing, burying, or modifying existing power lines and removing and restoring unused surface facilities associated with ROW grants.

Additional measures to be applied in GHMA areas include managing GHMA as ROW avoidance areas, which would require that impacts on GRSG and its habitats be avoided where practicable or minimized and mitigated, and collocating necessary new ROW features with existing features. These restrictions would be applied to 738,900 acres of GHMA. This could add to the costs of new locatable mineral development or expanded mine development. Where very long and indirect alignments are involved or burying existing power lines would be required, this could make a potential project economically infeasible.

Impacts on the locatable minerals program are greater under Alternative B than Alternative A due to potential for restrictions on access and increased cost for access.

Among land tenure measures for PHMA, Alternative B would prohibit disposing of BLM-administered or National Forest System lands. Moreover, Alternative B has a goal of acquiring certain private lands. Without project-specific information, it is not possible to assess this impact fully; however, it could prohibit locatable mineral development on otherwise accessible private lands. Additionally, it could keep some lands in federal ownership that might otherwise be disposed of and hence made accessible to potentially developable, locatable mineral resources.

Alternative C—Under this alternative, the measures related to PHMA areas in Alternative B would be applied to ADH, resulting in exclusion area restrictions applied to 1,744,100 acres of GRSG habitat. This is therefore likely to result in greater impacts on locatable minerals and development of locatable minerals since more lands would be affected.

The requirements under Alternative B for removing, burying, or modifying power lines and for removing and restoring any unused ROW corridors would also be applied under Alternative C, as would the requirement for relocating unbuilt ROW corridors outside PHMA and measures under Alternative B related to land tenure adjustments.

Alternative C would have the greatest impacts on locatable minerals because restrictions would be applied to the most acres, increasing the potential for reduced availability, reduced access, and increased costs for access to developing minerals.

Alternative D—This alternative would be less restrictive than Alternatives B and C by making PHMA habitat avoidance rather than exclusion areas for ROWs. Also within PHMA, new ROWs may be collocated within existing corridors without the requirement for collocation within the existing disturbance footprint. New ROWs in relation with existing mining claims or mines would also be less difficult to authorize, including accepting impacts where access would otherwise be inaccessible. The associated disturbance cap for access to valid existing rights would be 5 percent, compared to 3 percent under Alternative B, although mitigation would be required. Land withdrawals in PHMA are not proposed; impacts would be the same as Alternative A.

Alternative D proposes a disturbance exception criterion. Where data-based documentation is available to warrant a conclusion, the disturbance cap may be authorized in excess of 5 percent without requiring additional mitigation.

Alternative D would require only raptor perch deterrents instead of burying existing power lines in PHMA areas. In addition, unused ROWs would be required to be reclaimed only where mandated by regulation. Furthermore, new ROWs would be allowed where a compelling reason exists and GRSG populations would not be adversely affected by habitat loss or disruptive actives.

The Alternative B and C requirements for relocating unbuilt corridors from inside to outside PHMA areas would also not be applied under Alternative D. Actions related to GHMA areas and to land tenure adjustments would be the same as those in Alternatives B and D or, where different, would have the same relative impact on locatable minerals and mine development compared to current management.

This alternative would have fewer impacts on locatable mineral development than Alternatives B and C but more impacts than Alternative A.

Proposed LUPA—Impacts would be similar to those described above for Alternative D. However, the Proposed LUPA calls for additional restrictions on land use and other authorizations, as follows:

- Managing both PHMA and GHMA as avoidance
- Prohibiting aboveground structures within 1 mile of active leks
- Restricting surface disturbance to 3 percent in PHMA

Impacts on locatable minerals are similar to those described for Alternative D, with slightly greater impacts on locatable minerals due to increased restrictions on disturbance and disruption.

Impacts from Locatable Minerals on Locatable Minerals

There are several management actions affecting locatable minerals currently proposed under Alternatives B through D to reduce adverse impacts on GRSG and its habitats. These actions have varying degrees of potential adverse impacts on locatable minerals.

Generally, the management actions would result in reduced availability of federal mineral estate through withdrawal, eliminating access to existing mining claims through validity exams, and reduced efficiency and increased operational costs that could make operations economically infeasible.

Alternative A—The BLM manages 52,200 acres of mining claims in PHMA and 40,300 acres in GHMA. Alternative A has the fewest restrictions for locatable minerals and the fewest acres subject to withdrawal from mineral entry. There are currently 40,600 acres withdrawn from mineral entry in PHMA and 124,800 acres withdrawn in ADH.

Alternative B—Under this alternative, all PHMA would be withdrawn from mineral entry, subjecting existing claims to validity exams, potentially invalidating or cancelling existing mining claims. Under this alternative, approximately 923,200 acres would be identified for withdrawal and 52,200 acres of existing mining claims would be subject to new restrictions. In accordance with FLPMA, withdrawals exceeding 5,000 acres require congressional approval. Where plans of operations are required before any proposed surface-disturbing activities, additional mitigation would be required and seasonal restrictions would be considered if deemed necessary. These actions would result in impacts on the locatable minerals program through reduced access and increased cost due to requirements for mitigation. Alternative B would have greater impacts on locatable minerals than Alternative A.

Alternative C—This would be the same as Alternative B.

Alternative D—Under this alternative, withdrawal from mineral entry in PHMA is not proposed. Plans of operations in PHMA would require appropriate

effective mitigation for conservation. Also, seasonal restrictions would be applied if deemed necessary to prevent unnecessary or undue degradation. In ADH areas, operators would be requested to agree to the SDFs shown in **Appendix I**, Required Design Features, Preferred Design Features, and Suggested Design Features.

Reduced availability to federal locatable minerals would be the same as Alternative A; reduced accessibility and increased costs would be the same as Alternative C.

Alternative D would have slightly greater impacts on locatable minerals than Alternative A due to increased costs associated with seasonal restrictions, but it would have fewer impacts than Alternatives B and C.

Proposed LUPA—Management of Locatable minerals under the Proposed LUPA would be similar to Alternative D, with the additional restriction of a 3 percent cap on disturbance in PHMA. Withdrawal of PHMA would not be proposed under the Proposed LUPA. Impacts on locatable minerals are slightly greater under the Proposed LUPA than Alternatives A and D but less than under Alternatives B and C.

Impacts from ACEC/Zoological Area Management on Locatable Minerals
Under Alternatives A, B, D, and the Proposed LUPA, all existing ACECs would continue to be managed as designated.

Alternative C would recognize all of the existing ACECs and would designate all PHMA as a GRSG habitat ACEC to protect its habitat. Alternative C would not add additional restrictions to locatable minerals beyond those described above.

4.10.4 Summary of Impacts on Locatable Minerals

Alternative A would have the fewest restrictions on availability and access and would have the least impact on locatable minerals.

Alternative B would have greater impacts on locatable minerals than Alternative A because more acres would be unavailable to mineral entry and greater restrictions would result in reduced efficiency and increased cost of developing the locatable mineral resource.

For the most part, impacts from Alternative C would be similar to those under Alternative B, with more restrictions on access due to travel management and realty restrictions.

Alternative D would have more impacts on locatable minerals than Alternative A but fewer than Alternatives B and C.

The Proposed LUPA would have more impacts on locatable minerals than Alternative A but fewer than Alternatives B and C.

4.11 MINERALS (SALABLE)

Impacts described in this section are also applicable to nonenergy leasable minerals; no separate discussion for nonenergy leasable minerals is included.

4.11.1 General Description

The BLM and Forest Service have the authority to dispose of sand, gravel, clay, and other common variety minerals that are not subject to mineral leasing or location under the mining laws. Salable mineral material disposals are discretionary. Regulations regarding the disposal of salable minerals are found at 43 CFR, Part 3600, and 36 CFR, Part 228, Subpart C. The BLM and Forest Service sell mineral materials to the public at fair market value but gives them free to states, counties, or other government entities for public projects. Exploration for mineral materials is permitted by a letter of authorization of a sampling and testing program. Disposal of mineral materials conforms to individual LUPs.

Actions that could occur through implementing an alternative could affect the availability and opportunity for developing a salable mineral when areas are withdrawn from mineral entry. Other actions could affect costs of development by adding additional limits on the ability of operators to efficiently develop these types of salable minerals or reduce operators' ability to access minerals.

4.11.2 Methodology and Assumptions

General Impacts on Salable Minerals

Indicators of impacts on salable minerals and the measurements used to describe the impacts (where available or appropriate) are as follows:

- Actions that reduce the availability and opportunity for development of resources (i.e., mineral withdrawal)
  - Amount of federal minerals available versus closed to development
  - Indirect impacts include loss of production of the mineral for public use and for revenues, federal royalties from production, and tax revenues
- Actions placing restrictions or requirements that reduce efficiency and increased operational costs that could make development infeasible
  - Acreage unavailable for surface disturbance
  - Indirect impacts include reduced production of mineral resources for the public use and for the generation of revenues and tax revenues; possible adverse impact of higher cost of accessing portion of lease via more circuitous route for access road, electric utility lines, seasonal

limitations to road use or additional restrictions and requirements on development

- Actions that affect the ability to access minerals
  - Acreage unavailable for surface disturbance
  - Indirect impacts include adverse impacts of restrictions affecting the ability to access minerals that would otherwise be available; includes limits to road construction, permanent road closures, avoidance, and exclusion areas

Assumptions

- The terms "salable minerals" and "mineral materials" are used interchangeably.
- Any alternative that limits salable mineral development (i.e., reduces the area available for development) would have some adverse impact on the mineral materials.
- The 43 CFR, Part 3600, regulations manage disposal of mineral materials.
- Mineral operations are sensitive to costs, especially when prices are depressed.
- Ability to construct roads and utilities on private lands to access federal minerals subject to landowner approval are not guaranteed.
- Mineral resources are not evenly distributed across the landscape.
- Operators need predictable continuity of operations before acquiring or developing land.
- Development techniques are highly technical and not uniformly applicable.
- Seasonal closures on travel may make full development infeasible.
- A minimum of 5 years is needed for restoring self-sustaining native grass and forb cover on reclamation.
- A minimum of 10 years is needed for successful establishment or colonization by sagebrush on reclamation.

Implementing management actions for the following resources or resource uses would have negligible or no impact on salable minerals and are therefore not discussed in detail: recreation, range management, wind energy development, industrial solar, wild horse management, fuels management, fire operations, ESR, and habitat restoration.

4.11.3 Direct and Indirect Impacts on Salable Minerals

Impacts from Travel Management on Salable Minerals

Management actions for resources and resource uses could affect potential salable minerals when they result in the following:

- Reduced availability of identified, potentially developable, mineral material resources for disposal
- Reduced access to new or existing mineral material mines due to restrictions on use of the overlying surface lands
- Reduced efficiency and increased operational costs that make a potential mineral material development economically infeasible

Alternative A—A total of 574,100 acres of PHMA and 412,100 acres of GHMA would continue to be managed as open to cross-country travel. A similar acreage of routes would continue to be managed as limited to designated routes. Compared to the action alternatives, Alternative A has the most acres of open travel designation and the fewest restrictions on upgrades to routes; therefore, Alternative A has the fewest impacts on availability, access, and economic feasibility of salable minerals.

Alternative B—Restrictions on travel would be implemented in PHMA, including changing 574,100 acres from open to limited in PHMA. Motorized travel would be restricted to existing routes. No existing routes in PHMA could be upgraded to a higher use category (e.g., from trail to primitive road or from primitive road to road) unless it were necessary for motorist safety or to avoid constructing a new road outside the PHMA, and then only if impacts on GRSG would be minimal. Similarly, no new routes could be constructed in PHMA, although portions of existing routes may be rerouted to allow for motorist safety or to avoid constructing a new route outside the PHMA, and only if impacts on GRSG would be minimal.

An exception to the prohibition on new routes, except for realignments, is in the case of valid existing rights (current mining claims). To access current mineral material disposal sites, new routes could be constructed, but only to the minimum standard necessary for safe travel by the required types of vehicles and intensity of use, and only to the extent permissible, with a 3 percent disturbance cap. Requirements for mitigation could result in increased difficulty of access and increased cost for salable minerals.

Restricting travel to existing routes and limitations on upgrading or realigning of existing routes would adversely affect salable minerals.

Compared to Alternative A, management actions under Alternative B (restricting travel to existing routes and limiting upgrading or realigning of existing routes) would have a greater impact on salable minerals. Those impacts

would be greater within areas with the potential for locatable mineral deposits, potentially increasing the cost of development due to difficulty of access.

Alternative C—In terms of travel management, this alternative is similar to Alternative B. For existing mineral material disposal sites, the accommodation for new roads would be more restrictive, with no construction within a 4-mile buffer of a GRSG lek. Other types of restrictions under Alternative B (such as allowing realignments or route upgrades only in certain specified situations and closing and revegetating unneeded routes to restore GRSG habitat) would apply to ADH as well as PHMA. Other measures would be the same as under Alternative B.

Based on the above, Alternative C would be somewhat more restrictive than Alternative B, due to greater overlap with salable minerals, with a greater potential for making location of mineral material disposal sites infeasible or, at a minimum, reducing the amount of development and increasing costs.

Alternative D—This alternative is also similar to Alternative B, although it is more restrictive in some aspects and less restrictive in others. For example, the consideration for seasonal closures on travel would apply to ADH instead of only to PHMA lands. On the other hand, no consideration would be given to permanent closures. New roads needed to access current claims or existing mines would use the Gold Book standard and would be limited to a 5 percent instead of 3 percent disturbance cap. In addition, an exception could be granted for the 5 percent disturbance cap if GRSG populations within the MZ were healthy and stable or increasing and if the construction would not adversely affect GRSG due to habitat loss or disruption.

Road reroutes and upgrades would be less severely restricted, with the evaluation based on adverse impacts on GRSG populations instead of a requirement for a benefit in terms of safety or to avoid construction. On balance, this alternative would place fewer impediments to salable minerals and development from travel management than would Alternatives B and C.

Proposed LUPA—Under the Proposed LUPA, travel management would be the same as under Alternative D; impacts on locatable minerals from travel management are the same as those for Alternative D, above.

Impacts from Lands and Realty Management on Salable Minerals

Management actions for lands and realty, in relation to protecting GRSG and its habitats, could adversely impact salable minerals. This potential includes all three types of impacts on salable minerals described previously: reduced availability, reduced accessibility, and increased costs.

Reduced availability is expected because accessibility to new salable mineral sites could be significantly reduced or precluded when management of specific areas

as ROW exclusion areas would prohibit access roads or utility corridors (e.g., power lines, railroad sidings, and roads) into those areas.

ROW avoidance areas could make permissible facilities infeasible for technical or economic reasons. This could happen even if the ROW avoidance areas do not create absolute barriers to their use for access roads or utilities or for locating surface facilities on federal lands for accessing private minerals.

Some other potential management actions could also affect costs enough to make a project infeasible, such as collocating utilities along a road that follows a long, indirect, or topographically difficult route. Other types of lands and realty actions, such as identifying areas for withdrawals and land tenure adjustments (disposal, acquisition, or retention) could affect salable minerals, although analysis of outcomes of land tenure adjustment and withdrawals cannot be assessed until specific proposals are submitted to the BLM and Forest Service for review.

Alternative A—A total of 24,200 acres are managed as exclusion area and 90,700 acres are managed as avoidance areas within GRSG habitat (ADH). This alternative includes the fewest restrictions to locations of ROW corridors and ROWs and the fewest restrictions for construction. There is no disturbance cap for construction of new ROWs. Under this alternative, limits to access and the potential for increased costs for salable mineral development would be minimal.

Alternative B—Under this alternative, PHMA would be managed as ROW exclusion areas, precluding new access roads and electric distribution lines, conveyors, or other surface facilities. ROW exclusion would apply to 923,200 acres of PHMA. Exceptions would be considered, for example, in the case of a mineral materials disposal site not yet developed, in which a new ROW could be completed entirely within the disturbance footprint of a ROW (e.g., locating a power line along an existing road); or, in the case of an existing site, ROWs could be collocated with an existing ROW. If a new access road or other ROW could not be collocated with an existing ROW, it may be constructed only if impacts are minimized and disturbance remains within a 3 percent cap. If the cap could be avoided, mitigation would be required.

Other actions in PHMA under Alternative B to protect GRSG and its habitats include removing, burying, or modifying power lines and removing and restoring unused surface facilities associated with ROW grants.

Additional measures to be applied in GHMA areas are to manage GHMA as ROW avoidance areas, which would require impacts on GRSG and its habitats to be avoided where practicable, or minimized and mitigated; necessary new ROW features would be collocated with existing features. These restrictions would be applied to 738,900 acres of GHMA. This could add to the costs of new mineral material disposal sites or expanded development, where very long

and indirect alignments are involved, or existing power lines would have to be buried. This could make a potential project economically infeasible.

Impacts on the salable minerals program under Alternative B are greater than under Alternative A because of the potential for restrictions and increased cost for access.

Among land tenure measures, requirements for PHMA under Alternative B include a prohibition against the BLM and Forest Service disposing of the lands it administers and setting a goal to acquire certain private lands. Without project-specific information, it is not possible to assess this impact fully, but it could prevent some otherwise accessible private lands from being used for salable mineral development. It also could keep some lands in federal ownership that might otherwise be disposed of and hence unavailable for potentially developable salable mineral resources.

Alternative C—Under this alternative, the measures related to PHMA under Alternative B would be applied to ADH area, resulting in exclusion area restrictions applied to 1,744,100 acres of GRSG habitat. This is therefore likely to have greater impacts on salable minerals since more lands would be affected.

The requirements under Alternative B for removing, burying, or modifying power lines and for removing and restoring any unused ROW corridors would also be applied under Alternative C. This is because there is no requirement for relocating unbuilt ROW corridors outside PHMA, as would be the case for land tenure adjustments under Alternative B.

This alternative has the greatest impacts on salable minerals because restrictions would be applied to the greatest number of acres, increasing the potential for reduced availability, reduced access, and increased development costs for accessing salable minerals.

Alternative D—This alternative would be less restrictive than Alternatives B and C by making PHMA habitat avoidance areas, rather than exclusion areas, for ROWs. Also within PHMA, new ROWs may be collocated within existing corridors without the requirement for collocation within the disturbance footprint. New ROWs for mineral material disposal sites would have fewer siting restrictions. The associated disturbance cap for access to valid existing rights would be 5 percent, compared to 3 percent under Alternative B, although mitigation would be required. Land withdrawals in PHMA are not proposed; impacts would be the same as under Alternative A.

Alternative D proposes a disturbance exception criterion. Where data-based documentation is available to warrant a conclusion, the disturbance cap may be allowed to go beyond 5 percent without requiring additional mitigation.

Alternative D would require raptor perch deterrents rather than burying existing power lines in PHMA. In addition, unused ROWs would have to be reclaimed only where it is regulated. Furthermore, new ROWs would be allowed where a compelling reason exists, and GRSG populations would not be adversely affected by habitat loss or disruptive actives. The requirements of Alternatives B and C for relocating unbuilt corridors from inside to outside PHMA would also not be applied under Alternative D. Actions related to GHMA areas and to land tenure adjustments would be the same as those in Alternatives B and D, or where they are different, they would have the same relative impact as now on salable minerals and mine development.

This alternative has fewer impacts on salable mineral development than Alternatives B and C but more impacts than Alternative A.

Proposed LUPA—Impacts would be similar to those described above for Alternative D. However, additional restrictions on land use and other authorizations would be included under the Proposed LUPA, as follows:

- Managing both PHMA and GHMA as avoidance areas, with exceptions for pending large transmission lines
- Prohibiting aboveground structures within 1 mile of active leks
- Restricting surface disturbance to 3 percent in PHMA

Impacts on salable minerals are similar to those described for Alternative D, with slightly greater impacts on salable minerals due to increased restrictions on disturbance and disruption.

Impacts on salable minerals from lands and realty management under the Proposed LUPA are greater than those described under Alternative D. The Proposed LUPA could have large local impacts on access to salable minerals where the PHMA and GHMA are open for large transmission lines. Areas open to large transmission lines could preclude development of facilities required to access salable minerals. For the description of impacts from proposed large transmission lines in northwest Colorado, see Cumulative Impacts.

Impacts from Fluid Minerals, Solid Minerals (Coal), Locatable Minerals, and Nonenergy Leasable Minerals Management on Salable Minerals

Impacts from managing fluid, solid, locatable, and nonenergy leasable minerals would have minimal impact on salable minerals. The only exception would be the limits on surface disturbance proposed for Alternatives B, C, and D. Existing leases for minerals and mining claims for locatable minerals all carry a valid existing right and would likely take precedence if acres of surface disturbance were limited due to development within GRSG habitat. Although the cap on surface-disturbing acres could impact salable minerals, the overlap between GRSG habitat and salable mineral potential is not extensive.

Alternative A—Under Alternative A, managing fluid, solid, locatable, and nonenergy leasables would have a minimal impact on salable minerals.

Alternative B—Under Alternative B, there would be a 3 percent limit on all surface disturbance in PHMA. The limit on surface disturbance could impact both the acres available for salable minerals and the extraction cost if mitigation were required before the surface was disturbed. Alternative B has a greater impact on salable minerals than Alternative A.

Alternative C—Under Alternative C, there would be a limit of 3 percent on all surface disturbance in ADH. This could impact both the acres available for salable minerals and the cost for extraction if mitigation were required before surface disturbance. Alternative C has the greatest impact on the salable minerals program because the disturbance cap is applied to a greater number of acres and is more likely to overlap salable mineral potential.

Alternative D—Under Alternative D, there would be a 5 percent limit on all surface disturbance in ecological sites in PHMA that support sagebrush. This could impact both the acres available for salable minerals and the cost for extraction. Alternative D has a greater impact on salable minerals than Alternative A, but less than Alternatives B and C.

Proposed LUPA—Impacts would be similar to those described above for Alternative D. However, additional restrictions on leasing, land uses, and other authorizations would be included under the Proposed LUPA, as follows:

- Managing both PHMA and GHMA as avoidance areas
- Prohibiting aboveground structures within 1 mile of active leks
- Restricting surface disturbance to 3 percent in PHMA

Impacts on salable minerals are similar to those for Alternative D. Under the Proposed LUPA, there would be slightly greater impacts on salable minerals due to increased restrictions on disturbance and disruption.

Impacts from Salable Minerals Management on Salable Minerals

The proposed management actions under Alternatives B, C, and D to reduce adverse impacts on GRSG and its habitats would affect salable minerals. These actions have varying degrees of potential adverse impacts on salable minerals. Generally, the management actions would reduce the availability of federal mineral estate through certain restrictions. These are closure and disturbance caps on PHMA to mineral material sales and increased reclamation costs that could make operations economically infeasible.

Alternative A—Under Alternative A, 1,246,200 acres would continue to be managed as open to salable minerals in PHMA. See **Tables 3.46** and **3.47** for acres managed as mineral material disposal sites and acres closed to mineral

material sales within PHMA and GHMA. The existing mineral material disposal sites would continue to be managed with no restrictions to protect GRSG.

Alternative A has the least impact on salable minerals because it has the fewest restrictions on existing sites and the most acres available for mineral materials disposal sites.

Alternative B would close all PHMA to mineral material sales. The impact would be greater in those areas where there is a potential for salable minerals; this impact is described by field office below. This alternative would have a greater impact on salable minerals than Alternative A because there would be a greater number of acres unavailable for salable minerals, which would place greater restrictions on existing mineral material sites.

Colorado River Valley Field Office—Within the CRVFO, Alternative B would close approximately 24,400 acres of PHMA in Zone 14 to salable mineral development. This is about a 5 percent reduction in the total amount of potential salable minerals across the CRVFO. However, salable mineral resources are not evenly distributed across the landscape, and a comprehensive analysis of impacts on salable mineral development is unavailable. Regardless, any permanent closure of federal minerals would adversely affect the development of the salable mineral resources.

Grand Junction Field Office—There is little potential for salable minerals in GJFO PHMA, so impacts would be the same across all alternatives.

Kremmling Field Office—Under this alternative, PHMA would be closed to mineral material sales. Salable mineral pits no longer in use would be restored to meet GRSG habitat conservation objectives. Compared to the Alternative A, closing all PHMA in the KFO to mineral material sales would reduce the acreage open to mineral material sales to 46,353 of BLM-administered lands. This would significantly reduce the amount of potential salable minerals development in the KFO, compared to Alternative A, because of the large area closed to mineral material sales and the overlap of such areas to PHMA.

Little Snake Field Office—Under this alternative, PHMA would be closed to mineral material sales and salable mineral pits no longer in use would be restored to meet GRSG habitat conservation objectives. Compared to Alternative A, closing all PHMA in the LSFO to mineral material sales would reduce the acreage open to mineral material sales by 730,900 acres of federal mineral estate lands. This would significantly reduce the amount of potential salable minerals development in the LSFO, compared to Alternative A, because of the large area closed to mineral material sales and the overlap of such areas to PHMA.

White River Field Office—Within the WRFO, 139,900 acres open to mineral material sales would be closed, significantly reducing the amount of potential salable mineral development, compared to Alternative A.

It is not possible to assess the potential for these impacts to affect individual projects. This is because of a lack of specific project locations and how substantially this would affect the project's economic feasibility.

Alternative B would have a greater impact on salable minerals than Alternative A by reducing the acres available for mineral materials sites in PHMA.

Alternative C—This would be the same as Alternative B.

Alternative D—Under this alternative, continuing to operate mineral material sales would be considered, along with expanding mineral material sales sites. Where practicable, permitted disturbances would be limited to 5 percent in any Colorado MZ. Where disturbance were to exceed 5 percent, additional effective mitigation would offset the resulting loss of GRSG habitat. In ADH, salable mineral pits no longer in use would be restored in order to meet GRSG habitat conservation objectives. GRSG habitat would be reclaimed and restored to improve GRSG habitat in the long term.

Impacts on reduced availability and accessibility to salable minerals would be the same as under Alternatives A and B. Impacts on reduced efficiency and increased cost for salable minerals are greater under Alternative D than Alternative A. This is because of the required disturbance mitigation, which exceeds a 5 percent cap, and required reclamation.

Proposed LUPA—Under the Proposed LUPA, PHMA would be closed to salable minerals. Impacts from are the same as those for Alternative B.

Impacts from ACEC and Zoological Area Management on Salable Minerals

Alternatives A, B, D, and the Proposed LUPA—All existing ACECs would continue to be managed as designated, and no additional impacts on salable minerals would be expected.

Alternative C—All ACECs would be recognized, and all PHMA would be designated a GRSG habitat ACEC to protect GRSG habitat. Alternative C would not add more restrictions to salable minerals beyond those described above.

4.11.4 Summary of Impacts on Salable Minerals

Alternative A would have the fewest restrictions on availability and access and the least impact on salable minerals.

Alternative B would have greater impacts on salable minerals than Alternative A because more acres would be unavailable for mineral material disposal sites. Moreover, greater restrictions would result in reduced efficiency and increased cost of developing the salable minerals.

For the most part, impacts from Alternative C would be similar to those of Alternative B, with more restrictions on access due to travel management and realty restrictions.

Alternative D would have more impacts on salable minerals than Alternative A but fewer than Alternatives B and C.

Proposed LUPA—Impacts on salable minerals under the Proposed LUPA would be similar to those for Alternative B.

4.12 TRAVEL MANAGEMENT

4.12.1 General Description

This section is an analysis of potential impacts on public access and travel from implementing management actions and allowable uses to meet resource and resource use objectives for the various programs.

Travel designations support resource programs and are designed to help achieve their objectives. The land use emphasis for each area guides travel designations. Consequently, the travel designations would adhere to the management prescriptions included under each alternative, while following the theme of each alternative. Impacts resulting from the travel system on other resources and resource uses are discussed in those particular resource sections of this chapter. The existing conditions for trails and travel management, including current management by field office, are described in **Section 3.10**, Travel Management.

As required by Executive Order and regulation, all BLM-administered lands are classified as open, limited, or closed to OHV travel. Additionally, for areas classified as limited, the BLM designates the types or modes of travel—pedestrian, equestrian, bicycle, and motorized; limitations on time or season of use; limitations on certain types of vehicles (e.g., OHVs, motorcycles, all-terrain vehicles, and mechanized, such as mountain bikes); limitations on licensed or permitted vehicles or users; limitations on BLM administrative use only; or other types of limitations.

4.12.2 Methodology and Assumptions

Impact analyses and conclusions were based on interdisciplinary team knowledge of the travel system and information provided by other agencies and the public.

The travel system is managed to achieve the goals and objectives of each alternative and to provide for appropriate public access. This program is considered a support function for all BLM resource programs. As such, the determination of significance for travel management is based on the BLM's ability to administer comprehensive public travel along with administrative access for resource management.

General Impacts on Travel Management

Indicators of impacts on travel management and the measurements used to describe the impacts (where available or appropriate) are as follows:

- Impacts on OHV area designations (open, limited, or closed)
- Change of acres with an open or limited designation
- Impacts on the existing route network
- Management actions that reduce designated routes
- Impacts on new route construction or route maintenance
- Management actions that reduce opportunities for route construction or route maintenance for any or all modes of travel

Assumptions

The analysis makes the following assumptions:

- All types and modes of travel, designations, and limitations associated with public access are analyzed.
- The travel designations would not affect ROW holders, permitted uses, county or state roads, or other valid existing rights. Travel closures/limitations apply only to public access.
- The demand to increase travel routes on BLM and Forest Service lands would continue to increase over the life of the plan, especially near communities.
- The BLM and Forest Service has no authority over US highways, state, or county roads on BLM-administered or National Forest System lands, so those routes are not included in the analysis tables.
- The incidence of resource damage and conflicts among mechanized, motorized, and nonmotorized activities would increase with increasing use of BLM-administered and National Forest System lands.
- If necessary, the BLM would evaluate RS-2477 assertions under process and criteria separate from this planning process.
- Impacts on travel management occur from both limitations (i.e., wildlife stipulations, special designations, and cultural resources) and permitted uses (i.e., gas development, livestock grazing, and mining).

- Due to significant increases in use and the development of new vehicle technologies, designation of large areas as open to cross-country travel is no longer a viable management strategy. There is no motorized cross-country travel in areas designated as limited or closed (excluding game retrieval carts). Exceptions for motorized cross-country travel can be included within the terms and conditions of a lease or permit or by separate written authorization.
- Pedestrian and equestrian access would not be restricted by travel designations that limit or prohibit motorized/mechanized travel, and pedestrian and equestrian access would be allowed on all routes open to motorized and mechanized uses, unless otherwise specified.
- Administrative use authorizations are granted on a case-by-case basis with approval from the BLM and Forest Service.
- New routes, reroutes, or closures to the travel network in the limited areas would be changed adaptively through activity-level planning with site-specific NEPA analyses.
- Management actions that close or limit travel in areas with an open designation would limit the public's ability to access dispersed camp sites, retrieve game, and travel cross-country.
- Management actions that limit route construction would limit expansion of travel networks and would restrict public access.
- Management actions that seasonally close travel would constrain public access during the closure.

Implementing management actions for the following resources would have negligible or no impact on travel management and are therefore not discussed in detail: recreation management, range management, wild horse management, fuels management, fire operations, ESR, habitat restoration, and ACECs.

4.12.3 Direct and Indirect Impacts on Travel Management

The following discussion of the impacts on travel and access focuses on management actions and allowable uses that restrict or facilitate travel opportunities. The analysis describes the changes to miles of routes open for public use, the adjustments in the number of acres open, limited, or closed to off-road travel, and the specific travel restrictions (such as seasonal restrictions) that would affect access.

Impacts from Travel Management on Travel Management

Impacts on OHV Area Designations, the Existing Route Network, and New Route Construction or Route Maintenance

Travel management actions in this EIS are aimed at avoiding or minimizing new habitat loss and additional disruption of GRSG activities by prohibiting or limiting travel in PHMA and GHMA areas.

Alternative A—Compared to the action alternatives, Alternative A has the most acres of open travel designation (574,100) and a similar amount of designated routes. Each field office has seasonally limited or closed portions of the planning area to public travel or placed TLs on surface-disturbing activities. See **Table 2.3**, Description of Alternatives A and B, for a summary of these management actions.

Alternative B—Under Alternative B, all management actions would occur on PHMA. The management action that limits motorized travel to existing roads, primitive roads, and trails would change 574,100 acres from open to limited in PHMA. The 3 percent disturbance threshold could restrict the amount of new routes that could be constructed; any routes constructed in excess of the disturbance cap would require mitigation necessary to offset the resulting loss of habitat. The impacts from implementation actions, such as evaluating the need for permanent or seasonal road closures, activity-level travel plans, limiting new route construction, and restoration of routes in PHMA could only be evaluated during implementation. The impacts from these implementation actions would be analyzed in subsequent NEPA documents

Alternative C—Impacts from Alternative C would be the same as or similar to those under Alternative B, except Alternative C would further restrict the construction of new routes by not allowing new routes within a 4-mile buffer from leks in ADH. Alternative C would place additional restrictions in ADH for construction new routes, upgrading routes, and reseeding closed routes.

Alternative D—Impacts from Alternative D would be the same as or similar to those under Alternative B, except Alternative D would allow a 5 percent disturbance threshold before route construction would be limited and would require mitigation necessary to offset the resulting loss of habitat.

Proposed LUPA—Impacts on travel management would be similar to those for Alternative D for all indicators. Under the Proposed LUPA, however, the Wolford Mountain OHV area, which includes 1 acre of PHMA, would continue to be managed as open to OHVs. Under the Proposed Plan/Final EIS for the KFO, there would be an additional 13 acres of PHMA, which would be managed as open.

Impacts from Lands and Realty Management on Travel Management

Impacts on OHV Area Designations and the Existing Route Network

Land Tenure Adjustments

Land tenure adjustments could benefit the overall management of travel and transportation. These actions would help to facilitate the location of transportation systems by providing for a more contiguous BLM-administered and National Forest System land base and encouraging such developments near

communities. Management actions that limit land tenure adjustments would adversely impact travel management.

Under Alternative A, each BLM field office has specific criteria to use in regard to land tenure adjustments. Under Alternatives B, C, and D, land tenure adjustments within GRSG habitat would be specifically pursued, where such adjustments would benefit GRSG. This difference in management approach is not likely to have a significant impact on travel and transportation management.

ROWs

To avoid ROWs that could negatively impact GRSG, the BLM could identify areas as ROW avoidance areas or ROW exclusion areas. Within avoidance areas, ROWs may not be totally unavailable but should not be permitted, if possible. ROWs are to be completely prohibited from exclusion areas. Across all alternatives, identifying ROW avoidance and exclusion areas and requiring the collocation of ROWs could lead to increased use on the existing route system. ROW holders may build, maintain, or improve routes, which would improve public access to some areas.

Alternative A—Compared to Alternatives B, C, and D, Alternative A has the least amount of ROW exclusion and avoidance and requires the least amount of collocation of infrastructure (see **Table 2.2** for a comparison of ROW avoidance and exclusion acreages by alternative).

Alternative B—Compared to Alternative A, Alternative B would have more ROW exclusion and avoidance and would require more collocation of infrastructure in PHMA.

Alternative C—Impacts from Alternative C would be the same as or similar to those under Alternative B, except Alternative C would require collocation of ROWs in ADH.

Alternative D—Impacts from Alternative D would be the same as or similar to those under Alternative B.

Proposed LUPA—In addition to PHMA, all GHMA would be managed as ROW avoidance. Management of the lands program, specifically land tenure adjustments, would be the same under the Proposed LUPA as under Alternative D; impacts from lands and realty management are therefore similar to those described under Alternative D.

Impacts from Wind Energy and Industrial Solar Development on Travel Management

Impacts on New Route Construction or Route Maintenance

Energy development often leads to the improvement of roads. New roads constructed for wind or solar energy development could be gated and not offer

new public access. Wind or solar energy development also often leads to the improvement of existing roads. This could reduce the amount of primitive roads and trails available to the public.

Alternatives A, B, and D—Under these alternatives, limited wind or solar energy development could occur in some portions of GRSG habitat. This could lead to new routes or the improvement of some existing routes.

Alternative C—Under this alternative, wind or solar energy development would be prohibited in ADH, so there would be no beneficial impacts on travel management, as described above.

Proposed LUPA—Wind energy development would be prohibited in PHMA. Impacts on PHMA under the Proposed LUPA are similar to those under Alternative C.

Impacts from Fluid Minerals Management on Travel Management

Impacts on New Route Construction or Route Maintenance

Energy development can lead to the upgrading of existing routes and construction of new roads. However, new roads constructed for fluid minerals management can be gated to prevent public access.

Alternative A—Compared to the action alternatives, Alternative A has the least amount of restrictions on unleased and leased fluid minerals. Limited fluid minerals development could occur in some portions of GRSG habitat, which could lead to the improvement of existing roads.

Alternatives B and D—Compared to Alternative A, Alternatives B and D have more restrictions on unleased and leased fluid minerals, so there would be less improvement of existing roads. Under Alternative B, however, no upgrading of routes that would change the route category would be authorized in PHMA, which would limit the benefit to travel management.

Alternative C—Compared to Alternative B, Alternative C has more restrictions to unleased and leased fluid minerals. This alternative would allow the least amount of improvement of existing roads.

Proposed LUPA—The Proposed LUPA has greater restrictions for upgrading routes and therefore has a greater impact on the travel management program than Alternatives A, B, and D. However, it has fewer restrictions than Alternative C.

Impacts from Solid Minerals, Locatable Minerals, Nonenergy Leasable Minerals, and Salable Minerals Management on Travel Management

Impacts on New Route Construction or Route Maintenance

Development often leads to the improvement of roads. New roads constructed for solid minerals management could be gated and not offer new public access. Solid minerals development also often leads to the improvement of existing roads. The improvement of roads could reduce the amount of primitive roads and trails available to the public.

Alternative A—Compared to Alternatives B, C, and D, Alternative A has the least amount of restrictions on solid minerals management. Limited solid minerals development could occur in some portions of GRSG habitat, which could lead to the improvement of existing roads.

Alternatives B, C, and D—Compared to Alternative A, Alternatives B, C, and D have more restrictions on solid minerals management, so there would be less improvement of existing roads.

Proposed LUPA—The Proposed LUPA has greater restrictions on upgrading routes than Alternatives A, B, and D but fewer than Alternative C.

4.12.4 Summary of Impacts on Travel Management

The degree of impact would be lowest under Alternative A because of fewer land use restrictions for the protection of GRSG. Alternative B would have slightly more restriction, and therefore slightly greater impact, than Alternative A. Alternative C would result in the greatest level of impact on transportation and access. Alternative D would have slightly less restriction, and therefore slightly less impact, than Alternative B. The Proposed LUPA has similar impacts on travel management as those for Alternative D.

4.13 RECREATION

4.13.1 General Description

This section analyzes potential impacts on recreation resources from proposed management actions of other resources and resource uses. Existing conditions concerning recreation are described in **Section 3.11**.

Current BLM recreation management guidance offers three options for RMP-level recreation allocations: identifying SRMAs, identifying ERMAs, or not identifying areas as either kind of recreation management area. In an SRMA, BLM management protects specific, high-quality recreation opportunities that result in specific outcomes.

Outcomes include the experiences and benefits attained from recreation participation. Benefits from recreation include personal benefits to participants, benefits to local communities (social, political, and economic), and benefits to

the environment. Outcomes depend on activities and the physical, social, ad operational settings where recreation occurs.

Changes in recreation activities and settings can result in changes to the types of experiences visitors have and the types of personal, community, and environmental benefits that result from these experiences. A commitment is made in the SRMA allocation to specific, high quality, recreation opportunities.

In ERMAs, the BLM and partners make a commitment to support and sustain recreation and the associated qualities and conditions (recreation settings) of the recreation area. No commitment is made to protect the outcomes associated with recreation participation. In ERMAs, recreation is managed commensurate with other resource uses. The quality and quantity of recreation opportunities in an ERMA could change over time as a result of changes in use patterns and changes in other resource use program management.

In areas where no recreation management area is identified, the BLM makes a minimal commitment to recreation, by ensuring public health and safety, protecting biological and cultural resources, and reducing conflicts among recreationists and between recreation and other resource uses. In areas not identified as recreation management areas, recreation is managed to achieve other resource use objectives (e.g., livestock grazing, and lands and realty).

BLM recreation management strategies, and the recreation management area definitions and management prescriptions described above, have evolved substantially over the past 30 years. The 2011 Recreation Manual (BLM 2011) and the 2014 Recreation Permit and Fee Administration Handbook (BLM 2014) contain guidance for recreation management strategies. Consequently, LUPs in the planning area contain significant variations in recreation management identifications, depending on the age of the plan and subsequent plan amendments. In 2006, guidance was issued regarding implementing Appendix C of the *BLM Land Use Planning Handbook*, which prescribes the use of outcome-based recreation management objectives for SRMAs and ERMAs (BLM 2006).

4.13.2 Methodology and Assumptions

General Impacts on Recreation

Direct impacts on recreation are those that allow, restrict, or prohibit opportunity, including both the opportunity for access (e.g., public closure) and opportunity to engage in specific activities (e.g., camping, shooting, and ATV riding). Indirect impacts are considered to be those that alter the physical, social, or administrative settings. Impacts on settings can either be the achievement of a desired setting or the unwanted shift in setting, such as to either a more primitive or urban environment.

Physical, social, and administrative settings are not specifically managed for in areas not identified as recreation management areas, although these areas do

still provide intrinsic recreation values and opportunities. The indicator typically used to describe the impact on these areas is the availability of opportunities as described by either acreage restrictions or specific activity prohibitions.

For areas managed as SRMAs, both availability of recreation opportunities (activities and desired outcomes) and changes to physical, social, and administrative settings are used as indicators of impacts. This discussion analyzes the impacts that proposed management decisions would have on managing recreation settings and the targeted outcomes. For areas managed as ERMAs, both availability of activity opportunities and changes to the qualities and conditions (settings) are used as indicators of impacts. This discussion also analyzes the impacts that proposed management decisions would have on managing recreation and the prescribed setting conditions. Since visitor use patterns are difficult to estimate and because they depend on many factors beyond the scope of management (e.g., recreation trends and economy), qualitative language—for example, "increase" or "decrease"—is generally used unless quantitative visitor use data are available to describe anticipated impacts.

Indicators of impacts on recreation and the measurements used to describe the impacts (where available or appropriate) are as follows:

- Impacts on recreation
- Changes to the ability of the BLM to achieve targeted recreation outcomes (specific to SRMAs) and to achieve and maintain supporting setting conditions (specific to SRMAs and ERMAs)
- Changes to the ability of the BLM to provide opportunities for targeted visitors (specific to SRMAs), targeted activities (specific to SRMAs), and protected activities (specific to ERMAs)
- Short-term or long-term elimination or reduction of recreation opportunities, activities, or experiences
- Changes in level of conflict among different recreation users and between other resource uses and recreation

Assumptions

The analysis has the following assumptions:

- Recreation would be managed to achieve the objectives of the field offices.
- Recreation management areas and associated objectives and management implementation would vary, based on the age of a field office's LUP.
- Traditional recreation uses within the planning area would continue and are anticipated to increase as local populations grow.

- Improved facilities, especially recreation trails, would result in increased use.
- Conflicts between motorized users and nonmotorized recreationists would increase with increasing use, especially in areas that area open to both.
- Demand for SRPs will increase over time.

4.13.3 Direct and Indirect Impacts on Recreation

Impacts from Travel Management on Recreation

Impacts on Recreation Outcomes and Settings and Recreation Opportunities

Impacts from Limiting Motorized Travel to Existing Roads, Primitive Roads, and Trails

Changes to area and route travel designations include changes to miles of routes or area acreages available for specified recreation activities, changes in the remoteness of the physical setting, and changes in the access attribute of the operational setting. Routes that are designated open for specific recreation uses continue to provide opportunities for those uses, and routes closed to specified uses restrict opportunities for those uses. Areas designated as closed to motorized and mechanized travel results in a more primitive operational setting.

Where cross-country travel is currently allowed, limiting that type of use would reduce motorized/mechanized recreation, which depends on unrestricted travel, such as OHV exploration and hunting access. Opportunities for nonmotorized and nonmechanized recreation, such as hiking, horseback riding, and hunting, in a more natural or primitive setting would be expanded and enhanced.

Alternative A—This has the most areas open to cross-country motorized travel (574,100 acres in PHMA, 412,100 acres in GHMA); therefore, Alternative A would provide the most areas available for unrestricted OHV recreation and the fewest opportunities for nonmotorized recreation in a more primitive setting.

Alternatives B, C, and D and the Proposed LUPA—These would have fewer areas available for unrestricted OHV recreation than Alternative A and more opportunities than Alternative A for primitive nonmotorized recreation.

Impacts from Construction of Roads and Trails

In areas with high potential for development and in SRMAs and ERMAs, construction of roads and trails would have a greater impact on recreation than in areas with low potential for development or no recreation management area identification. Construction of roads and trails would increase the access attribute of the operational setting for OHV and mountain bike trail riding but would also reduce the remoteness attribute of the physical setting. This

attribute represents how far a visitor is from a road or a trail. The farther it is from a road or trail, the more primitive and remote the setting is. The naturalness attribute of the physical setting would also be diminished by road and trail construction; therefore, road and trail construction would reduce opportunities for recreation, experiences, and outcomes requiring more remote and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Alternative A—This has the most areas available for surface-disturbing activities and so has the greatest potential to change recreation opportunities, activities or experiences. Impacts would vary, based on each area's prescribed recreation management objectives and the nature of the surface disturbance. Recreation opportunities requiring less remote or natural settings would benefit, while more primitive backcountry opportunities would likely be diminished.

Alternative B—This would limit surface disturbance and have more beneficial impacts for primitive backcountry recreation than Alternative A. It would allow fewer opportunities than Alternative A for recreation that depends on road and trail development.

Alternative C—This has the fewest areas available for surface-disturbing activities and so has impacts similar to those for Alternative B, but it would provide greater benefit to primitive recreation settings and greater detriment to developed recreation.

Alternative D—This has impacts similar to Alternative B but with more potential for road and trail development.

Impacts from Restoration of Roads and Trails

In areas that contain higher densities of roads and trails, prioritization of restoration would have a greater impact on recreation resources than areas that contain a lower density of roads and trails. As described in the section above, travel management decisions can impact the recreation characteristics of an area. The remoteness attribute of the physical setting does not change based on whether a road or trail is open. It changes only if the road or trail is removed from the landscape. Consequently, any road or trail restoration creates a more primitive recreation setting, reducing opportunities for development-dependent recreation and increasing opportunities for primitive backcountry recreation activities and experiences.

Alternative A—This would put the lowest priority on restoration, which would therefore provide the most areas available for motorized/mechanized recreation and the fewest opportunities for nonmotorized recreation in a more primitive setting.

Alternative B—This would put a lower priority on restoration than Alternative C but would put a higher priority on restoration than Alternatives A and D.

Alternative C—This would put the highest priority on restoration and so would provide the most opportunities for recreation in a primitive setting and the fewest opportunities for motorized and mechanized recreation.

Alternative D—This would put a higher priority on restoring roads and trails than Alternative A, but Alternative D would put a lower priority on restoration than Alternatives B and C.

Proposed LUPA—Impacts on recreation from travel management would be similar to those described for Alternative D for all indicators.

Impacts from Recreation Management on Recreation

Impacts on Recreation Outcomes and Settings, Recreation Opportunities, and Recreation Conflict

SRPs and Forest Service Recreation SUAs

Permits or authorizations that are in or near PHMA could be terminated or modified. SRPs and SUAs within PHMA, GHMA, and LCHMA that could be affected by these changes currently include big and small game hunting, mountain lion hunting, OHV tours, horseback and hiking tours, float boating, and fishing (see **Table 4.5**). The types of modifications to permits or authorizations would determine the type and level of impact on recreation participants and service providers. Specific permit modifications are not prescribed at the EIS level, but potential adverse impacts could include loss of unique recreation opportunities provided by permittees, loss of commercial revenue to recreation service provider businesses, and loss of permit-generated fee revenue for the managing agencies. Beneficial impacts include reductions in user conflicts among different recreation users (either other permittees or the general public) and enhanced opportunities for GRSG-compatible recreation.

Alternative A—This would have the least impact with no change in current management.

Alternatives B and C—These would have the greatest impact since they have the most potential for modifying permit/authorization management. Only SRPs that are neutral or beneficial to GRSG would be authorized. This could impact existing and potential SRPs that could not be shown to be neutral or beneficial to GRSG.

Alternative D—This is not as restrictive as Alternatives B and C, but Alternative D would have a greater impact than Alternative A. Alternative D could still impact significant numbers of current permit or authorization holders because only those SRPs that would not adversely affect GRSG would be authorized.

Table 4.5
BLM Special Recreation Permits Authorized in PHMA, GHMA, and LCHMA in the Decision Area

Field Office	Number of Permitted Activities Affected by Habitat Type*			Permitted Activity									Total SRPs in GRSG Habitat**
	PHMA	GHMA	LCHMA	Big Game Hunting	Mountain Lion Hunting	Small Game/Bird Hunting	Equestrian Activities	OHV Activities	Hiking, Snowshoeing, Skiing	Fishing	Boating	Other	
CRVFO	58	58	15	x	x	x	X	x	x	x	x	x	52
GJFO	11	11	0	x	x								11
KFO	25	21	2	x	x	x	X	x	x	x	x	x	42
LSFO	45	48	23	x	x		X					x	48
WRFO	25	29	22	x	x		X						29
												Decision Area Total	*182*

*Permitted activities may overlap multiple habitat types.
**Many SRPs are combination permits with multiple activities on one permit. Hence, this total may be less than the number of activities shown elsewhere in the table.

Restrictions on camping and nonmotorized recreation

Timing restrictions on recreation would eliminate certain recreational opportunities in these areas during the identified time of year.

Alternatives A, B, and D—Under these alternatives, there would be no restrictions on camping or nonmotorized recreation above and beyond what is already in the existing LUPs and the Routt National Forest Plan. Impacts on camping and nonmotorized recreation would be minimal under these alternatives.

Alternative C—This alternative would have the greatest adverse impact on recreation due to a seasonal prohibition on camping and other nonmotorized recreation within 4 miles of active GRSG leks. This restriction on camping and nonmotorized recreation would make large areas of the planning area unavailable for those uses during spring, a prime time for those activities. Many recreationists would be displaced under this alternative.

Proposed LUPA—Impacts on recreation from management restrictions would be the same as those for Alternatives A, B, and D, above.

Impacts from Lands and Realty Management on Recreation

Impacts on Recreation Outcomes and Settings and Recreation Opportunities

Construction of Structures/Construction of Roads and Trails/Earthwork Construction and Vegetation Disturbance

In areas with high potential for surface disturbance and development and in SRMAs and ERMAs, construction of structures, roads and trail, and vegetation disturbance would have a greater impact on recreation than in areas with low potential for surface disturbance and development or areas outside of recreation management areas (see **Table 2.2**, Comparative Summary of Alternatives, for a comparison of ROW exclusion and avoidance areas by alternative). New ROWs, including those for power lines, pipelines, access roads, and communication sites, would diminish the naturalness of the physical setting and so would reduce opportunities for recreation activities, experiences, and outcomes that require more remote and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Construction of roads and trails would increase the access attribute of the operational setting for certain recreation activities, such as OHV and mountain bike trail riding, but would also reduce the remoteness of the physical setting. Remoteness represents how far a visitor is from a road or a trail. The farther a visitor is from a road or trail, the more primitive the remoteness setting. The naturalness of the physical setting would also be diminished by road and trail construction; therefore, road and trail construction would reduce opportunities for recreation activities, experiences, and outcomes, requiring more remote and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Utilities, communication facilities, and energy facilities, as well as their ancillary facilities and structures, would necessitate construction and vegetation clearing; this would in turn diminish the naturalness of the physical setting, reducing opportunities for recreation activities, experiences, and outcomes and requiring more remote and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Alternative A—Under Alternative A, there are 25,600 acres managed as ROW exclusion areas, and 127,600 acres managed as ROW avoidance areas. This alternative makes the most areas available for ROWs and associated structure building. With no restrictions in place to protect GRSG habitat specifically, Alternative A would have the greatest impact on recreation setting characteristics and the associated activities, experiences, and outcomes. Recreation opportunities requiring less remote or natural settings would benefit, while more primitive backcountry opportunities would likely be diminished.

Alternative B—Under Alternative B, there would be 930,500 acres managed as ROW exclusion areas. This alternative would implement restrictions to protect GRSG habitat, resulting in fewer areas available for ROWs and associated structure building. Therefore, impacts on recreation setting characteristics are less than under Alternatives A and D but would be greater than Alternative C.

Alternative C—Under Alternative C, there would be 1,761,500 acres managed as ROW exclusion areas. This alternative would make the fewest areas available for ROWs and associated structure building and so would have the least impact on recreation setting characteristics. Alternative C would have greater benefit to primitive recreation setting and greater detriment to developed or motorized recreation.

Alternative D—Under Alternative D, there would be 883,200 acres managed as ROW exclusion for large transmission lines (greater than 230 kilovolts), 65,200 acres managed as ROW avoidance for large transmission lines (greater than 230 kilovolts) and 930,500 acres managed as ROW avoidance areas. This alternative would have fewer impacts than Alternative A but greater impacts than Alternatives B and C. This has impacts similar to Alternative B but with more potential for road and trail development.

Proposed LUPA—Under the Proposed LUPA, there would be additional protections. Both PHMA and GHMA would be managed as avoidance areas, with exceptions for pending large transmission lines. Aboveground structures would be prohibited within 1 mile of active leks, and surface disturbance would be restricted to 3 percent in PHMA. impacts on the recreation program are similar to those for Alternative D.

Impacts on Recreation Opportunities

<u>Public Land Retention, Acquisitions, and Conservation Easements</u>

Public land retention, acquisitions, and conservation easements in areas with high potential for surface disturbance and development would have a greater impact on recreation than in areas with low potential for surface disturbance and development. Retaining or acquiring GRSG habitat for public ownership, or for conservation purposes would enhance or preserve opportunities for recreation in primitive settings. However, management of areas retained, acquired, or preserved for GRSG protection would not likely emphasize recreation and would provide only limited primitive recreation opportunities.

Alternative A—This would not specifically target GRSG habitat for retention, acquisition, or conservation and so would be least likely to retain or expand areas potentially available for primitive recreation.

Alternative B—This would emphasize retention, acquisition, and conservation of PHMA and so would be more likely to retain or expand areas potentially available for primitive recreation opportunities than Alternative A. Actual

availability of these lands for recreation would depend on site-specific management strategies.

Alternative C—This has impacts similar to those of Alternatives B and D, but it would place greater emphasis on retention, acquisition, and conservation of GRSG habitat. Alternative C would therefore be most likely to retain or expand areas potentially available for primitive recreation. Actual availability of these lands for recreation would depend on site-specific management strategies.

Alternative D—This has impacts similar to those of Alternatives B and C, but it would provide more flexibility to allow disposal of federal lands; therefore, Alternative D is less likely than Alternatives B and C and more likely than Alternative A to retain or expand areas potentially available for primitive recreation.

Proposed LUPA—Management of the lands program, specifically land tenure adjustments, would be the same as under Alternative D; impacts are therefore also the same.

Impacts from Wind Energy and Solar Energy Development on Recreation

Impacts on Recreation Outcomes, Settings, and Opportunities

Construction of Structures

In areas with high potential for development and in SRMAs and ERMAs, structure building would have a greater impact on recreation than in areas with low potential for development or no recreation management area identification. Wind or solar energy facilities, as well as their ancillary facilities and structures, would diminish the naturalness of the setting and so would reduce opportunities for recreation activities, experiences, and outcomes, requiring more remote and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Alternative A—This would have the most areas available for ROWs and associated structure building. With no restrictions in place to protect GRSG habitat specifically, Alternative A would have the greatest impact on recreation setting characteristics and the associated recreation activities, experiences, and outcomes.

Alternative B—This would implement restrictions to protect GRSG habitat, resulting in fewer areas available for ROWs and associated structure building; therefore, impacts on recreation setting characteristics are less than Alternative A and D but would be greater than Alternative C.

Alternative C—This would have the fewest areas available for ROWs and associated structure building and so would have the least impact on recreation setting characteristics.

Alternative D—This has fewer impacts than Alternative A but more impacts than Alternatives B and C.

Construction of Roads

In areas with high potential for surface disturbance and development, and SRMAs and ERMAs, construction of roads and trails would have a greater impact on recreation than in areas with low potential for surface disturbance and development or no recreation management area identification.

Construction of roads associated with wind or solar energy development would increase the access attribute of the operational setting for certain recreation activities, such as OHV and mountain bike trail riding, but it would also reduce the remoteness attribute of the physical setting. The remoteness of the physical setting represents how far a visitor is from a road or a trail. The farther a visitor is from a road or trail, the more primitive the remoteness setting.

The naturalness of the setting would also be diminished by road construction; therefore, road construction would reduce opportunities for recreation activities, experiences, and outcomes, requiring more remote and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Alternative A—This would have the most areas available for surface-disturbing activities and so has the greatest potential to change recreation opportunities, activities, or experiences. Impacts would vary, based on each area's prescribed recreation management objectives and the nature of the surface disturbance. Recreation requiring less remote or natural settings would benefit, while more primitive backcountry opportunities would likely be diminished.

Alternative B—This would limit surface disturbance and have more beneficial impacts for primitive backcountry recreation than Alternative A. It would allow fewer opportunities than Alternative A for recreation that depends on road and trail development.

Alternative C—This would have the fewest areas available for surface-disturbing activities and so has impacts similar to those described for Alternative B but with greater benefit to primitive recreation setting and greater detriment to developed recreation.

Alternative D—This has impacts similar to Alternative B but with more potential for road and trail development.

Vegetation Disturbance

In areas with high potential for surface disturbance and development, and in SRMAs and ERMAs, changes in topography and vegetation disturbance would have a greater impact on the recreation setting characteristics for naturalness than in areas with low potential for surface disturbance and development or no

recreation management area identification. Wind or solar energy developments, as well as their ancillary facilities and structures, would necessitate construction and vegetation clearing. This would in turn diminish the naturalness of the physical setting, reducing opportunities for recreation activities, experiences, and outcomes and requiring more remote and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Alternative A—This would have the most areas available for ROWs and associated vegetation disturbance. With no restrictions in place to protect GRSG habitat specifically, Alternative A would have the greatest impact on recreation setting characteristics and the associated recreation activities, experiences, and outcomes.

Alternative B—This would implement restrictions to protect GRSG habitat, resulting in fewer areas available for ROWs and associated vegetation disturbance; therefore, impacts on recreation setting characteristics would be less than under Alternative A and D but would be greater than under Alternative C.

Alternative C—This would have the fewest areas available for ROWs and associated vegetation disturbance, so it would have the least impact on recreation setting characteristics.

Alternative D—This has fewer impacts than Alternative A but greater impacts than Alternatives B and C.

Proposed LUPA—Industrial solar and wind energy would be prohibited in PHMA. The impacts from managing solar and wind projects under the Proposed LUPA for all indicators are similar to those for Alternative C.

Impacts from Range Management on Recreation

Impacts on Recreation Outcomes and Settings and Recreation Opportunities

Disturbance and Construction of Structures Associated with Range Management

Areas with high potential for vegetation disturbance and structure building associated with range management (such as water troughs, fences, and corrals) and in SRMAs and ERMAs would have a greater impact on recreation than areas with low potential for vegetation disturbance and construction of range management structures or no recreation management area identification. Vegetation disturbance and range management structures would diminish the naturalness of the physical setting and so would reduce opportunities for recreation activities, experiences, and outcomes, requiring more remote and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Alternative A—This would have the most areas available for livestock grazing and associated vegetation disturbance and structure building. Impacts on recreation setting characteristics, activities, experiences, and outcomes would be determined during analysis of site-specific management and project proposals.

Alternative B—This would implement range management strategies to protect and enhance GRSG habitat, which could alter the type, number, and location of range management structures. Impacts on recreation setting characteristics, activities, experiences, and outcomes would be determined during analysis of site-specific management and project proposals. Impacts would be similar to those in Alternatives A, C, and D. Areas available for livestock grazing and associated vegetation disturbance and structure building would likely be less than under Alternatives A and D but greater than under Alternative C.

Alternative C—This has impacts similar to Alternative B but would likely have the fewest areas available for livestock grazing and associated vegetation disturbance and structure building.

Alternative D—This has impacts similar to Alternative B.

Presence or Evidence of Livestock

Areas open for livestock grazing would have a greater impact on recreation than areas not available for livestock grazing. The presence or evidence of livestock would diminish the naturalness of the physical setting and so would reduce opportunities for recreation activities, experiences, and outcomes, requiring more natural and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Alternative A—This has the most areas available for livestock grazing and so would have the greatest impacts on recreation setting characteristics, activities, experiences, and outcomes.

Alternative B—This would implement range management strategies to protect and enhance GRSG habitat, which could alter the number, location, and timing of livestock grazing. Impacts on recreation setting characteristics, activities, experiences, and outcomes would be determined during analysis of site-specific management and project proposals. Impacts would be similar to those in Alternatives C and D. Areas available for livestock grazing would likely be less than Alternatives A and D but greater than Alternative C.

Alternative C—This has impacts similar to Alternative B but would likely have the fewest areas available for livestock grazing.

Alternative D—This has impacts similar to Alternative B.

Proposed LUPA—The same areas would be available for livestock grazing as under Alternatives A, B, and D. Impacts on recreation are the same for all indicators as described under those alternatives.

Impacts from Wild Horse Management on Recreation

Impacts on Recreation Outcomes and Settings and Recreation Opportunities

Vegetation Disturbance and Construction of Structures

Designated wild horse HMAs and herd areas would have more potential for vegetation disturbance and structure building than areas not managed as HMAs or herd areas. The disturbances and structures are usually temporary and associated with gather events. Structures and vegetation disturbance would diminish the naturalness of the physical setting and so would reduce opportunities for some recreation activities, experiences, and outcomes, requiring more remote and primitive settings.

Alternative A—This would place the fewest restrictions on wild horse management and so would have the most potential for installation of structures to manage the herds. Impacts on recreation setting characteristics, activities, experiences, and outcomes would be determined during analysis of site-specific management and project proposals.

Alternative B—This would implement herd management strategies to protect and enhance GRSG habitat, which would alter the level of vegetation disturbance and the type, number, and location of structures. Impacts on recreation setting characteristics, activities, experiences, and outcomes would be determined during analysis of site-specific management and project proposals. Impacts would likely be similar to those under Alternatives A, C, and D. Areas used for wild horse activity, and associated vegetation disturbance and structure building, would likely be less than Alternative A and D but greater than Alternative C.

Alternative C—This has impacts similar to Alternative B but would likely have the fewest areas available for wild horse activity and associated vegetation disturbance and structure building.

Alternative D—This has impacts similar to Alternative B.

Presence or Evidence of Wild Horses

Designated HMAs and herd areas would have a greater impact on recreation than areas not managed as HMAs or herd areas. The presence or evidence of wild horses could enhance or diminish recreation experiences and outcomes, depending on user-desired or agency-defined objectives. In recreation management areas, recreation management objectives define these desired setting characteristics, experiences, and outcomes.

Alternative A—This would place the fewest restrictions on wild horse management and would likely provide the most potential for wild horse viewing. Impacts on recreation setting characteristics, activities, experiences, and outcomes would be determined during analysis of site-specific management and project proposals.

Alternative B—This would implement herd management strategies to protect and enhance GRSG habitat, which could alter opportunities for wild horse viewing. Impacts on recreation setting characteristics, activities, experiences, and outcomes would be determined during analysis of site-specific management and project proposals. Impacts would likely be similar to those in Alternatives C and D.

Alternative C and D—These have impacts similar to Alternative B.

Proposed LUPA—Wild horse management would be the same as Alternative D, so impacts are also the same for all indicators.

Impacts from Minerals (Fluid, Solid Coal, Locatable, Nonenergy Leasable, and Salable Minerals) Management on Recreation

Impacts on Recreation Outcomes and Settings and Recreation Opportunities

Construction of Structures

In areas with high development potential and areas with high recreation concentration there is more likely to be resource conflict. Energy or nonenergy minerals facilities, as well as their ancillary facilities and structures, would diminish the naturalness of the physical setting and so would reduce opportunities for recreation activities, experiences, and outcomes requiring more remote and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Alternative A—This would place the fewest restrictions on mineral development and so has the most potential for installing structures to extract the minerals. Alternative A would likely have the greatest impact on recreation setting characteristics and the associated recreation activities, experiences, and outcomes.

Alternative B—This would implement new restrictions on mineral development to protect GRSG habitat, likely resulting in fewer structures. Impacts on recreation setting characteristics would likely be less than under Alternative A and D but would be greater than under Alternative C.

Alternative C—This would place the most restrictions on mineral development and so would have the least impact on recreation setting characteristics.

Alternative D—This has fewer impacts than Alternative A but greater impacts than Alternatives B and C.

Construction of Roads

In areas with high development potential and areas with high recreation concentration there is more likely to be resource conflict. Construction of roads associated with energy or nonenergy mineral development would increase the access attribute of the operational setting for certain recreation activities, such as OHV and mountain bike trail riding. However, it would also reduce the remoteness of the setting, which represents how far a visitor is from a road or a trail. The farther a visitor is from a road or trail, the more primitive the remoteness setting.

The naturalness attribute of the physical setting would also be diminished by road construction; therefore, road construction would reduce opportunities for recreation activities, experiences, and outcomes, requiring more remote and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Alternative A—This has the fewest restrictions on mineral development and so would have the greatest potential to change recreation opportunities, activities, or experiences. Impacts would vary, based on each area's prescribed recreation management objectives and the nature of the surface disturbance. Recreation opportunities requiring less remote or natural settings would benefit, while more primitive backcountry opportunities would likely be diminished.

Alternative B—This would limit mineral development and would have more beneficial impacts for primitive backcountry recreation opportunities than Alternative A. It would allow fewer opportunities than Alternative A for recreation that depends on road and trail development.

Alternative C—This would place the most restrictions on mineral development and so has impacts similar to those described for Alternative B, but with greater benefits to primitive recreation settings and greater detriment to developed recreation.

Alternative D—This has impacts similar to Alternative B but with more potential for road and trail development.

Earthwork Construction and Vegetation Disturbance

In areas with high potential and availability for minerals development and in SRMAs and ERMAs, changes in topography and vegetation disturbance would have a greater impact on the recreation setting characteristics for naturalness than in areas with low potential and low or no availability for mineral development or no recreation management area identification.

Energy or nonenergy minerals facilities, as well as their ancillary facilities and structures, would necessitate construction and vegetation clearing. This would in turn diminish the naturalness of the physical setting, reducing opportunities for recreation activities, experiences, and outcomes and requiring more remote and primitive settings. In recreation management areas, recreation management objectives define these desired setting characteristics.

Alternative A—This would place the fewest restrictions on mineral development and so would have the greatest potential for changes in topography, such as clearing and leveling of well pads. Alternative A would likely have the greatest impact on recreation setting characteristics and the associated recreation activities, experiences, and outcomes.

Alternative B—This would implement new restrictions, resulting in fewer areas available for mineral development and associated changes in topography and vegetation disturbance; therefore, impacts on recreation setting characteristics would be less than under Alternative A and D but would be greater than under Alternative C.

Alternative C—This would implement the most restrictions on mineral development and so would have the least impact on recreation setting characteristics.

Alternative D—This has fewer impacts than Alternative A but greater impacts than Alternatives B and C.

Proposed LUPA—Impacts on recreation from managing fluid, solid coal, locatable, nonenergy leasable, and salable minerals would be similar to those under Alternative D. There would be more restrictions on development and therefore the potential for less impact on recreation settings.

Impacts from Wildfire Suppression, Fuels Management, and Fire Rehabilitation on Recreation

Impacts on Recreation Opportunities

Short-Term Loss of Recreation Opportunities

Areas prioritized for wildfire suppression, fuels management, and fire rehabilitation would be more likely to experience short-term losses of recreation opportunities than areas not prioritized for those actions. Fire and fuels management generally require the short-term suspension of most recreation within the immediate area of the project or incident. Recreation generally resumes following these fire management actions, but recreation setting characteristics are usually altered for a longer term.

Alternative A—This would not prioritize fire management in GRSG habitat, and there would be no increased likelihood of impacts on recreation.

Alternative B—This would focus fire management actions in PHMA and would likely have greater short-term impacts on recreation than Alternatives A and D but fewer impacts than Alternative C.

Alternative C—This would focus fire management actions in ADH and would likely have the greatest short-term impacts on recreation.

Alternative D—This has more impacts than Alternative A but fewer impacts than Alternatives B and C.

Impacts on Recreation Outcomes and Settings and Recreation Opportunities

Vegetation Disturbance

In areas prioritized for wildfire suppression, fuels management, and fire rehabilitation and in SRMAs and ERMAs, vegetation disturbance would have a greater impact on recreation setting characteristics than in areas not prioritized for fire management or no recreation management area identification. Wildfires and fire management actions can result in large-scale vegetation disturbance and significant changes to the physical settings for recreation opportunities, potentially affecting the attainment of recreation management objectives.

Alternative A—This would not prioritize fire management in GRSG habitat, and there would be no increased likelihood of impacts on recreation.

Alternative B—This would focus fire management actions in PHMA and would likely have greater impacts on recreation than Alternatives A and D but fewer impacts than Alternative C.

Alternative C—This would focus fire management actions in ADH and would likely have the greatest impacts on recreation.

Alternative D—This has more impacts than Alternative A but fewer than Alternatives B and C.

Impacts from Habitat Restoration on Recreation

Impacts on Recreation Outcomes and Settings and Recreation Opportunities

Restoration of Surface Disturbance

In areas that contain higher densities of surface disturbance, prioritization of restoration would have a greater impact on recreation than areas that contain a lower density of surface disturbance. Restoration of roads and trails would decrease the access attribute of the operational setting for certain recreation activities, such as OHV and mountain bike trail riding; however, it would also increase the remoteness attribute of the physical setting, which represents how far a visitor is from a road or a trail. The farther it is from a road or trail, the more primitive the remoteness setting is.

The remoteness attribute of the physical setting does not change based on whether a road or trail is open; it changes only if the road or trail is removed from the landscape. Consequently, any road or trail restoration creates a more primitive recreation setting, reducing opportunities for development-dependent recreation and increasing opportunities for primitive backcountry recreation. The naturalness attribute of the physical setting would also be enhanced by restoring surface disturbances.

Alternative A—This would put the lowest priority on restoring sagebrush habitat. This would provide the most areas available for motorized and mechanized recreation opportunities and the fewest opportunities for nonmotorized recreation in a more primitive setting.

Alternative B—This would put a lower priority on restoration than Alternative C but would put a higher priority on restoration than Alternatives A and D.

Alternative C—This would put the highest priority on restoration and so would provide the most opportunities for recreation in a primitive setting and the fewest opportunities for motorized and mechanized recreation.

Alternative D—This would put a higher priority on restoration of sagebrush habitat than Alternative A but a lower priority on restoration than Alternatives B and C.

Proposed LUPA—Management of wildfire suppression, fuels management, and fire rehabilitation would be the same as Alternative D; therefore, impacts for all indicators are the same as under Alternative D, above.

Impacts from ACEC and Zoological Area Management on Recreation

Impacts on Recreation Outcomes and Settings and Recreation Opportunities

Preclusion of Surface Disturbance

Areas that are designated as ACECs would have greater impacts on recreation than those that are not. Management of ACECs to protect relevant and important values would likely decrease the access attribute of the operational setting for certain recreation activities, such as OHV and mountain bike trail riding; however, this could also increase the remoteness and naturalness attributes of the physical setting. Consequently, designated ACECs would likely create more primitive recreation settings, reducing opportunities for development-dependent recreation opportunities and increasing opportunities for primitive backcountry recreation.

Alternative A—This would recognize all of the existing ACEC designations. Alternative A has fewer impacts on recreation than Alternative C, which would make all PHMA an ACEC.

Alternative B—This would also recognize all of the existing ACEC designations. Impacts from Alternative B would be the same as impacts from Alternative A.

Alternative C—This would recognize all of the existing ACECs and would also make all PHMA an ACEC. Alternative C would likely provide the most opportunities for recreation in a primitive setting and the fewest opportunities for motorized and mechanized recreation. No additional protections would be added by designating PHMA an ACEC.

Alternative D—This alternative would recognize all of the existing ACECs but does not propose to designate any new ACECs. Impacts from Alternative D would be the same as for Alternatives A and B.

Proposed LUPA—All existing ACECs would be recognized, but there are no new ACECs proposed. Impacts from the Proposed LUPA are the same as those for Alternatives A, B, and D.

4.13.4 Summary of Impacts on Recreation

Alternative A places the fewest restrictions on development and allows for the most modification of the landscape. Consequently, it would provide the most opportunities for recreation access, especially for motorized and mechanized modes of travel. However, it would also reduce the naturalness and remoteness attributes of the physical setting for all types of recreation. Impacts would vary, based on each area's prescribed recreation management objectives and the nature of any development or surface disturbance. Recreation opportunities requiring less remote or natural settings would benefit, while more primitive backcountry opportunities would likely be diminished.

Alternative B would limit development and surface disturbance in GRSG habitat and would have more beneficial impacts for primitive backcountry recreation than Alternative A. It would allow fewer opportunities than Alternative A for recreation that depends on road and trail development.

Alternative C has the fewest areas available for surface-disturbing activities and so would have impacts similar to those described for Alternative B; however, Alternative C would have greater benefit to primitive recreation settings and greater detriment to developed recreation.

Alternative D would have impacts similar to Alternative B but with more potential for road and trail development and the associated recreation activities, experiences and outcomes.

Impacts from the proposed action would be similar to those described for Alternative D, with slightly fewer impacts overall due to greater restrictions on ground disturbance and disruption.

4.14 RANGE MANAGEMENT

4.14.1 General Description

This section discusses impacts on range management from proposed GRSG management actions of other resources and resource uses. Existing conditions concerning range management are described in **Section 3.12**, Range Management. Impacts on range management are commonly the result of activities and management actions from other resources. Impacts on other resources and resource uses from applying range management actions can be found in those particular resource sections of this chapter.

This section also discusses the differences between alternatives for each impact on range management from other resources and resource uses.

4.14.2 Methodology and Assumptions

Indicators of impacts on range management and the measurements used to describe the impacts (where available or appropriate) are as follows:

- Forage availability
- Ability to support operations on individual allotments long term and the amount of AUMs available
- Indirect impacts include loss of forage would be an adverse impact on range management; activities that increase forage availability would be beneficial
- Ability to develop, maintain, and use range improvement projects
- Areas with restrictions on surface disturbance that would preclude range project construction and maintenance
- Actions that allow continued maintenance or construction of infrastructure, such as water development, would be beneficial; actions that restrict maintenance or construction of livestock management structures would be adverse to range management
- Areas available for livestock grazing
- Acres lost or gained that are available or not available for livestock grazing
- Indirect impacts include closing areas for GRSG management would adversely affect permittees whose livestock graze within occupied habitat
- Ability to manage livestock allotments within permit[9]

[9]"Permit" in this section refers to all Section 3 grazing permits and Section 15 grazing leases.

- Ability of livestock operators to comply with permit or lease terms and conditions
- Indirect impacts would include ability to manage within permit lease terms and conditions

Assumptions

The following list presents the basic assumptions related to range management that apply to the impacts assessment for Alternatives A through D.

- All new and existing leases and permits would be subject to terms and conditions determined by the authorizing officer to achieve the management and resource condition objectives for the public lands and to meet BLM Colorado Public Land Health Standards.
- Livestock permittees would work toward achieving the BLM Colorado Public Land Health Standards (BLM 1997) on all grazing allotments on BLM-administered lands.
- By definition in this plan, livestock grazing is not considered a surface-disturbing activity; however, in small isolated areas where livestock concentrate, some surface disturbance would occur.
- Grazing preference is attached to base property owned or controlled by a permittee or lessee. Increases in forage availability could increase permitted AUMs for livestock permittees, except when specifically prohibited by RMP or Forest Plan management actions.
- Adverse impacts on vegetation (forage) or rangeland health from other resources or resource uses would likely result in AUM reductions.
- Construction of range improvements (e.g., fences, pipelines, water wells, troughs, catchments, and reservoirs) would result in a localized loss of vegetation cover throughout their useful life. Vegetation would be reestablished through reclamation along water pipelines within 5 to 10 years, to the extent possible.
- Any change in type of livestock would result in management changes within the BLM and Forest Service and within the livestock operation.
- Loss of the ability to develop, maintain and use range improvements would result in loss of livestock distribution capabilities, which could decrease the ability to manage the rangelands (e.g., soils, vegetation, and water) to properly meet BLM Colorado Public Land Health Standards on lands administered by the BLM or Forest Plan standards and guidelines for National Forest System lands.

- New range improvements could be subject to limitations, as specified in the RMP or Forest Plan. Range improvements generally lead to improved livestock distribution and vegetation management, which in turn would support long-term vegetation objectives without changes to permitted AUMs or season of use.
- Implementation of particular livestock grazing management actions from other resources or resource uses may affect permittees by increasing their operational cost through more intensive livestock management, season-of-use changes, class of livestock changes, modified grazing systems, decreased AUMs, or other actions needed to meet GRSG objectives.
- All classes of livestock depend on the herbaceous component of a shrub/grass plant community.
- Increases in shrubs or pinyon-juniper are adverse to forage production; increases in grasses and forbs are beneficial to forage production.
- Vegetation treatments, such as prescribed burns or weed control, can enhance the plant community composition and forage availability.
- Overutilization, which could include more livestock than AUMs or improper season of use would adversely affect plant composition, plant succession, and ground cover.
- Water is vital to proper range management.
- Areas without available water would have less use than areas with water.
- Water developments can improve livestock distribution.
- Water developments can adversely affect such resources as rare plants and cultural sites if not properly located.
- In most cases, fences are necessary to confine grazing to within allotments, particularly where cattle and horses are involved.
- Fences are an important tool used to control areas, timing, and intensity of livestock use.
- Except where needed to control areas of neighboring cattle or horse grazing, fencing is less necessary on sheep allotments.
- Under Alternative C, where the management action is to close grazing in ADH, the assumption is that private land parcels with continued livestock grazing would be fenced to prevent livestock from occupying public lands in areas identified as GRSG habitat.

Implementing management actions for recreation and ACECs would have negligible or no impact on range management and are therefore not discussed in detail.

4.14.3 Direct and Indirect Impacts on Range Management

Impacts from Travel Management on Range Management

A variety of management actions for travel and transportation are currently being applied or are proposed to be applied under Alternatives B, C, and D to reduce adverse impacts on GRSG and its habitat. These have varying degrees of potential adverse impacts on range management. Depending on the amount of roads and trails and their level of use, transportation and travel management could result in both short- and long-term rangeland degradation, forage loss, and temporary livestock displacement. Impacts of route-based travel use include reduced availability of forage, reduced palatability because of dust on vegetation, disturbance and harassment of livestock, as well as hindrance or facilitation of livestock movements on the landscape.

Forage Availability

Alternative A—Under Alternative A, 574,100 acres in PHMA and 412,100 acres in GHMA would continue to be managed as open to cross-country motorized travel on BLM-administered lands. All travel is limited to designated routes in the Routt National Forest. This alternative has the most acres available for motorized travel, which results in the greatest potential for increased surface disturbance and the greatest impacts on vegetation cover. Alternative A therefore has the greatest impact on forage availability.

Alternative B—Under Alternative B, travel in PHMA would be limited to designated routes. Increased limitations on surface disturbance associated with travel and transportation under Alternative B could increase forage availability due to decreased acres available for surface-disturbing activities. Limitations on upgrading existing routes could also increase forage availability by decreasing areas available for surface disturbance. Forage availability under Alternative B would be greater than under Alternative A.

Alternative C—Under Alternative C, cross-country travel would be limited to existing routes in ADH, and new roads would be prohibited within 4 miles of a lek. Alternative C would have the least amount of acres available for construction of routes and therefore would have the least impact on forage availability. The impacts would be the same as the impacts described under Alternative B, but the impacts on forage availability under Alternative C are greater in scope because they apply to a larger area.

Alternative D—Restrictions on route construction are less restrictive under Alternative D than Alternatives B and C and would have greater impacts on forage availability than Alternatives B and C but less than under Alternative A.

Proposed LUPA—Restrictions on route construction under the Proposed LUPA would be similar to those for Alternative D; impacts on forage availability for livestock grazing would be similar to those under Alternative D.

Under the Proposed LUPA, new road or trail construction on National Forest System lands would be prohibited in GRSG habitat, and road construction in riparian and mesic meadows would be restricted. This direction would be beneficial to livestock grazing by reducing impacts from roads on rangeland and riparian areas. This could indirectly improve forage production and overall rangeland conditions. However, impacts from roads and transportation could be disproportionately concentrated in areas outside of priority and general GRSG habitats, which could indirectly impact grazing conditions through increased development.

Ability to Develop, Maintain, and Use Range Improvement Projects

Alternative A—Alternative A would allow the most ability to develop, maintain, and use range improvements since it puts the fewest restrictions on access.

Alternative B—Restrictions on access and route construction under Alternative B would apply to PHMA, which could hinder the ability to develop, maintain, and use range improvements on 481 allotments.

Alternative C—Alternative C would restrict access in ADH, which could hinder the ability to develop, maintain, and use range improvements on 818 allotments.

Alternative D—Alternative D would allow for increased access and flexibility, compared to Alternatives B and C, in ADH to develop, maintain, and use range improvements, as long as they do not adversely affect GRSG.

The Proposed LUPA would eliminate the construction of new roads (if they were associated with a new range improvement) in PHMA for Colorado MZs exceeding the 3 percent disturbance cap. Depending on the improvement and needs for future access, this could effectively curtail some new projects. Otherwise, impacts would be similar to those for Alternative B.

Ability to Manage Livestock Allotments within Permit Terms and Conditions

Impacts on the ability to manage livestock allotments within permit terms and conditions would be the same as the impacts described under ability to develop, maintain, and use range improvements.

Impacts from Lands and Realty Management, Wind Energy Development, and Industrial Solar Development on Range Management

Management actions related to lands and realty, wind energy development, and industrial solar development for protecting GRSG and its habitat could adversely affect the range management program through reduced ability to develop range improvement projects. There is also the potential to beneficially affect the range management program by restricting acres available for

construction of projects that result in surface disturbance. Impacts from management actions associated with land tenure adjustments could increase forage availability through acquisition of additional public lands. Since wind and solar energy facilities require ROW authorizations, impacts are being considered with the impacts from management of lands and realty.

Forage Availability

Alternative A—Within the Northwest Colorado District, 24,200 acres are managed as exclusion area and 90,700 acres are managed as avoidance areas within GRSG habitat (ADH). This alternative includes the fewest restrictions to locations of ROW corridors and ROWs and the fewest restrictions for construction. There is no disturbance cap for construction of new ROWs.

Alternative A has the most acres available for land use authorizations and therefore has the greatest potential for surface disturbance associated with those authorizations. Alternative A has the greatest impact on forage availability. Acquisitions and disposals would be on a case-by-case basis throughout the planning area.

Alternative B—Under Alternative B, all PHMA would be managed as exclusion areas. Those restrictions on surface-disturbing activities would be a benefit to forage availability. Prioritization of acquisitions in PHMA would expand areas that could be made available for public land livestock grazing, thereby increasing forage availability, if those acquisitions were made available for livestock grazing.

Alternative C—Under Alternative C, ADH would be managed as exclusion areas for ROWs. Those restrictions on lands and realty actions would be the most beneficial to forage availability because they would exclude surface disturbance from the most acres. Exclusion areas for ROWs would apply to ADH under this alternative. The prioritization of acquisitions in ADH over easements under this alternative and the expansion of areas targeted for acquisition would also expand areas that could be made available for public land livestock grazing. This would increase forage availability, assuming that those acquisitions are made available for livestock grazing.

Alternative D—Under Alternative D, PHMA would be managed as avoidance areas for ROWs. The restrictions on potential surface-disturbing activities associated with land use authorizations would be greater than Alternative A but less than Alternatives B and C. There would be more forage available, therefore, under Alternative D than Alternative A, but less than under Alternatives B and C.

Proposed LUPA—The issuance of new ROWs would be greatly restricted in both PHMA and GHMA. Forage loss would be similar to Alternative B.

Under the Proposed LUPA, prohibiting solar and wind development in PHMA on National Forest System lands and restricting development in GHMA would

limit any impacts of ground disturbance. This would limit the direct impacts of development and surface disturbances on existing rangelands, which would be beneficial to livestock grazing. However, it may shift development to areas outside of priority and general GRSG habitats, which could indirectly impact rangelands and grazing conditions.

Impacts from Range Management on Range Management

Range management actions intended to benefit GRSG populations and their habitats described in **Chapter 2** are measures within a variety of categories. Depending on the specific alternative, these include incorporating GRSG habitat requirements into overall management of grazing allotments, prioritizing land health assessments in GRSG habitat, managing vegetation communities for the benefit of GRSG, and responding to drought conditions. In addition to these are restrictions related more specifically to managing riparian areas and wet meadows, implementing treatments to increase forage for livestock and wild ungulates, installing new structure range improvements and livestock management tools, such as water developments, removing or modifying existing structural improvements such as fences, and retiring grazing privileges.

Impacts from management actions designed to reduce the threat of West Nile virus are not expected to affect the range management program in northwest Colorado because the vast majority of allotments there are found at elevations above where West Nile virus is commonly found (Naugle et al. 2005).

Impacts on the range program from range management actions described below by alternative are those on forage availability, ability to develop range improvement projects, and areas available for livestock grazing.

Alternative A—Alternative A is the least restrictive of all the alternatives. In general, current grazing management is geared toward meeting BLM Colorado Public Land Health Standards and Forest Plan standards and guidelines, but there are no specific management actions specifically for GRSG habitat. If BLM Colorado Public Land Health Standards and Forest Plan standards and guidelines are being met, then vegetation composition, vigor, and seed production is adequate for maintaining healthy vegetation communities. Management for riparian areas is based on riparian proper functioning condition and Forest Plan standards and guidelines, and there are no specific management actions for GRSG habitat.

Most GRSG habitat is currently used for livestock grazing in northwest Colorado. Alternative A would provide the most benefit to forage availability when compared with the other alternatives because vegetation treatments would not be prioritized to benefit GRSG habitat; instead it would be targeted to increase forage for livestock and would result in increased forage for livestock.

Alternative A does not contain restrictions for construction of range improvement projects and allows for the greatest degree of flexibility for construction of infrastructure and therefore livestock.

Alternative B—Alternative B has moderate restrictions on grazing management within GRSG habitat. Management primarily focuses on completing integrated ranch planning to aid in improving GRSG habitat at a landscape level, completing land health assessments in ADH, creating livestock grazing objectives that aim at keeping vegetation composition consistent with ecological site descriptions, and managing livestock use to meet seasonal needs of GRSG. Areas without GRSG habitat would receive fewer vegetation treatments because treatments would be prioritized in GRSG habitat.

Timing and seasonal limitations, as well as drought-related adjustments geared toward improving habitat for GRSG, could reduce forage availability because permittees would be required to move livestock off range if necessary to protect GRSG. The potential for decreased availability of forage exists under this alternative throughout northwest Colorado. Drought-related adjustments would result in short-term reductions in forage but could sustain or increase forage availability in the long term.

New range improvements would be authorized only when the improvement would improve or enhance GRSG habitat. In PHMA, range improvements would be restricted to only those that conserve, enhance, or restore GRSG habitat. This would reduce the ability to develop range improvements and the flexibility for distribution of livestock across 481 allotments in the planning area.

Alternative C—Alternative C would exclude livestock grazing in ADH. Forage on 1,702,800 acres of ADH would no longer be available for livestock grazing; this would eliminate approximately 337,000 AUMs on BLM-administered allotments. Livestock grazing operators would have to cease or greatly reduce their livestock operations.

Closing BLM-administered and National Forest System land to livestock grazing in ADH would require fencing along the boundary of ADH. However, it is not practical to assume that the BLM and Forest Service would fence along the entire perimeter of ADH, especially in those allotments that are only partially in ADH. There are 59 allotments, for example, that are less than 10 percent in ADH. It is more likely that fences would be constructed on a case-by-case basis, as determined by land patterns, topography, and impacts on GRSG. On private land portions of allotments, however, it is likely that many landowners would build fences along their property boundaries to ensure no livestock trespassed on BLM-administered or National Forest System lands in ADH that has been closed to livestock grazing.

In order to prevent trespass onto closed allotments on BLM-administered and National Forest System land, landowners could construct up to 4,955 miles of

fence. The fences would follow property lines between the BLM and Forest Service and other landowners without any regard to existing leks, nesting habitat, or brood-rearing habitat. Impacts on GRSG due to increased fencing are addressed in **Section 4.4.2**, GRSG.

Table 4.6 represents acres per Colorado MZ that would be closed to grazing in Alternative C and miles of fence by MZ that could be built along private/public land boundaries.

Under Alternative C, no new structural range developments would be allowed in ADH unless they had been shown to benefit GRSG. However, those restrictions would apply only for allotments within ADH, which would be closed under this alternative.

Table 4.6
Livestock Grazing Management—Alternative C

Colorado Management Zone	Acres In ADH That Would Be Closed To Grazing	Miles of Fence Needed to Close Grazing in ADH
1	0	0
2	1,199,000	200
3	455,800	400
4	109,700	400
5	120,000	400
6	49,900	300
7	27,800	100
8	4,300	60
9	166,800	700
10	189,700	500
11	137,300	500
12	6,800	30
13	63,700	300
14	43,600	200
15	3,100	30
16	11,300	0
17	112,500	300
18	13,000	30
19	63,200	300
20	2,100	20
21	2,200	10
Total	**1,702,800**	**5,000**

Closing grazing in ADH would add complexity to the ability to effectively manage both the remaining portions of allotments on BLM-administered or National Forest System lands that could remain open and the management of the private land portions of those allotments that are either closed or partially closed. The flexibility to manage livestock on those allotments would be greatly reduced, potentially to the point of infeasibility.

Alternative D—Under Alternative D, several management objectives provide more flexibility for actions to improve land health and manage riparian areas or vegetation treatments, but the objectives apply to a larger area (ADH). Management objectives are primarily targeted at managing the range within ADH to be consistent with ecological site descriptions, similar to Alternative B and C; however, there is increased flexibility for managing BLM-administered and National Forest System lands for other resource values.

Alternative D is less restrictive than Alternative B and C but is more restrictive than Alternative A.

Under Alternative D the ability to construct range improvements and livestock management tools is greater than under Alternatives B and C but slightly less than Alternative A. Under Alternative D, range improvement projects would be designed to both enhance livestock distribution across allotments and to protect GRSG habitat. This would provide more flexibility than Alternatives B and C but less flexibility than Alternative A.

The Proposed LUPA would allow for greater flexibility in implementing range improvements designed to increase forage in GRSG habitat; otherwise, the impacts are very similar to Alternative D.

Under the Proposed LUPA on National Forest System lands, livestock grazing would be managed to achieve or maintain desired conditions in GRSG seasonal habitats, as described in **Section 2.5.3**, Forest Service Proposed Plan Amendment. Livestock grazing would also be managed in order to maintain residual perennial grass height. This would provide adequate GRSG nesting cover, according to the guidelines described in **Section 2.5.3**, Forest Service Proposed Plan Amendment.

Current direction for livestock grazing under Alternative A is generally less restrictive than that under the Proposed LUPA; therefore, grazing use guidelines under the Proposed LUPA would directly impact livestock grazing management on National Forest System lands. Impacts could include modifying grazing strategies or rotation schedules, changing the season of use and the kind and class of livestock, closing a portion of an allotment, or reducing livestock numbers.

Implementing this management direction could reduce AUMs on some allotments and possibly overall operation viability. The level and intensity of impacts could vary on a site-specific basis, with permitted grazing likely decreasing moderately over time, as permits are modified to achieve desired conditions and meet annual grazing use guidelines.

Implementing the Forest Service grazing guidelines could also directly impact permittees by increasing the amount of time permittees spend to manage livestock on National Forest System lands and the total costs to a livestock

operation. Impacts would occur at the allotment scale as management direction is incorporated into permits, allotment management plans, and annual operating instructions.

Implementing grazing use guidelines under the Proposed LUPA on National Forest System lands would impact about 12 allotments, 11,419 acres, and 16,192 AUMs in nesting and brood-rearing habitats in active grazing allotments. During the nesting season, from March 1 to June 15, in nesting habitat no allotments would be impacted by the grazing use guidelines. However, outside of the nesting season in nesting habitat, two allotments, 1,261 acres, and 2,361 AUMs would be impacted.

Under the Proposed LUPA on National Forest System lands, sheep camps could not be within 1.2 miles of the perimeter of a lek during lekking season; trailing livestock would be minimized during breeding and nesting seasons. This management direction would result in the need to modify grazing practices, with increased costs for permittees.

Additional constraints under the Proposed LUPA on National Forest System lands would also apply to structural range improvements in priority GRSG habitat, compared to current plan direction. Fence construction or reconstruction would be prohibited within 1.2 miles of the perimeter of occupied lek. This could be avoided by mitigating the collision risk through design features or markings, by not constructing new permanent livestock facilities (e.g., windmills, water tanks, and corrals) within 1.2 miles of the perimeter of occupied leks, and by not constructing water developments in PHMA unless they would benefit GRSG.

Prohibiting new structural improvements could limit the ability of permittees to effectively distribute livestock. This could increase time and costs to permittees and potentially the full use of permitted AUMs. Although these constraints could increase the amount of time permittees spend to manage livestock on National Forest System lands, it should allow sufficient flexibility so that permittees could continue to use structural range improvements to effectively distribute livestock.

Under the Proposed LUPA, the Forest Service would consider closing grazing allotments and pastures or portions of pastures; or it could manage the allotment as a forage reserve as opportunities arise and where removing livestock would enhance the ability to achieve desired habitat conditions. These actions would occur according to applicable regulations and, when implemented, would reduce overall the available AUMs.

Managing livestock grazing to achieve the desired conditions in and livestock use guidelines in **Section 2.5.3**, Forest Service Proposed Plan Amendment, may indirectly benefit rangeland conditions. It could do this by increasing vegetation productivity and forage in the long term. This in turn would provide managers

and permittees with better management options, especially on those allotments where livestock numbers are approaching a sustainability threshold or during drought and other disturbances, such as wildfire.

Impacts from Wild Horse Management on Range Management

The following management actions are to protect GRSG and its habitats in relation to management of wild horses: keeping populations within appropriate management levels, prioritizing gathers to reduce impacts of wild horses on GRSG habitats, addressing potential impacts on GRSG in NEPA analyses for wild horse management activities, and considering GRSG habitat requirements in conjunction with HMAs.

Forage Availability

Alternative A—Under Alternative A, horses would continue to be managed within established HMAs and under established appropriate management levels. Existing competition between wild horses and livestock would continue at current levels.

Alternative B—Wild horse management areas, such as the Little Bookcliffs HMA, that do not contain any GRSG habitat would be categorized as a low priority for future gathers under Alternative B. Wild horse areas that have occupied habitat would be categorized a higher priority. For those allotments that overlap HMAs and that are categorized a low priority for gathers, forage availably would decrease due to growing populations of wild horses that have not been gathered due to the lower priority for gathers in that HMA.

HMAs that are identified as a high priority for gathers would stay within appropriate management levels, and forage would stay at stable levels.

Alternative C—Impacts from Alternative C would be the same as those described under Alternative B.

Alternative D—Under this alternative, gathers would be prioritized, but other resource values would be taken into account during that prioritization. Alternative D is similar to Alternatives A and B but gives more flexibility, depending on other management objectives of the BLM and Forest Service (e.g., listed plants).

Proposed LUPA—Impacts from the Proposed LUPA would be the same as for Alternative D.

Impacts from Fluid Minerals Management on Range Management

The development and maintenance of fluid minerals production facilities often impacts resources that livestock grazing operations rely on. Loss of forage through the direct disturbance of drilling and production pads, roads, compressor stations, and other structures has impacted numerous allotments throughout the affected area.

Unleased Fluid Minerals

Forage Availability

Alternative A—Alternative A would allow the most development of unleased minerals. This would have the greatest impacts on forage availability and would decrease forage availability over time as infrastructure associated with fluid minerals is developed.

Alternative B—For areas within PHMA that are not currently leased, no new leases would be allowed, so forage loss would not occur and there would be no negative impacts on livestock management. Activities related to geophysical exploration are temporary, with very minor surface disturbances. The continuation of these activities would not result in impacts on forage availability.

Alternative C—Under this alternative, ADH would be closed to new fluid mineral leases. Impacts from this alternative would be similar to the impacts from Alternative B, only it would apply to a larger area (ADH as opposed to PHMA; see **Table 4.6**); therefore, Alternative C would have a more beneficial impact on forage availability from decreased surface disturbance associated with fluid mineral development.

Alternative D—Under this alternative, PHMA would be an NSO area for new fluid mineral leases. This alternative is similar to Alternative B. Minerals underlying PHMA could be leased, but no development associated disturbance would be allowed in PHMA. There would still be a potential for continued fluid mineral leasing along the periphery of PHMA if directional drilling were feasible. Development could occur outside PHMA, possibly in GHMA or LCHMA, which could decrease forage availability in those areas.

Proposed LUPA—Development associated with new leases could occur farther than 2 miles from active leks in ADH but outside of PHMA. The restrictions on new leasing and the resulting surface occupancy restrictions in PHMA would result in only negligible impacts on forage availability throughout the planning area.

Under the Proposed LUPA on National Forest System lands, new fluid mineral leases would require a no surface occupancy stipulation in PHMA and controlled surface use and timing restrictions in GHMA. New leases would be prioritized in nonhabitat first and then in the least suitable habitat for GRSG.

For existing leases under the Proposed LUPA, leaseholders would be required to avoid and minimize surface disturbance and disruption in PHMA for leases that are not yet developed. In addition, reclamation plans would be designed to restore habitat to the desired conditions described in **Section 2.5.3**, Forest Service Proposed Plan Amendment. Fluid mineral operations would be mitigated in PHMA to reduce soil compaction. This in turn would improve vegetation reestablishment and keep GRSG habitat disturbance to a minimum.

Surface disturbances would also be prohibited for unleased coal mines in PHMA; other mitigation measures would reduce disturbances for leased coal mines and associated facilities. Locatable mineral, nonenergy leasable, and mineral material operations in PHMA would be mitigated to protect GRSG habitat.

Minerals management direction under the Proposed LUPA on National Forest System lands would have positive impacts for livestock grazing in priority and general GRSG habitats. This is because development and surface disturbance would be limited, and the potential from development-related disturbance of rangeland and forage resources would be reduced. However, impacts from new and existing mineral leases could be disproportionately concentrated in areas outside of priority and general GRSG habitats; this could indirectly impact grazing conditions through increased development.

Areas Available for Livestock Grazing

Reductions in areas available for fluid mineral leasing would be a benefit to range management. Impacts would be similar to those described under forage availability.

Leased Fluid Minerals

Forage Availability

Alternative A—Alternative A would allow the most development of leased fluid minerals. This would have the most impacts on forage availability and would decrease forage availability over time as infrastructure associated with fluid minerals is developed.

Alternative B—For areas within PHMA that are currently leased, some level of fluid mineral development and associated impacts on forage would occur, albeit at diminished levels. For PHMA, the implementation of an NSO (4 miles from leks) would result in fewer losses of forage from fluid mineral development. Where exceptions to the NSO would apply, a 3 percent disturbance cap would effectively reduce related impacts, though they would continue to occur. Development under this alternative might force development to the most distant area of a lease if it were within 4 miles of a lek, which could impact forage availability on any associated allotments.

Alternative C—Impacts from this alternative are largely the same as Alternative B. However, where seasonal restrictions are applied to benefit GRSG, under Alternative C those restrictions would apply to ADH, thereby causing a greater benefit to forage availability under this alternative than under Alternative B.

Alternative D—Under this alternative, where exceptions apply to the NSO, a 5 percent disturbance cap would effectively reduce impacts on forage availability, albeit at a lower level than Alternative B. Development under this alternative is greater than under Alternatives B and C.

Proposed LUPA—A 3 percent disturbance cap would have negligible impacts on forage availability.

Areas Available for Livestock Grazing

Reducing areas available for fluid mineral leasing would be a benefit to range management. Impacts would be similar to those described under forage availability.

Impacts from Solid Minerals–Coal Management on Range Management

Management actions for protecting GRSG and its habitats from coal mining projects include measures in Alternatives B and C that would prohibit new surface mines in PHMA. Other measures under these alternatives would prohibit new subsurface mine leases in PHMA, unless surface facilities would be located entirely outside PHMA. These measures would limit expansion of existing leases unless new surface facilities were either located outside PHMA or, if that is not possible, collocated with existing disturbances or otherwise kept to a minimum. Alternative D includes additional measures but is also aimed at limiting impacts on GRSG populations in both PHMA and ADH by minimizing habitat loss and disruption of GRSG activities.

Impacts from solid minerals development on the range program would be the same or similar to those discussed above in fluid minerals but would vary in scale, duration, and intensity.

Impacts from Locatable Minerals Management on Range Management

Alternatives analyzed in this EIS for protecting GRSG from developing locatable minerals are aimed at avoiding or minimizing new habitat loss and additional disruption of GRSG activities by prohibiting or limiting future mining in PHMA.

Forage Availability

Alternative A—Under this alternative, the most acres are available for mineral entry, so it would have the highest potential to impact forage availability.

Alternative B—This alternative involves similar impacts on forage availability as described under *Impacts from Management of Fluid Minerals on Range Management*. Within PHMA, the extraction of locatable minerals could continue at some level, but where mineral entries are withdrawn due to impacts on GRSG, the impacts on forage availability would be minimized. While some extractive activities could continue, the increased mitigations on operations would have relatively little effect, and localized losses of forage would still occur.

Alternative C—Impacts from this alternative would be the same as for Alternative B.

Alternative D—Under this alternative, the impacts on forage availability would be the same or similar to those described under Alternative B. However, there is a slightly higher potential for impacts on forage availability under this

alternative as opposed to Alternatives B and C, due to the slightly higher potential for continued locatable mineral development.

Proposed LUPA—The impacts would be similar those under Alternative D.

Impacts from Nonenergy Leasable Minerals Management on Range Management

Measures to protect GRSG and its habitat from development of nonenergy leasable minerals (nahcolite) are aimed at avoiding or minimizing new habitat loss and additional disruption of GRSG activities by prohibiting or limiting future mining in PHMA.

Impacts from nonenergy leasable mineral development on the range program would be the same or similar to those discussed above under *Impacts from Management of Fluid Minerals on Range Management* but vary in scale, duration, and intensity.

Impacts from Salable Minerals Management on Range Management

As with the solid minerals addressed above, the alternative measures for protecting GRSG from development of salable minerals are aimed at avoiding or minimizing new habitat loss and additional disruption of GRSG activities by prohibiting or limiting future mining in PHMA.

Impacts from salable minerals development on the range program would be the same or similar to those described above under *Impacts from Management of Fluid Minerals on Range Management* but vary in scale, duration, and intensity.

Impacts from Fuels Management on Range Management

Management actions for protecting GRSG and its habitats from fuels management are described in detail in **Section 4.7**, Wildland Fire Ecology and Management, and in **Chapter 2**. These measures focus on ensuring that activities related to fuels reduction to reduce the risk of future catastrophic fires do not significantly affect GRSG populations through either disruption of GRSG activities or destruction of occupied or suitable habitat.

Forage Availability

Alternative A—Under this alternative, no restrictions would be applied to fuels management in GRSG habitat. A greater number of acres would be treated under this alternative, potentially benefiting forage for livestock through increased herbaceous cover.

Alternative B—Under this alternative, forage availability would decrease over time due to a restricted ability to remove sagebrush through fire, mechanical, or chemical means to reduce fuel and increase herbaceous plants in PHMA. No treatments would be allowed in winter range in PHMA under this alternative, which would decrease the herbaceous understory and in turn decrease forage availability.

Alternative C—Impacts would be the same as Alternative B, except that restrictions under Alternative C would be applied to ADH, thereby increasing the scope of the impact. No treatments would be allowed in winter range in ADH under this alternative, which would decrease the herbaceous understory over time, and in turn decrease forage availability to a greater degree than Alternatives A, B, and D.

Alternative D—Under this alternative, treatments in winter habitat would be allowed in ADH if 70 percent of ecological sites supporting sagebrush maintain 12 percent canopy cover of Wyoming big sagebrush or 15 percent cover of mountain big sagebrush. This would allow more flexibility for treatments, resulting in increased forage availability over Alternatives B and C but less than Alternative A.

The Proposed LUPA would be more restrictive than Alternative D in that fuels treatments in PHMA winter habitat would be highly restricted. Otherwise, the impacts from this alternative would be similar to those of Alternative D.

Under the Proposed LUPA on National Forest System lands, measures to protect GRSG habitat from fire and associated fire operations would be beneficial to livestock grazing, especially in the 12-inch or less precipitation zone. This is because it would help prevent the expansion of nonnative invasive species, such as cheatgrass. Although management to suppress and control the spread of wildfire under the Proposed LUPA would decrease the risk of disturbance from wildfire in GRSG habitat, fires outside of GRSG habitat could decrease suppression efforts.

Management direction to protect GRSG habitat from fire in higher elevation mountain big sagebrush habitats could indirectly and negatively impact livestock grazing in the long term. This is because sagebrush could increase and forage production could decrease.

Areas Available for Livestock Grazing

Alternative A—This alternative is the least restrictive for ability to implement sagebrush treatments and increase areas available for livestock grazing. There would be a short-term decrease in ability to use areas identified for treatments leading up to and following the treatment; however, in the long term there would be an increase in areas available for livestock grazing.

Alternative B—In PHMA, restrictions on sagebrush treatments would decrease the ability to create or maintain areas in sagebrush habitat that are available for livestock grazing.

Alternative C—In ADH, restrictions on sagebrush treatments would decrease the ability to create or maintain areas in sagebrush habitat that are available for livestock grazing.

Alternative D—This alternative would allow more flexibility in terms of areas available for livestock grazing, due to the increased ability to maintain early to mid-seral sagebrush communities in winter range, which would allow for more areas available for livestock grazing.

The Proposed LUPA would allow for less flexibility in implementing treatments for increasing grazing suitability in PHMA winter habitat; all other impacts would be similar to those of Alternative D.

Impacts from Fire Operations Management on Range Management

Management actions for protecting GRSG and its habitats from fire operations are described in detail in **Section 4.7**, Wildland Fire Ecology and Management, and in **Chapter 2**.

Forage Availability

Alternative A—Under Alternative A, after firefighter safety, prioritization of suppression would be considered for multiple resources. This would result in little change in forage availability in the short term, while in the long term, forage would decrease the most due to an overall increase in later seral stage sagebrush communities, with resulting decreases in herbaceous species used for forage.

Alternative B—Under this alternative, prioritization of suppression in PHMA would result in little change in forage availability in the short term, while in the long term, forage would decrease due to an overall increase in later seral stage sagebrush communities, with resulting decreases in herbaceous species used for forage.

Alternative C—Impacts from Alternative C would be the same as the impacts described above for Alternative B.

Alternative D—Impacts from Alternative D would be similar to the impacts described under Alternative B, except that suppression would be prioritized in PHMA, with preference given to GRSG habitat, unless site-specific circumstances warrant an exemption. This could increase herbaceous forage to a greater degree than in Alternatives A, B, and C.

Proposed LUPA—The impacts would be very similar to Alternative D; however, suppression would consider all at-risk resource values. This could result in slightly greater suppression prioritization in PHMA than under Alternative D.

Impacts from Emergency Stabilization and Rehabilitation on Range Management

ESR or burned area emergency response following a wildland fire would be focused on restoring habitat consistent with GRSG habitat needs, to the extent practicable. Depending on the alternative (see **Chapter 2**), this includes use of

locally selected native seeds and of sagebrush where available, as well as temporary restrictions on grazing, motorized travel, and other uses.

Impacts from ESR or burned area emergency response on the range program are the same or similar to those discussed above under *Impacts from Management of Fuels on Range Management* but vary in scale, duration, and intensity.

Impacts from Habitat Restoration on Range Management

As with ESR or burned area emergency response treatments, general habitat restoration treatments would emphasize improving existing habitats with current or future potential for supporting GRSG through such measures as weed control and use of locally adapted native seeds in revegetation. Depending on the alternative, these measures would be variously applied in PHMA or ADH areas (see **Chapter 2**).

Impacts from habitat restoration on the range program would be the same or similar to those discussed above under *Impacts from Management of Fuels on Range Management* but vary in scale, duration, and intensity.

4.14.4 Summary of Impacts on Range Management

Alternative A—Alternative A would provide the most flexibility in management, the fewest impacts on forage availability, and the fewest restrictions on development of range improvements, which would benefit range management.

Alternative B—Alternative B would provide less flexibility than Alternatives A and D but would provide more flexibility than Alternative C for range management. Alternative B would put more restrictions on developing range improvements than Alternatives A and D but fewer restrictions than Alternative C, which could impact the range program.

Alternative C—Alternative C would close ADH to livestock grazing and would cause the need for additional infrastructure to implement that closure. Impacts on the range management program are greatest under Alternative C.

Alternative D—Alternative D would provide more flexibility in management than Alternatives B and C but less flexibility than Alternative A. Impacts on forage availability under this alternative are greater than Alternative A but are less than Alternatives B and C.

The Proposed LUPA would provide slightly less flexibility than Alternative D but greater flexibility than Alternatives B and C. Impacts on forage availability are greater than Alternative A but less than Alternatives B and C.

4.15 WILD HORSE MANAGEMENT

4.15.1 General Description

The Wild and Free-Roaming Horses and Burros Act of 1971 and BLM policy state that wild horse populations will be managed as self-sustaining populations of healthy animals, in balance with other uses and the production capacity of their habitat. The goal is to protect and manage self-sustaining wild horse populations within established HMAs at appropriate management levels. Healthy, self-sustaining wild horse populations depend on forage, water, cover, and space as essential components.

4.15.2 Methodology and Assumptions

General Impacts on Wild Horse Management

Indicators of impacts on wild horse management and the measurements used to describe the impacts (where available or appropriate) are as follows:

- Forage availability
  - Ability to support appropriate management levels long term
  - Indirect impacts include loss of forage Those activities which increase forage would be beneficial.
- Water availability
  - Sufficient volume, quality, and distribution (location) of water sources to evenly use available habitat
  - Indirect impacts include home ranges without reliable water.
- Cover and space availability
  - Lack of obstacles, notably fences, that hinder the ability of horses to evenly use available habitat to access cover and space (in addition to the forage and water needs previously identified)
  - Indirect impacts include actions or lack of action that restricts free roaming wild horse access. Actions that allow free roaming and full access to habitat within HMAs are beneficial
- Ability to manage wild horses within the boundaries of established HMAs
  - Those wild horses that are included in the estimated population of an HMA are not straying outside of the boundaries of their HMA
  - Indirect impacts include management and resources of adjacent areas when wild horses become unauthorized

users of allocated resources; it is beneficial when horses are using designated HMAs

- Reliable ability to prevent overpopulation within HMAs and restrict horse distribution to HMAs through gather operations or fertility control, conducted on schedule and at the planned number of horses removed or gathered
  - Ability to stay within appropriate management levels
  - Indirect impacts include periodic over populations of wild horses that are causing resource damage. Ability to remain within appropriate management levels and meeting BLM Colorado Public Land Health Standards is beneficial

Assumptions

The following list presents basic assumptions related to wild horse management that apply to the impacts assessment for Alternatives A through D.

- Horses depend on the herbaceous component of a shrub/grass plant community.
- Encroachment of shrubs or pinyon-juniper onto established rangelands is adverse; increases in grasses and forbs are beneficial.
- Vegetation treatments, such as prescribed burns or weed control, can enhance the plant community composition and forage availability.
- Heavy or poorly timed grazing would adversely affect plant composition, plant succession, and ground cover.
- Water is the primary resource associated with wild horse distribution. Furthermore, man-made water developments that employ some type of mechanical device (e.g., windmill or electric pump) can fail and cause horses to go without or go elsewhere for water.
- Areas without available water would be unused or used only when horses are required to trail extensive distances.
- Water developments can improve wild horse distribution.
- Distribution would vary by season, climatic conditions, and population.
- Snow can serve as a reliable winter water source for wild horses.
- Water development is not always beneficial because it can adversely affect seasonal distribution, rare plants, and cultural sites.
- Wild horse social band structure requires space.
- Climatic conditions in Colorado HMAs require access to cover.

- Fences and other disturbances can restrict wild horse movement and access.
- Fences are sometimes necessary to restrict horse distribution to areas inside HMAs or to protect sensitive resources within HMAs.
- Intensive livestock grazing management strategies (scheduled pasture rotation) that involve project infrastructure (fences) are not appropriate for wild horse management.
- HMAs should be designed to meet the four season habitat needs and allow for a self-sustaining herd at an appropriate management level.
- Areas outside HMAs have no forage allocated to wild horses and potential conflicts that have not been evaluated and addressed.
- The BLM has no authority to manage (except to remove) wild horses outside of HMAs.
- Wild horse gather operation scheduling is a product of a national priority process.
- Factors affecting gather priorities include determinations of excess horses and overpopulations, wild horse and range condition, funding, availability of contractors, adoption market, and long-term holding availability for unadoptable excess horses.
- Fertility control agents and sex ratio adjustments can aid in population control, but periodic gathers are still necessary to remove excess wild horses.
- The ability to implement fertility control independent of a gather operation varies by terrain and the ability of people to get in near enough to horses.

Implementing management actions for the following resources would have negligible or no impact on wild horse management and are therefore not discussed in detail: air quality, soundscapes, visual resources, and ACECs.

4.15.3 Direct and Indirect Impacts on Wild Horse Management

The impacts of GRSG management on wild horses are summarized in **Table 4.7**.

Impacts from Travel Management on Wild Horse Management

Restrictions on off-highway travel designed to protect GRSG habitat would also protect wild horse habitat but also may reduce some management options designed to benefit wild horses.

Table 4.7
Acreage by Wild Horse Management Unit and Alternative Affected by GRSG Management*

Wild Horse Management Unit	Total Acres (All Surface Ownership) *ADH (PHMA, GHMA, and LCHMA)*	Acres of PHMA (Alternative B and the Proposed LUPA) *PHMA only*	Acres of ADH (Alternatives A and C) *ADH (PHMA, GHMA, and LCHMA)*	Acres of Sagebrush within PHMA (Alternative D)
Sand Wash Basin HMA	158,200 (153,130) [2]	93,500 (91,100)	158,200 (153,100)	73,600 (71,500)
Outside Sand Wash Basin Common Use Area	210,301 (172,200)	76,779 (56,748)	210,301 (172,200)	62,107 (46,300)
Piceance East Douglas HMA	33,700 (16,400)	8,500 (3,200)	33,700 (16,400)	2,600 (1,200)
Outside Piceance East Douglas HMA	24,900 (18,800)	10,400 (6,900)	25,900 (18,800)	5,500 (4,400)
North Piceance Herd Area	21,900 (14,000)	0	21,900 (14,000)	0
West Douglas Herd Area	8,400 (7,500)	0	8,400 (7,500)	0
Outside West Douglas Herd Area Common Use Area	1,900 (40)	0	1,900 (40)	0
Bookcliffs HMA	0	0	0	0
Bookcliffs outside HMA Common Use Area	0	0	0	0
Total Area Affected	**459,400** **(382,000)**	**189,200** **(158,900)**	**459,400** **(382,900)**	**143,800** **(123,400)**

*Numbers in parentheses denote acres administered by the BLM; numbers not in parenthesis denote total of both acres administered by the BLM and acres not administered by the BLM.

Forage Availability

Restrictions on travel designed to protect GRSG habitat would also protect wild horse habitat as anthropogenic disturbance caused by OHV travel removes forage from the habitat. Restrictions on surface disturbance would maintain forage availability and would retain the ability to support the appropriate management level. These restrictions on travel may adversely affect management of horses by restricting access to construct or maintain range improvements and restrict areas where traps may be needed to remove horses.

Alternative A—fewest restrictions on surface disturbance would result in the least protection to wild horse ranges. Current travel management designations within the HMAs are not affecting enough acreage to substantially change the appropriate management level. The potential exists for travel development to become a larger factor in the future.

Alternative B—Increased off-highway travel restrictions on PHMA would benefit wild horse forage available. Limited travel restrictions on GHMA would also be beneficial. These travel restrictions may limit some wild horse management options.

Alternative C—The most travel restrictions in the largest acreage would have the most positive impact on forage availability. These same restrictions could result in the greatest restrictions on options to manage wild horses.

Alternative D—Moderate restrictions on sagebrush habitat in PHMA would offer limited protection from forage loss compared with Alternatives B and C. However the management of the anthropogenic disturbance cap would minimize this loss, and contain it at manageable level. Moderate restrictions on travel may result in limited management options for wild horses.

Proposed LUPA—Travel management would be the same as under Alternative D; impacts on wild horse management are the same as Alternative D.

Water Availability

Reductions in disruptive activity associated with off-highway travel and travel management would benefit wild horse access to water. Restrictions on travel designed to protect GRSG habitat would affect the ability to develop water sources and perform maintenance on water developments.

Alternative A—Fewest restrictions on off-highway travel would result in the most disruption to wild horses and their ability to obtain water, forage and cover.

Alternative B—Increased restrictions on travel in PHMA would reduce potential disruption to a limited degree. These restrictions may or may not restrict development and maintenance of water developments.

Alternative C—The most highly restrictive travel management on the largest acreage would have the most positive impact on wild horses by reducing disruption. This alternative could also result in the highest impacts on the development and maintenance of water developments.

Alternative D—Moderate travel restrictions on sagebrush habitat in PHMA could reduce disruptive activity. Moderate restrictions could restrict development and maintenance of water developments.

Proposed LUPA—Travel management would be the same as under Alternative D; impacts on wild horse management are the same as Alternative D.

Cover and Space Availability

Restrictions on off-highway travel could prohibit some types of authorizations (e.g., construction of fences) that might become obstacles to wild horse ability to seek appropriate habitat.

Alternative A—Fewest restrictions on off-highway travel would result in the most disruption to wild horses and their ability to seek appropriate habitat.

Alternative B—Increased restrictions on off-highway travel in PHMA may reduce disruption to a limited degree. These restrictions could result in disruptions to wild horses and their ability to seek appropriate habitat.

Alternative C—Most restrictions on the largest acreage would have the most positive impact on wild horses and their ability to seek appropriate habitat.

Alternative D—Moderate restrictions on off-highway travel in sagebrush habitat within PHMA could reduce disruptive activity. Moderate restrictions could result in disruptions to wild horses and their ability to seek appropriate habitat.

Proposed LUPA—Travel management would be the same as under Alternative D; impacts on wild horse management are the same as Alternative D.

Ability to Manage Wild Horses within Established Herd Management Areas

Impacts would be similar to the impacts discussed under *Water Availability*. Restrictions on off-highway travel could preclude the construction of fencing necessary to confine wild horses to HMAs.

Attempting to prevent overpopulation within HMAs and restrict horse distribution to HMAs would put areas outside GRSG habitat at risk for overpopulations. Methods to prevent overpopulation are through gather operations and fertility control, conducted on schedule and at the planned number of horses removed or gathered, and through establishing priority for gather operations in GRSG habitat. The Little Bookcliffs Wild Horse Range contains no habitat, while the North Piceance and West Douglas Herd Areas contain little habitat. These areas would be most at risk within the planning area.

Impacts from Recreation Management on Wild Horse Management

Restrictions on recreation that are designed to protect GRSG habitat would also protect wild horse habitat. Examples of recreation permits that could become obstacles; hunting guide permits or competitive event permits. With the current restrictions in place there seems to be little disturbance to wild horses from recreation. Future restrictions put on recreation could affect the public's ability to observe and study wild horses in their natural habitat. Much of the public observes wild horses as a form of recreation.

Forage Availability

Restrictions on recreation designed to protect GRSG habitat would also protect wild horse habitat by reducing disturbances that could reduce forage availability. Restrictions on surface disturbance would maintain forage availability and retain the ability to support the appropriate management level.

Alternative A—fewest restrictions on surface disturbance would result in the least protection to wild horse ranges.

Alternative B—Increased restrictions on PHMA would benefit wild horse forage availability. Limited restrictions on GHMA would also be beneficial.

Alternative C—Most restrictions to the largest acreage would have the most positive impact on forage availability. These same restrictions would have the greatest restrictions on individuals to observe wild horses.

Alternative D—Moderate restrictions on sagebrush habitat in PHMA would offer limited protection from forage loss compared with Alternatives B and C. However management of the anthropogenic disturbance cap would minimize any forage loss due to recreation.

Proposed LUPA—Recreation management would be the same as under Alternative D; impacts on wild horse management are the same as Alternative D.

Water Availability

Reductions in disruptive activity associated with recreation and recreation development would benefit wild horse access to water. Some recreation restricts or eliminates some water sources from wild horse use for short periods.

Alternative A—Fewest restrictions on recreation would likely result in the most disruption to the ability of wild horses to obtain water.

Alternative B—Increased restrictions on recreation development in PHMA would reduce potential disruption to a limited degree.

Alternative C—Most restrictions on the largest acreage would have the most positive impact on wild horse by reducing disruption.

Alternative D—Moderate restrictions on sagebrush habitat in PHMA could reduce disruptive activity.

Proposed LUPA—Recreation management would be the same as under Alternative D; impacts on wild horse management are the same as Alternative D.

Cover and Space Availability
Restrictions on recreational permits would preclude authorizations that might become obstacles to wild horse's ability to find cover and enough space to continue normal behavior.

Alternative A—Fewest restrictions on recreation would result in the most disruption to wild horses and the ability to seek cover and may restrict the availability of required space.

Alternative B—Increased restrictions on recreation in PHMA may reduce potential disruption to a limited degree. These restrictions may or may not result in disruptions to wild horses and the ability to seek cover and may restrict the availability of required space.

Alternative C—Most restrictions on the largest acreage would have the most positive impact on wild horse ability to seek cover and provide the space for a natural free roaming behavior within the HMAs.

Alternative D—Moderate restrictions on sagebrush habitat in PHMA could reduce disruptive activity. Moderate restrictions may or may not restrict development of water projects and maintenance on water developments.

Proposed LUPA—Recreation management would be the same as under Alternative D; impacts on wild horse management are the same as Alternative D.

Ability to Manage Wild Horses within Established Herd Management Areas
Protections afforded to GRSG under the varying alternatives would benefit wild horses whose HMAs overlap PHMA or GHMA.

Reliable Ability to Prevent Overpopulation in HMAs and Restrict Horse Distribution to HMAs
Establishment of priority for gather operations in GRSG habitat would put HMAs that do not contain PHMA (Spring Creek and Little Bookcliffs) at risk for overpopulations.

Impacts from Lands and Realty Management on Wild Horse Management
Protections afforded to GRSG under the varying alternatives would benefit wild horses whose HMAs overlap PHMA or GHMA. Restrictions on lands and realty designed to protect GRSG habitat would also protect wild horse habitat, but could reduce some management options that would benefit wild horses. Areas with high potential for lands and realty development would be most affected both adversely and beneficially.

Forage Availability
Restrictions on lands and realty designed to protect GRSG habitat would also protect wild horse habitat by reducing disturbance, which removes forage from

the habitat. Restrictions on surface disturbance would maintain forage availability, would help support the appropriate management level.

Alternative A—fewest restrictions on surface disturbance would result in the least protection to wild horse ranges.

Alternative B—Increased restrictions on PHMA would increase forage availability. Limited restrictions on GHMA would also be beneficial.

Alternative C—Most restrictions the largest acreage would result in the most forage availability.

Alternative D—Moderate restrictions on sagebrush habitat in PHMA would offer the limited protection from forage loss compared with Alternatives B and C. Restrictions on lands and reality development designed to protect GRSG habitat would also protect wild horse habitat by reducing disturbances, which could reduce forage availability.

Proposed LUPA—Impacts would be similar to those for Alternative D. However, the following additional restrictions on land use authorizations would be included under the Proposed LUPA:

- Managing both PHMA and GHMA as avoidance areas with exceptions for pending large transmission lines
- Prohibiting aboveground structures within 1 mile of active leks
- Restricting surface disturbance to 3 percent in PHMA

Impacts on wild horse and burro management are similar to those described for Alternative D, with slightly greater benefits for all indicators described below. This is because of increased restrictions on disturbance and disruption.

Water Availability

Reductions in disruptive activity associated with lands and realty would benefit wild horse access to water.

Alternative A—Fewest restrictions on lands and realty would result in the most disruption to wild horses and their ability to obtain appropriate habitat.

Alternative B—Increased restrictions on lands and realty development in PHMA would reduce potential disruption to a limited degree.

Alternative C—Most restrictions on the largest acreage would have the greatest positive impact on wild horse by reducing disruption.

Alternative D—Moderate restrictions on sagebrush habitat in PHMA would result in the least reduction in disruptive activity.

Proposed LUPA—See forage availability, above.

Cover and Space Availability
Restrictions on lands and realty designed to protect GRSG habitat would also protect wild horse habitat. Disturbances would be reduced allowing wild horses the ability to seek natural habitat.

Alternative A—Fewest restrictions on Lands and Realty would result in the most disruption to wild horses may impact their ability to find appropriate habitat.

Alternative B—Increased restrictions on Lands and Realty in PHMA may reduce potential disruption. These restrictions may or may not improve the horse's ability to find appropriate habitat.

Alternative C—Most restrictions on the largest acreage would have the most positive impact on the horse's ability to seek appropriate habitat.

Alternative D—Moderate restrictions on sagebrush habitat in PHMA could reduce disruptive activity. Moderate restrictions may or may not restrict development of water projects and maintenance on water developments.

Proposed LUPA—See forage availability, above.

Ability to Manage Wild Horses within Established Herd Management Areas
Protections afforded to GRSG under the varying alternatives would benefit wild horses whose HMAs overlap PHMA or GHMA.

Reliable Ability to Prevent Overpopulation in HMAs and Restrict Horse Distribution to HMAs
Occasionally high levels of lands and realty activities conflicts with BLM wild horse operations. This activity can affect options such as access to preferred trap site locations. While this situation could vary somewhat by alternative the conflict only occurs in localized situations. More restrictive alternatives would theoretically reduce this potential conflict, but the conflict would most like arise from existing operations associated with valid existing rights.

Impacts from Wind Energy Development on Wild Horse Management
Restrictions on wind energy development designed to protect GRSG habitat would also protect wild horse habitat. Protections afforded to GRSG under the varying alternatives would benefit wild horses whose HMAs overlap PHMA or GHMA.

Forage Availability
Restrictions on Wind Energy Development designed to protect GRSG habitat would also protect wild horse habitat because of reductions in anthropogenic disturbance that removes forage from the habitat. Restrictions on surface

disturbance would maintain forage availability, and retain the ability to support the appropriate management level. This loss would be short term in any one location, but could be cumulative in some areas.

Alternative A—fewest restrictions on surface disturbance would result in the least protection to wild horse ranges. Wind energy development operations are not currently affecting enough acreage to substantially alter forage availability. The potential exists for wind energy development to become a larger factor in the future.

Alternative B—Without a proposed action the result would be the same as no action.

Alternative C—Most restrictions on disturbance would have the most positive impact on wild horse forage availability.

Alternative D—Without a proposed action the result would be the same as no action.

Proposed LUPA—Wind energy development would be excluded from PHMA; impacts on wild horse management therefore would be similar to those under Alternative C for all indicators. The impact on terrestrial wildlife from restrictions on wind energy development are not expected to vary between alternatives. This is because the potential for wind energy in northwest Colorado is very limited.

Water Availability

Restrictions on Wind Energy Development designed to protect GRSG habitat may affect the ability to develop water. However reductions in disruptive activity associated with wind energy development would benefit wild horse access to water, and would improve distribution. In most cases wild horses tend to acclimate to this type of disturbance, this disruptive reduction would be short term.

Alternative A—Fewest restrictions on surface disturbance would result in the most disruption to wild horses.

Alternative B—Without a proposed action the result would be the same as no action.

Alternative C—Most restrictions on the ADH would have the most positive impact on wild horses by reducing disruption.

Alternative D—Without a proposed action the result would be the same as no action.

Proposed LUPA—See *Forage Availability*, above.

Cover and Space Availability
Disruptive activates associated with Wind Energy Development may affect the horse's ability to seek appropriate habitat.

Ability to Manage Wild Horses within Established Herd Management Areas
The disruptive activity associated with wind energy development within HMAs may result in movement of horses away from home range within the HMAs. Once horses move they sometimes relocate outside HMAs. There would be a decrease in the avoidance behavior of wild horses to human presence, vehicles, structures, and other project components as wind energy is developed.

Reliable Ability to Prevent Overpopulation in HMAs and Restrict Horse Distribution to HMAs
Occasionally high levels of wind energy activities have the potential for conflicts with BLM implementation of population control activities.

Impacts from Industrial Solar Development on Wild Horse Management
Impacts from management of industrial solar would be the same as the impacts described in the impacts from management of wind energy development on wild horse management.

Impacts from Range Management on Wild Horse Management
Restrictions on range management designed to protect GRSG habitat would also protect wild horse habitat, while reducing some management options designed to benefit wild horses. Areas with high need for livestock grazing developments could be adversely affected by restrictions. These restrictions would be affected both adversely and beneficially. Projects that restrict free movement of horses via fences are adverse, and projects that enhance forage and water availability production are beneficial.

Forage Availability
Restrictions on livestock grazing designed to protect GRSG habitat would also protect wild horse habitat because of reductions in anthropogenic disturbance that removes forage from the habitat. Restrictions on surface disturbance would maintain forage availability and retain the ability to support the appropriate management level.

Alternative A—Fewest restrictions on surface disturbance would result in the least protection to wild horse ranges.

Alternative B—Limited restrictions on disturbance would have limited protection of forage availability.

Alternative C—More restrictions on disturbance would have a more positive impact on wild horse forage availability.

Alternative D—Most restrictions on disturbance would have the most positive impact on wild horse forage availability.

Proposed LUPA—Solar energy development would be excluded from PHMA; impacts on wild horse management therefore would be similar to those under Alternative C for all indicators. The impact on terrestrial wildlife from restrictions on solar energy development are not expected to vary between alternatives. This is because the potential for solar energy in northwest Colorado is very limited.

Water Availability

Restrictions on Range designed to protect GRSG habitat may affect the ability to develop water. However reductions in disruptive activity associated with livestock grazing would benefit wild horse access to water.

Alternative A—Fewest restrictions on surface disturbance would result in the least protection to wild horse ranges.

Alternative B—Limited restrictions on disturbance would have limited protection of water availability.

Alternative C—More restrictions on disturbance would have a more positive impact on wild horse water availability.

Alternative D—Most restrictions on disturbance would have the most positive impact on wild horse water availability.

Proposed LUPA—See *Forage Availability*, above.

Cover and Space Availability

Disruptive activities associated with range management may affect the horses' ability to seek appropriate habitat. Restrictions on livestock grazing activities could preclude installation of barriers that restrict wild horse access to HMA acreage.

Ability to Manage Wild Horses within Established Herd Management Areas

The disruptive activity associated with livestock grazing sometimes results in movement of horses away from home range within the HMAs. Horses may relocate outside HMAs.

Reliable Ability to Prevent Overpopulation in HMAs and Restrict Horse Distribution to HMAs

More restrictive alternatives would theoretically reduce this potential conflict, but the conflict would most likely arise from existing operations associated with valid existing rights.

Impacts from Fluid Minerals Management on Wild Horse Management

Restrictions on fluid minerals designed to protect GRSG habitat would also protect wild horse habitat, while reducing some management options designed to benefit wild horses. Areas with high potential for fluid mineral development would be most affected both adversely and beneficially.

Forage Availability

Restrictions on fluid minerals designed to protect GRSG habitat would also protect wild horse habitat because of reductions in anthropogenic disturbance that removes forage from the habitat. Restrictions on surface disturbance would help maintain forage availability and would retain the ability to support the appropriate management level.

Alternative A—fewest restrictions on surface disturbance would result in the least protection to wild horse ranges. Fluid mineral operation is not currently affecting enough acreage to substantially alter the appropriate management level. The potential exists for energy development to become a larger factor in the future especially in the Piceance East Douglas HMA. The acreage affected would be the same as Alternative C, but the restrictions on that acreage are much less.

Alternative B—Increased restrictions on PHMA would benefit wild horse forage available. Limited restrictions on GHMA would also be beneficial.

Alternative C—Most restrictions on the largest acreage would have the most positive impact on wild horse forage availability.

Alternative D—Moderate restrictions on sagebrush habitat in PHMA would offer the limited protection from forage loss compared with Alternatives B and C. However the management of the anthropogenic disturbance cap would minimize this loss.

Proposed LUPA—Restrictions on fluid mineral development would be similar to those under Alternative B; impacts on wild horse management are similar to those under Alternative B for all indicators.

Water Availability

Restrictions on fluid minerals designed to protect GRSG habitat would not affect the ability to develop water. However reductions in disruptive activity associated with energy development would benefit wild horse access to water and would improve distribution.

Alternative A—Fewest restrictions on surface disturbance would result in the most disruption to wild horses.

Alternative B—Increased restrictions in PHMA would reduce potential disruption to a limited degree.

Alternative C—Most restrictions on the largest acreage would have the most positive impact on wild horse reducing disruption.

Alternative D—Moderate restrictions on sagebrush habitat in PHMA could reduce disruptive activity.

Proposed LUPA—See *Forage Availability*, above.

Cover and Space Availability
Disruptive activities associated with fluid minerals development could affect wild horses from seeking appropriate habitat. Restrictions placed on fluid minerals development would protect needed cover and space. Under all of the action alternatives, many activities considered disruptive to wild horses would be restricted, and therefore the disruption to wild horses would be reduced under those alternatives.

Ability to Manage Wild Horses within Established Herd Management Areas
The disruptive activity associated with fluid minerals sometimes results in movement of horses away from their home ranges. Horses may relocate outside HMAs.

Reliable Ability to Prevent Overpopulation in HMAs and Restrict Horse Distribution to HMAs
Occasionally high levels of fluid mineral activities conflicts with BLM gather operations. This activity can affect options such as access to preferred trap site locations. More restrictive alternatives would theoretically reduce this potential conflict.

Impacts from Solid Minerals–Coal Management on Wild Horse Management

Restrictions on solid minerals-coal designed to protect GRSG habitat would also protect wild horse habitat. Areas with high potential for solid minerals-coal development would be most affected both adversely and beneficially.

Forage Availability
Restrictions on solid minerals-coal designed to protect GRSG habitat would also protect wild horse habitat because of reductions in anthropogenic disturbance that removes forage from the habitat. Restrictions on surface disturbance would maintain forage availability and would retain the ability to support the appropriate management level.

Alternative A—fewest restrictions on surface disturbance would result in the least protection to wild horse ranges. Solid minerals-coal operation is not currently affecting enough acreage to substantially alter the appropriate management level.

Alternative B—Increased restrictions on PHMA would benefit wild horse forage available. Limited restrictions on GHMA would also be beneficial.

Alternative C—Most restrictions the largest acreage would have the most positive impact on wild horse forage availability.

Alternative D—Moderate restrictions on sagebrush habitat in PHMA would offer the limited protection from forage loss compared with Alternatives B and C. However, the management of the anthropogenic disturbance cap would minimize this loss and would contain it at manageable level.

Proposed LUPA—Impacts on wild horse management from solid mineral management would be similar to those under Alternative D for all indicators.

Water Availability

Restrictions on solid minerals-coal designed to protect GRSG habitat would not affect the ability to develop water. However reductions in disruptive activity associated with solid minerals-coal development would benefit wild horse access to water, and would improve distribution.

Alternative A—Fewest restrictions on surface disturbance would result in the most disruption to wild horses.

Alternative B—Increased restrictions in PHMA would reduce potential disruption to a limited degree.

Alternative C—Most restrictions on the largest acreage would have the most positive impact on wild horse reducing disruption.

Alternative D—Moderate restrictions on sagebrush habitat in PHMA could reduce disruptive activity.

Proposed LUPA—See forage availability, above.

Cover and Space Availability

Disruptive activities associated with solid minerals-coal minerals development would affect cover and space in the same manner described for water availability. Restrictions on fluid mineral activities could preclude installation of barriers that restrict wild horse access to HMA acreage.

Ability to Manage Wild Horses within Established Herd Management Areas

The disruptive activity associated with solid minerals-coal sometimes results in movement of horses away from their home ranges. Once horses move they sometimes relocate outside HMAs.

Reliable Ability to Prevent Overpopulation in HMAs and Restrict Horse Distribution to HMAs

Occasionally high levels of coal mining activities conflict with BLM gather operations. This activity can affect options such as access to preferred trap site locations. More restrictive alternatives would theoretically reduce this potential conflict.

Impacts from Locatable Minerals Management on Wild Horse Management

Restrictions on locatable minerals designed to protect GRSG habitat would also protect wild horse habitat. All impacts from locatable minerals would be the same as the impacts described under *Impacts from Management of Solid Minerals (Coal) on Wild Horse Management*.

Impacts from Nonenergy Leasable Materials Management on Wild Horse Management

Restrictions on nonenergy leasable materials designed to protect GRSG habitat would also protect wild horse habitat. All impacts from management of nonenergy leasable minerals would be the same as the impacts described under *Impacts from Management of Solid Minerals (Coal) on Wild Horse Management*.

Impacts from Salable Minerals Management on Wild Horse Management

Restrictions on salable materials designed to protect GRSG habitat would also protect wild horse habitat. All impacts from management of salable minerals would be the same as the impacts described under *Impacts from Management of Solid Minerals (Coal) on Wild Horse Management*.

Impacts from Fuels Management on Wild Horse Management

Restrictions on Fuels Management designed to protect GRSG habitat would in most cases protect wild horse habitat. Reseeding projects that plan on limiting grazing by livestock and wild horses for specific time frames could reduce available lands within HMAs. Closures within HMAs would remove forage, may restrict available waters, prevent natural movement and restrict migration routes, and prevent wild horses from seeking cover. Planned fires have the potential to displace wild horses outside of the HMAs.

Forage Availability

Restrictions on Fuels Management designed to protect GRSG habitat would also protect wild horse habitat. Areas of prescribed burns may temporarily reduce available forage. Actions that increase shrubs or pinyon-juniper are adverse; actions that increase grasses and forbs are beneficial.

Alternative A—fewest restrictions on surface disturbance would result in the least protection to wild horse ranges.

Alternative B—Increased restrictions on PHMA would benefit wild horse forage available. Limited restrictions on GHMA would also be beneficial.

Alternative C—Most restrictions the largest acreage would have the most positive impact on wild horse forage availability.

Alternative D—Moderate restrictions on sagebrush habitat in PHMA would offer the limited protection from forage loss compared with Alternatives B and C.

Proposed LUPA—Management of fuels would be the same as under Alternative D. Impacts from fuels management on wild horse management are therefore also the same as under Alternative D for all indicators.

Water Availability

Some restrictions on Fuels Management projects designed to protect or increase GRSG habitat may restrict available waters for wild horses. Restricting access to treated and reseeded areas from livestock and wild horse use may eliminate critical available waters from use.

Alternative A—Fewest restrictions on surface disturbance would result in the most disruption to wild horses.

Alternative B—Increased restrictions in PHMA would reduce potential disruption to a limited degree.

Alternative C—Most restrictions on the largest acreage would have the most positive impact on wild horse reducing disruption.

Alternative D—Moderate restrictions on sagebrush habitat in PHMA could reduce disruptive activity.

Proposed LUPA—See *Forage Availability*, above.

Cover and Space Availability

Disruptive activities associated with fuels management such as prescribed burns and reseeding projects may prevent wild horses from seeking appropriate habitat.

Ability to Manage Wild Horses within Established Herd Management Areas

The disruptive activity associated with fuels management sometimes results in movement of horses away from home ranges. Horses may relocate outside of their HMA. This situation would occur by alternative in the same manner described under *Water Availability*.

Reliable Ability to Prevent Overpopulation in HMAs and Restrict Horse Distribution to HMAs

Occasionally, high levels of fuels management activities conflicts with BLM gather operations. This activity can affect options such as access to preferred trap site locations. While this situation could vary somewhat by alternative the conflict

only occurs in localized situations. More restrictive alternatives would theoretically reduce this potential conflict.

Impacts from Fire Operations on Wild Horse Management

Managing fire operations to maintain and enhance large blocks of continuous sagebrush habitat would also protect habitat for wild horses.

Forage Availability

Priorities on fire operations designed to protect GRSG habitat would also protect wild horse habitat. Areas of prescribed burns may temporarily reduce available forage. Juniper encroachment is adverse; actions that increase grasses and forbs are beneficial.

Alternative A—fewest restrictions on surface disturbance and fire suppression priorities would result in the least protection to wild horse ranges.

Alternative B—Increased fire suppression on PHMA would benefit wild horse forage habitat. Prioritizing GHMA that threatens PHMA would also protect wild horse habitat.

Alternative C—Same as Alternative B.

Alternative D—Alternative D would allow the potential for same actions as Alternative A while allowing for consideration of other resource priorities. After firefighter and public safety, Alternative D would give priority to fire operations in PHMA and GHMA, unless site-specific conditions warrant an exception.

Proposed LUPA—Management of wildfire suppression fuels and fire rehabilitation would be the same as under Alternative D. Impacts from the Proposed LUPA, therefore, are also the same as those for Alternative D, for all indicators.

Water Availability

Priorities on Fire Operations designed to protect or increase GRSG habitat may also protect access to available waters.

Alternative A—fewest restrictions on surface disturbance and fire suppression priorities would result in the least protection to wild horse ranges.

Alternative B—Increased fire suppression on PHMA may benefit wild horse water availability. Prioritizing GHMA that threatens PHMA may also protect wild horse water availability.

Alternative C—Same as Alternative B.

Alternative D—Would allow the potential for same actions as Alternative A while allowing for consideration of other resource priorities.

Proposed LUPA—See forage availability, above.

Cover and Space Availability
Prioritizing fire operation suppression for GRSG habitat has the potential of sacrificing important cover for wild horses if that cover is outside of GRSG habitat. Also if large areas within HMAs are allowed to burn because they are not priority suppression areas may leave wild horses without the space needed for normal behavior within HMAs. Alternative D would allow resources to prioritize suppression.

Ability to Manage Wild Horses within Established Herd Management Areas
Any fire or fire suppression activity has the potential to displace wild horses outside of HMAs.

Reliable Ability to Prevent Overpopulation in HMAs and Restrict Horse Distribution to HMAs
Any fire or fire suppression activity within HMAs may lead to emergency gathers of wild horses.

Impacts from Emergency Stabilization and Response on Wild Horse Management
ESR operations designed to restore GRSG habitat post-wildfire would also restore wild horse habitat.

Forage Availability
ESR operations designed to restore GRSG habitat post-fire would also restore wild horse habitat.

Alternative A—Without ESR plans to stabilize and rehabilitate habitat post-wildfire would have the longest and most negative impact on wild horse available forage.

Alternative B—ESR operation plans to restore GRSG habitat would also restore habitat for wild horses.

Alternative C—Same as Alternative B.

Alternative D—Would allow the potential for same actions as Alternative A while allowing for consideration of other resource priorities.

Proposed LUPA—Management of ESR would be the same as under Alternative D. Impacts from the Proposed LUPA are also the same as those under Alternative D, for all indicators.

Water Availability
ESR plans to restore areas of habitat for GRSG and excluding grazing by fencing out livestock may fence wild horses out of critical available waters.

Alternative A—fewest restrictions on area closures would have the least restrictions on wild horses access to water.

Alternative B—Closures of areas to all grazing after fires may require gathering and removing wild horse from areas for an undermined duration before releasing them back into the closed area.

Alternative C—Same as Alternative B.

Alternative D—Same as Alternative B.

Proposed LUPA—See *Forage Availability*, above.

Cover and Space Availability
The closure of areas for grazing after fire events by fencing may reduce availability of appropriate habitat.

Ability to Manage Wild Horses within Established Herd Management Areas
Required removal of all grazing animals from areas may also require the partial or total removal of wild horses from the HMA.

Reliable Ability to Prevent Overpopulation in HMAs and Restrict Horse Distribution to HMAs
Disturbances from ESR activities could interfere with gather or fertility control operations, if those ESR activities were to take place simultaneously as planned gathers or fertility control operations.

Impacts from Habitat Restoration on Wild Horse Management
The impacts of habitat restoration would be the same as the impacts described above under *Impacts from ESR on Wild Horse Management*.

4.15.4 Summary of Impacts on Wild Horse Management

Alternative A provides the most opportunity for development and land uses. It puts very few restrictions on development, which could result in the most development and human activity on the landscape and, consequently, the most impacts on wild horses. Alternative A would provide the most flexibility in managing wild horses.

Alternative B provides a greater level of protection for wild horses than Alternative A but less protection than Alternative C. Alternative B would also prioritize wild horse gathers in PHMA, which could negatively impact herd areas and HMAs that are not within habitat and could hamstring flexibility in managing wild horses.

Alternative C would place the most restrictions on development, recreation, and travel and transportation. It would benefit horses the most due to an

expected decrease in human activity and therefore a decrease in disruptions to wild horses.

Alternative D would be more beneficial for wild horses than Alternative A but less beneficial than Alternatives B and C. More flexibility for development is built into Alternative D, which could result in higher levels of development and associated disruption of horses than Alternatives B and C.

Proposed LUPA—Impacts from the Proposed LUPA on wild horse management are similar to those for Alternative D.

4.16 SPECIAL DESIGNATIONS

4.16.1 Areas of Critical Environmental Concern

General Description

This analysis identifies impacts of proposed management decisions for other resources and resource uses to prevent irreparable damage to the values associated with each ACEC. It also discusses the impacts on existing ACECs from proposed management actions that would designate a new GRSG habitat ACEC in PHMA.

The analysis of impacts on ACECs is necessarily an analysis of impacts on the relevant and important values that are given special management attention through the designation of ACECs. A complete evaluation of impacts on these values is incorporated into the appropriate impact analysis sections addressing Fish and Wildlife (**Section 4.3**), Special Status Species (**Section 4.4**), Vegetation Management (**Section 4.6**), Soil and Water Resources (**Section 4.16**), Visual Resources (**Section 4.19**), Cultural Resources (**Section 4.22**), and Paleontological Resources (**Section 4.23**).

Rather than reiterating those discussions here, the impacts analysis for ACECs focuses on how proposed management decisions would interact with the management decisions in place for ACECs. Focusing on how proposed management decisions interact with existing management decisions is appropriate and necessary since, in order to be designated as an ACEC, "an area must require special management attention to protect the important and relevant values" (BLM 1988).

The degree to which a proposed management decision would affect a particular ACEC depends largely on the extent of the area that would be subject to those decisions. Since ACECs have been designated for a variety of reasons, there are some that are completely within PHMA and others that have minimal overlap. **Table 3.62** identifies the extent of overlap with GRSG habitat types for each ACEC in the GRSG habitat decision area.

Methodology and Assumptions

General Impacts on ACECs

Indicators of impacts on ACECs and the measurements used to describe the impacts (where available or appropriate) are described below.

- Degradation of relevant and important values included in ACEC designations
  - Plant communities—Important biologically diverse plant communities; listed, candidate, and proposed plant species; BLM and Forest Service sensitive plant species; remnant vegetation associations; riparian habitats; rare plants
  - Wildlife—Bald eagle roosts; critical habitat for Colorado pikeminnow; Colorado River cutthroat trout habitat; peregrine falcon nests
  - Cultural resources
  - Paleontological resources
  - Soil resources—fragile soils, erosive soils
  - Scenic values
  - Natural processes
- Threat of irreparable harm to the relevant and important values

Indicators of beneficial impacts on ACECs are reduced risk of degradation and irreparable harm to relevant and important values, as described above.

Assumptions

The analysis is based on the following assumptions:

- The relevant and important values for which an ACEC was designated are not necessarily uniformly distributed across the entire ACEC.
- Management actions designed to protect GRSG habitat by reducing surface disturbance and human activity would benefit those relevant and important values that also occur within sagebrush communities.
- Not all relevant and important values within an ACEC have the same level of protection due to variation in specific management decisions. This is the case both within an individual LUP and among different LUPs. Management actions designed to protect GRSG habitat by reducing surface disturbance and human activity may result in impacts on relevant and important values that occur outside of sagebrush communities. This could come about in two ways: if the activity shifts to locations outside of sagebrush

communities, or if those values that occur outside of sagebrush communities either do not have specific management decisions or protections identified in existing LUPs or those decisions allow for some level of impact on those values.

- The designation of an ACEC does not prevent appropriate land uses so long as they are not detrimental to the relevant and important values.
- Proposed management decisions would not replace existing decisions that are more restrictive.
- Designation of all PHMA as the GRSG habitat ACEC would not replace existing ACEC designations; GRSG habitat would be added to existing ACECs as another reason for designation and special management attention.

Direct and Indirect Impacts on ACECs and Zoological Areas

Impacts from Travel Management on ACECs and Zoological Areas

Degradation of and Irreparable Harm to Relevant and Important Values of the ACECs

Many of the relevant and important values within ACECs are sensitive to increased human visitation to an area (e.g., wildlife habitat and cultural resources), noxious weeds (e.g., wildlife and special status plant habitats), and fugitive dust (e.g., special status plant habitats). The extent of negative impacts depends on the location of the road networks, the level and season of use, and the road surface type.

Alternative A—The ACECs that are currently managed with designated routes year-round are Blacks Gulch, Deer Gulch, Raven Ridge, South Cathedral Bluffs, and Yanks Gulch/Upper Greasewood Creek. The assumption is that proposed management decisions would not replace existing decisions that are more restrictive and that ACECs that are currently closed to motorized vehicles would remain closed (e.g., Bull Gulch and Moosehead Mountain).

Alternative B—Alternatives B, C, and D would limit motorized travel to existing roads within PHMA; this would not change management direction for those ACECs that are currently managed with designated routes year-round, but it would increase protection for those ACECs that currently lack such restrictions (e.g., approximately 800 acres of PHMA in East Douglas Creek) by decreasing impacts associated with off-road travel. New route construction would also be limited under Alternatives B, C, and D, but to different degrees. Alternative B would limit route construction to realignments of existing designated routes within PHMA. This would increase protection for approximately 5,000 acres within the seven ACECs that contain PHMA and would allow motorized vehicles (see **Table 3.62**).

Alternative C—This would limit new route construction within ADH, which would apply to approximately 24,300 acres within the 15 ACECs that allow motorized vehicles (see **Table 3.62**). Restrictions on upgrading existing routes and limiting route construction within GRSG habitat would be beneficial for those relevant and important values that occur within GRSG habitat. However, it is possible that restrictions on road development in GRSG habitat may result in routing roads through non-sagebrush habitat.

The following ACECs have substantial acreage of non-sagebrush vegetation types in GRSG habitat; they are most likely to be affected by routing roads through non-sagebrush habitat: Trapper/Northwater Creek, East Fork Parachute Creek, Yanks Gulch/Upper Greasewood Creek, and Deer Gulch. This could increase impacts, such as habitat loss, increased spread of noxious weeds, and fugitive dust, on relevant and important values that do not occur exclusively in sagebrush vegetation types (e.g., special status plant species and remnant vegetation associations).

Alternative D—Impacts from Alternative D would be similar to Alternative B in that Alternative D limits new route construction within PHMA. However, it is less restrictive than Alternative B because it would allow for up to 5 percent of a Colorado MZ to be impacted by surface disturbance (compared to only 3 percent in Alternative B).

Proposed LUPA—Impacts from travel management would be similar to those under Alternative B because disturbance would be capped at 3 percent.

Impacts from Recreation Management on ACECs and Zoological Areas

<u>Degradation of and Irreparable Harm to Relevant and Important Values of the ACECs</u>

Many of the relevant and important values within ACECs are sensitive to increased human visitation to an area (e.g., wildlife habitat and cultural resources) and noxious weeds (e.g., wildlife and special status plant habitats). The extent of negative impacts depends on the type of recreation (motorized versus nonmotorized), the location of use, the season of use, and the number of participants.

Alternative A—SRPs within ACECs are currently issued on a case-by-case basis under Alternative A, which is the least restrictive of all the alternatives.

Alternative B—This would allow SRPs in PHMA only if they have neutral or beneficial impacts on PHMA areas. This could restrict the number of SRPs that are issued within the seven ACECs that contain PHMA and could reduce impacts associated with human visitation.

Alternative C—This would manage SRPs the same as Alternative B. In addition, camping and nonmotorized recreation would be seasonally prohibited within 4

miles of active GRSG leks, which could push recreationists to use other sites. The extent of any impact associated with displacing recreationists from preferred sites depends on the level of use by recreationists, whether they relocate to another campsite within the ACEC, and the time of year they want to camp. In offices where ACECs are not the focus of recreation or where fall big game hunting is the primary recreation (e.g., the WRFO), there would be no impacts.

Alternative D—This is similar to Alternative B but would allow SRPs, so long as they would not adversely affect GRSG populations due to habitat loss or disruptive activities. More SRPs would likely be issued in PHMA under Alternative D than Alternative B, which could result in increased impacts associated with human visitation.

Proposed LUPA—Impacts from recreation management are the same as those for Alternative D.

Impacts from Lands and Realty Management on ACECs/Zoological Areas

ROW grants may be issued for either commercial or residential users and can include such linear features as roads, pipelines, and power lines, as well as nonlinear facilities, such as gas plants, communication sites, and well pads. Wind energy and solar facilities are also types of ROW grants.

Degradation of and Irreparable Harm to Relevant and Important Values of the ACECs

Many of the relevant and important values within ACECs are sensitive to increased human visitation (e.g., wildlife habitat and cultural resources). Initial installation of ROWs typically involves surface disturbance, which can increase erosion, spread noxious weeds, and generate fugitive dust. These can negatively impact such values as wildlife and special status plant habitats. The extent of impacts associated with each ROW varies widely, depending on such factors as the amount of initial surface disturbance associated with a site, the length of time required for construction, the amount of activity required for routine operations, maintenance requirements, and proximity to other infrastructure.

Alternative A—Some of the ACECs are currently managed as ROW exclusion areas—Blacks Gulch, Bull Gulch, Irish Canyon, Moosehead Mountain, South Cathedral Bluffs, and Raven Ridge. The assumption is that these management decisions would remain in place regardless of which decisions were adopted under this planning effort. Other ACECs are currently managed as ROW avoidance areas—Blue Hill, Deer Gulch, East Douglas Creek, White River Riparian, and Yanks Gulch/Upper Greasewood Creek. The assumption is that the most protective management decision would be applied. The Kremmling Cretaceous Ammonite, North Park Natural Area, Anvil Points, and East Fork of Parachute Creek ACECs currently do not have specific decisions restricting placement of ROWs.

Alternative B—Approximately 800 acres (2 percent) of the East Douglas Creek ACEC, which is currently managed as an avoidance area, would receive increased protection if PHs were managed as ROW exclusion areas. Since the Kremmling Cretaceous Ammonite and North Park Natural Area ACECs are entirely within PHMA, these ACECs would receive a substantial increase in protection as they would be managed as exclusion areas.

Alternative C—Alternative C would manage ADH as ROW exclusion areas, which would provide increased protection for approximately 16,700 acres within the 10 ACECs that are currently not managed as exclusion areas. The Deer Gulch and Yanks Gulch/Upper Greasewood Creek ACECs would receive the greatest increase in protection under Alternative C. This is because over 90 percent of both of these ACECs is mapped as ADH. However, there may be increased pressure to approve ROWs for linear features, such as pipelines and power lines, within portions of ACECs that fall outside of GRSG habitat and that are currently managed as avoidance areas (e.g., East Douglas Creek and White River Riparian). This is because exclusion areas are "not available for location of ROWs under any conditions" and avoidance areas are "areas to be avoided but may be available for location of ROWs with special stipulations" (*BLM Land Use Planning Handbook* H-1601-1). Locating ROWs in these areas to avoid GRSG habitat could impact habitat for bald eagles and Colorado River cutthroat trout.

The proposed management decision to prohibit industrial solar projects in ACECs would be consistent with the October 2012 ROD for the Solar Programmatic EIS, which amended all of the LUPs in the planning area to state that all lands would be excluded from utility-scale solar development (20 megawatts or greater).

Proposed decisions that would prohibit siting wind energy developments within occupied habitat or within 5 miles of active GRSG leks would provide increased protection of resources that occur within these areas. It would accomplish this by limiting both direct and indirect habitat loss and human activity. Most of the ACECs are currently managed as ROW exclusion or avoidance areas, and these management decisions would have no impact on management of those resources. However, this decision would provide increased protection for the Kremmling Cretaceous Ammonite, North Park Natural Area, Anvil Points, and East Fork of Parachute Creek ACECs. This is because these areas currently do not have specific decisions restricting placement of ROWs and occur either wholly or partially within ADH.

Alternative D—Alternative D would manage PHMA as avoidance areas. The Kremmling Cretaceous Ammonite and North Park Natural Area ACECs currently do not have specific decisions restricting placement of ROWs. Both of these ACECs are wholly within GRSG PHMA and would receive increased protection from proposed management decisions under Alternative D to

manage PHMA as avoidance areas; however, this protection would be less than Alternative B's proposal to manage these same areas as exclusion areas.

Proposed LUPA—In addition to managing PHMA for avoidance, all PHMA and GHMA would be managed as ROW avoidance. Additionally, under the Proposed LUPA, no aboveground structures would be authorized within 1 mile of active leks. The Proposed LUPA would provide greater protections for ACEC values than Alternative D.

Land Tenure Adjustments May Transfer Important Resources Outside of Federal Management

The ACECs and their relevant and important values receive additional protection under federal management compared to the protections on private land afforded by law. Through the land use planning process, the BLM and Forest Service may place restrictions on travel management, mineral development, and placement of ROWs. During a site-specific NEPA review of a proposal, additional mitigation may also be required to further minimize impacts.

Alternative A—In the GJFO, KFO, and LSFO, parcels to be included in land exchanges are evaluated on a case-by-case basis. Within the CRVFO, the Trapper/Northwater Creek ACEC and East Fork Parachute Creek ACEC atop the Roan Plateau would be retained. In the WRFO, all ACECs are identified as Category III lands to be retained in federal ownership.

Alternative B—Alternatives B, C, and D would retain PHMA in federal ownership. This may provide additional protection to those seven ACECs that contain PHMA, although in practice, it is highly unlikely that ACECs would be proposed for disposal after review of site-specific proposals.

Alternative C—This would be the same as Alternative B.

Alternative D—This is similar to Alternatives B and C, but it would allow for the disposal of isolated federal parcels that are not capable of altering GRSG populations. This management is less restrictive than Alternatives B and C; however, in practice it is highly unlikely that portions of an ACEC would be proposed for disposal after review of site-specific proposals. Relevant and important values would be prioritized for protection and retention, regardless of whether they overlap GRSG habitat.

Proposed LUPA—Management of the lands program, specifically land tenure adjustments, would be the same under the Proposed LUPA as under Alternative D; impacts are therefore the same as those under Alternative D.

Alternative A—The Colorado River Valley, Grand Junction, Kremmling, and Little Snake RMPs have no similar action. There are some existing withdrawals and reserves within the WRFO that limit the availability of lands for entry.

Alternative B—Both Alternatives B and C propose lands within PHMA for mineral withdrawal. This would eliminate another source of surface disturbance and resultant impacts (e.g., increased erosion, spread of noxious weeds, and habitat loss) within ACECs that contain PHMA (i.e., Bull Gulch, Kremmling Cretaceous Ammonite, North Park Natural Area, Moosehead Mountain, East Douglas Creek, and South Cathedral Bluffs). There would be no change in management for the Irish Canyon ACEC since it is already proposed for mineral withdrawal. Alternative B would consider only other nonmineral withdrawals in PHMA if they were consistent with GRSG conservation. This would provide increased protection for those relevant and important values that occur within sagebrush communities in the seven ACECs with PHMA.

Alternative C—Alternative C is similar to Alternative B, except that nonmineral withdrawal proposals in ADH would be considered only if they were consistent with GRSG conservation. This would provide increased protection for those relevant and important values that occur in sagebrush communities within the 16 ACECs that have GRSG habitat.

Alternative D—Alternative D does not provide any direction for proposed land withdrawals.

Proposed LUPA—Management of the lands program, specifically land tenure adjustments, would be the same under the Proposed LUPA as under Alternative D; impacts are therefore the same as those under Alternative D.

Impacts from Range Management on ACECs/Zoological Areas

<u>Degradation of and Irreparable Harm to Relevant and Important Values of the ACECs</u>

Many of the relevant and important values within ACECs, including cultural resources, special status plants, and wildlife habitat, can be negatively impacted by livestock concentration areas, trailing, and trampling. The extent of negative impacts depends on the location of any areas of concentrated use (e.g., water developments and locations of mineral supplements), the season of use, the duration of use, the stocking rate, and the class of livestock.

Alternative A—GRSG are currently a BLM and Forest Service sensitive species. The influence of grazing operations on BLM Colorado Public Land Health Standard #4 are considered during site-specific NEPA reviews of grazing permits. For this reason, most of the proposed management decisions in Alternatives B, C, and D would have negligible influence on current management of ACECs. Specifically, these decisions are to consider specific GRSG habitat requirements when evaluating livestock grazing operations, to manage livestock use of riparian areas and wet meadows in the context of GRSG habitat, and to evaluate treatments to increase forage for livestock and wild ungulates in consideration of GRSG.

Alternative B (Livestock Grazing)—Alternative B would retire grazing privileges within ADH if the current permittee is willing to retire all or part of an allotment. The impacts associated with a retired grazing privilege would be the same as in Alternative C, which would exclude livestock grazing. However, due to the voluntary nature of the management proposed in Alternative B, the assumption is that a considerably smaller area of ADH would be removed from livestock grazing; thus, the scale of the change in management is substantially different between the two alternatives.

Alternative B (Range Improvements)—Designing structural range improvements and the location of supplements to "conserve, enhance, or restore GRSG habitat" would have negligible influence on the management of ACECs. Alternative B would authorize only new water developments from seeps or springs in PHMA if they would benefit GRSG. If there were inadequate distribution of livestock within an allotment or pasture due to the constraints of available water or topography, focusing solely on what may benefit GRSG could impact implementation of allotment management plans. It could also indirectly influence important values managed for in ACECs, such as special status plant species, other wildlife habitat, and remnant vegetation associations.

Alternative C (Livestock Grazing)—Alternative C would exclude livestock grazing from ADH. This would be a substantial change in management of those ACECs where most of the acreage is classified as GRSG habitat—East Fork Parachute Creek, Trapper/Northwater Creek, a portion of the Kremmling Cretaceous Ammonite, North Park Natural Area, Yanks Gulch/Upper Greasewood Creek, Moosehead Mountain, and Deer Gulch. Eliminating livestock grazing would remove impacts on cultural resources, special status plants, and wildlife habitat associated with livestock concentration areas, trailing, and trampling.

Alternative C (Range Improvements)—Avoiding all structural range developments, including fences and exclosures, within ADH could negatively impact management of ACECs. Fences and exclosures can be long-term cost-effective means of minimizing impacts from livestock grazing on important values within an ACEC. As such, other alternatives provide more flexibility for a site-specific analysis of all resources. For example, there is currently an exclosure within the Trapper/Northwater Creek ACEC that is used to manage livestock trailing damage to habitat for Colorado River cutthroat trout. Other possible reasons to use fences or exclosures within ACECs may be to minimize damage to important cultural sites or to special status plant habitats. The ACECs that would be influenced the greatest by this type of decision are those where ADH is most of the acreage within the ACEC (i.e., East Fork Parachute Creek, Trapper/Northwater Creek, Kremmling Cretaceous Ammonite, North Park Natural Area, Yanks Gulch/Upper Greasewood Creek, Moosehead Mountain, and Deer Gulch).

Alternative C would not permit the use of salt or supplements within occupied habitat or the creation of new water developments from spring or seep sources. Rather than abandon the use of mineral supplements or water developments, livestock operators would be forced to place these range improvements outside of ADH, which could result in a less efficient grazing management system. ACECs could be affected if they contain pastures that are both within and outside of GRSG habitat.

Alternative D (Livestock Grazing)—Alternative D is similar to Alternative B in that it relies on a permittee to voluntarily relinquish grazing preference. However, in contrast to Alternative B, which would retire those grazing privileges, Alternative D would consider converting them to reserve pastures (grass banks). This could help to meet resource objectives elsewhere and may benefit ACECs that require rest or deferment due to fire, reclamation, or habitat treatments. Alternative B would benefit only ACECs if those areas that were retired from livestock grazing were within the ACEC; however, Alternative D could provide benefit to numerous ACECs over the long term.

Alternative D (Range Improvements)—Alternative D would design range improvement projects to enhance livestock distribution and to control the timing and intensity of utilization; in contrast to Alternative B, there is no requirement to focus solely on what might benefit GRSG. This allows the BLM and Forest Service the flexibility to consider other important resources, such as those for which ACECs were designated. Mineral and salt supplements would be placed away from water sources and leks but could still be used within occupied GRSG habitat to enhance livestock distribution. Similarly, new water developments could be authorized if it has been determined that the project would not adversely impact GRSG from habitat loss.

The Proposed LUPA has impacts similar to Alternative D.

Impacts from Wild Horse Management on ACECs and Zoological Areas

Wild horse management decisions would have minimal impact on those ACECs that overlap herd areas or HMAs (i.e., South Cathedral Bluffs and White River Riparian) and would have no impact on those ACECs that are outside of those areas.

Impacts from Fluid Minerals Management (including split-estate) on ACECs and Zoological Areas

<u>Degradation of and Irreparable Harm to Relevant and Important Values of the ACECs</u>

Development of fluid minerals requires not only well pads, access roads, and pipelines but also associated field infrastructure, such as gas plants, compressor stations, and power lines. Once drilled and completed, wells are assumed to be in production for decades before being abandoned, which means that associated field infrastructure would also be in place for decades.

Many of the relevant and important values within ACECs are sensitive to increased human visitation to an area (e.g., wildlife habitat and cultural resources), noxious weeds and habitat loss (e.g., wildlife and special status plant habitats), and fugitive dust (e.g., special status plant habitats). Resources can also be directly impacted or destroyed during construction (e.g., cultural and paleontological resources). The extent of negative impacts depends on the location of surface disturbance, the amount of initial surface disturbance associated with a site, the length of time required for construction, the amount of activity required for routine operations, maintenance requirements, and proximity to other infrastructure.

Alternative A (Unleased Fluid Minerals)—The Bull Gulch and Irish Canyon ACECs are closed to fluid mineral leasing. Most of the other ACECs are managed with NSO stipulations across the entire ACEC (East Fork Parachute Creek, Trapper/Northwater Creek, Kremmling Cretaceous Ammonite, North Park Natural Area, Blacks Gulch, Deer Gulch, Yanks Gulch/Upper Greasewood Creek, Moosehead Mountain, South Cathedral Bluffs, and Raven Ridge). The White River Riparian and East Douglas Creek ACECs are managed with CSU stipulations, although there may be specific resources within these areas that are managed with NSO stipulations, such as bald eagle roosts along the river. The Anvil Points ACEC is managed with a combination of NSO and CSU stipulations for specific resources. The Blue Hill ACEC is not managed with either NSO or CSU stipulations.

Alternative A (Leased Fluid Minerals)—Alternative A is the least restrictive in regard to placement of aboveground facilities for leased fluid minerals. Existing NSO stipulations provide protection from 0.25 to 0.6 mile around a lek. The Little Snake RMP would allow up to 5 percent disturbance, and the White River RMP would allow for up to 10 percent disturbance within 2 miles of a lek.

Alternative B (Unleased Fluid Minerals)—Alternative B would close PHMA to fluid mineral leasing. This would provide more protection than existing NSO or CSU stipulations in Alternative A since there would be no opportunity for exceptions to the NSO stipulations. In practice, this would make the Kremmling Cretaceous Ammonite and North Park Natural Areas closed to leasing but would close only from 2 to 67 percent of the remaining ACECs that have PHMA and are currently open for leasing (East Douglas Creek, 800 acres; South Cathedral Bluffs, 300 acres; and Moosehead Mountain, 6,200 acres).

Alternative B (Leased Fluid Minerals)—Most of the proposed management actions associated with leased fluid minerals, including seasonal restrictions, master development plans, unitization, and GRSG mitigation, would have negligible impact on management of ACECs. As discussed above, most PHMA within ACECs is currently either closed to oil and gas operations or is managed with NSO stipulations, so management actions designed to cap surface disturbance within PHMA (3 percent in Alternatives B and C and 5 percent in

Alternative D) also would not influence management of ACECs. The one exception would be the 800 acres (2 percent) of East Douglas Creek, which is PHMA that is currently managed with a CSU stipulation.

Alternative C (Unleased Fluid Minerals)—Alternative C would close ADH to fluid mineral leasing, which would provide more protection to a larger area and also would eliminate the possibility of exceptions being granted to the NSO stipulations. There would be no difference between Alternatives B and C for Bull Gulch, Irish Canyon, Kremmling Cretaceous Ammonite, and North Park Natural Area ACECs, but Alternative C would provide more protection for approximately 25,500 acres within the other 12 ACECs. However, while from 4 to 95 percent of those 12 ACECs would be closed, those areas that are not within GRSG habitat would remain open to leasing and may experience increased development pressure.

Alternative C (Leased Fluid Minerals)—As discussed in Alternative B, caps on surface disturbance within PHMA are not expected to substantially influence management of ACECs since most of these areas are already managed with NSO stipulations. However, limiting surface disturbance to 3 percent per section within ADH could reduce surface disturbance in those ACECs that are managed with CSU stipulations or no stipulations (i.e., Anvil Points, Blue Hill, White River Riparian, and East Douglas Creek). However, GRSG habitat represents only a portion of these ACECs (from 3 to 14 percent); in order to remain within the 3 percent disturbance cap, it is possible that development would shift to other areas of the ACEC. This could result in impacts on other values that are managed either with no lease stipulations or CSU stipulations (e.g., rare plant habitat). A shift in development could be expected for any ACEC that is currently managed with no lease stipulations or CSU stipulations, regardless of whether it overlaps with Colorado MZs.

Alternative D (Unleased Fluid Minerals)—PHMA areas would be managed with an NSO stipulation that provides for an exception if development would not adversely affect GRSG populations. Only the Kremmling Cretaceous Ammonite, North Park Natural Area, and Moosehead Mountain ACECs have most of their acreage mapped as PHMA, but these areas are already managed with NSO stipulations under existing LUPs.

The expectation is that managing PHMA with NSO stipulations would push oil and gas development into other areas of the ACECs. All of the ACECs that have more than 2 percent of their acreage identified as PHMA are either currently closed to oil and gas operations (Irish Canyon and Bull Gulch) or are already managed with NSO stipulations (South Cathedral Bluffs, Moosehead Mountain, Kremmling Cretaceous Ammonite, and North Park Natural Area). Considering the extent of ACECs that are already managed with NSO stipulations, Alternative D provides only a minor increase in protection compared to Alternative A (applies to 800 acres of East Douglas Creek ACEC).

Alternative D (Leased Fluid Minerals)—Alternative D provides allowances for up to 5 percent surface disturbance within PHMA, which is less restrictive than the 3 percent proposed in Alternatives B and C. This would affect only the East Douglas ACEC since the other ACECs that contain PHMA are either closed to leasing or managed with NSO stipulations.

Proposed LUPA—Impacts from fluid minerals management on ACECs would be the same as those under Alternative D, with greater protections for ACECs that overlap PHMA. This is because disturbance would be managed not to exceed 3 percent.

Impacts from Solid Minerals Management on ACECs/Zoological Areas

Degradation of and Irreparable Harm to relevant and important values of the ACECs

Development of solid minerals, including coal, locatable minerals, nonenergy leasable minerals, and salable mineral materials, results in increased human activity and surface disturbance at a site.

Many of the relevant and important values within ACECs are sensitive to increased human visitation to an area (e.g., wildlife habitat and cultural resources) and impacts associated with surface disturbance such as habitat loss, erosion, spread of noxious weeds, and fugitive dust. The extent of impacts associated with each type of solid mineral development depends on such factors as the amount of initial surface disturbance associated with a site, the length of time required for construction, the amount of activity required for routine operations, maintenance requirements, and proximity to other infrastructure.

Alternative A—There would be no change in management for the Bull Gulch and Irish Canyon ACECs since they are currently recommended for withdrawal from mineral location and are closed to nonenergy leasable minerals and mineral material sales.

Alternative B—Alternatives B and C would restrict both surface and subsurface coal mines within PHMA. The only ACECs within the Colorado MZs that contain areas suitable for coal mining are the Raven Ridge and White River Riparian ACECs. Neither of these ACECs contains PHMA, so management decisions that would prohibit or limit mining in PHMA are irrelevant.

Proposed withdrawals from mineral entry within PHMA (Alternatives B and C) and closing PHMA to nonenergy leasable mineral leasing and mineral material sales (Alternatives B and C) would provide increased protection from surface-disturbing activities within ACECs that contain substantial amounts of PHMA (South Cathedral Bluffs, Moosehead Mountain, Kremmling Cretaceous Ammonite, and North Park Natural Area).

Alternative C—Impacts would be the same as Alternative B.

Alternative D—Limiting surface disturbance in ADH associated with coal mining to less than 5 percent of any Colorado MZ could reduce surface disturbance within the White River Riparian ACEC. While most of the acreage identified in the Raven Ridge ACEC that is suitable for coal mining does not overlap GRSG habitat, the proposed cap on surface disturbance would not result in any shifts in mine plan locations. This is because the ACEC is currently managed with an NSO stipulation. (In accordance with the 1997 White River RMP, coal leases are subject to the same lease stipulations as oil and gas leases.)

Alternative D does not propose any withdrawals from mineral entry for locatable minerals. Rather than close PHMA to nonenergy leasable mineral leasing and mineral material sales, as in Alternatives B and C, Alternative D would limit permitted disturbances to less than 5 percent in any Colorado MZ; this would provide increased protection from surface-disturbing activities within ACECs that contain substantial amounts of PHMA, compared to Alternative A, but is less restrictive than Alternatives B and C.

Proposed LUPA—Impacts from solid minerals management on ACECs would be the same as those under Alternative D, with greater protections for ACECs that overlap PHMA. This is because disturbance would be managed not to exceed 3 percent.

Impacts from Fuels Management, Fire Operations, Emergency Stabilization and Response, and Habitat Restoration on ACECs/Zoological Areas

<u>Reduced Risk of Degradation of and Irreparable Harm to Relevant and Important Values</u>

The reality of limited resources (including budgets, personnel, equipment, and supplies) requires that the BLM and Forest Service prioritize which areas or resources to focus on when planning for fire and fuels management. Some of the relevant and important values within ACECs are sensitive to wildfire: cultural resources, special status plant habitat, and remnant vegetation associations. Irreparable harm could be done if wildfire were to destroy irreplaceable resources, such as wickiup villages or remnant vegetation associations.

Alternative A—Impacts from Alternative A are negligible on management of ACECs from proposed fuels management and most fire operations decisions, with the exception of fuels suppression, native seed allocation, and livestock exclosures.

Alternative B—Alternative B would prioritize fire suppression in GRSG habitat and within GHMA if wildfires threatened PHMA. Prioritizing suppression across a minimum of 923,200 acres (federal surface only) affects decisions about where to position firefighting resources. ACECs are already recognized to contain important resources and could be negatively impacted if firefighting resources were diverted to suppress fires within PHMA, regardless of what other values may be at risk elsewhere in the planning area.

It is important to remember that not all of the ACECs within the planning area are listed in **Table 3.62**, and this management action in particular is more likely to influence those ACECs that are farther removed from GRSG habitat.

Many of the ACECs contain important vegetation, such as federally listed plant species, BLM sensitive plant species, remnant vegetation associations, and rare plants; reclamation within these areas may be limited to using only local native species. Proposed management decisions could prioritize native seed allocation for use in GRSG habitat (1,744,100 acres on federal surface) in years when preferred native seed is in short supply. In this case, this may unintentionally hinder reclamation in plant habitats that have been identified as important values within ACECs but that do not occur within GRSG habitats.

Alternative C—Alternative C is similar to Alternative B, except that it would prioritize suppression only in PHMA and not in GHMA. Impacts from Alternative C are very similar to Alternative B because GRSG habitat would receive priority for suppression over other resources and for native seed allocation.

Excluding livestock from burned areas until woody and herbaceous plants achieve GRSG habitat objectives would benefit any burned areas within ACECs that are within GRSG habitat (32,900 acres). This is because this management approach would likely reduce erosion. Alternatives B and D do not provide any similar management guidance.

Alternative D—Alternative D acknowledges the BLM and Forest Service's multiple-use mandate and considers GRSG habitat requirements in conjunction with all other resource values. GRSG habitat would be given preference for fire suppression, but site-specific circumstances could warrant an exemption and allow the BLM and Forest Service to focus on protecting other important values. This would be the case should there be a time when managers must choose between protecting GRSG habitat and irreplaceable resources within ACECs.

Alternative D is similar to Alternatives B and C in that it would require the use of native plant seeds within ADH. However, when native seed availability is low, Alternative D would allow for the use of other species so long as they meet GRSG habitat objectives. This would afford the BLM and Forest Service the ability to prioritize native seed for use in areas where other species would not meet resource objectives (e.g., habitat for listed plant species).

Proposed LUPA—Fuels and fire operations management, emergency stabilization and response, and habitat restoration would be the same as under Alternative D. Impacts on ACECs and zoological areas for the Proposed LUPA, therefore, would be the same as those for Alternative D.

Impacts from Habitat Restoration on ACECs and Zoological Areas
Impacts would be negligible on management of ACECs from proposed habitat restoration decisions.

Impacts from Designation of All PHMA as the GRSG Habitat ACEC on Other ACECs

Reduced Risk of Degradation of and Irreparable Harm to Relevant and Important Values
ACEC designations highlight areas where special management attention is needed to protect resources. The designation indicates to the public that the BLM recognizes that an area has important values and also serves as a reminder that these values must be considered when evaluating future proposals.

In order to be considered as a potential ACEC, an area must meet the relevance and importance criteria (43 CFR, Part 1610.7-2). The BLM evaluated PHMA (Alternative C) and determined that it did meet the required criteria. PHMA was considered to be relevant as a fish and wildlife resource because GRSG are a candidate species under the ESA, as well as a BLM sensitive species and a state species of special concern. PHMA was considered to meet the importance criteria for the following reasons:

- The Colorado portion of PHMA has special worth in that it is the southeastern-most edge of the range of GRSG
- PHMA in Colorado is considered a fragile ecosystem that is vulnerable to adverse change and supports all life stages of GRSG, including lekking, brood-rearing, and winter range
- GRSG land use planning has been identified as a national priority

Alternative A—No new ACECs are proposed, and there would be no change in the reasons for designation of the existing ACECs.

Alternative B—Same as Alternative A.

Alternative C—Designation of all PHMA as the GRSG habitat ACEC would not replace existing ACEC designations; rather PHMA would simply be added as another reason for designation within the Bull Gulch, Kremmling Cretaceous Ammonite, North Park Natural Area, Irish Canyon, Moosehead Mountain, East Douglas Creek, and South Cathedral Bluffs ACECs. Potential impacts on and changes to management of existing ACECs resulting from proposed management decisions within PHMA have been discussed above. Approximately 1 percent (11,200 acres) of PHMA on federal surface is within an existing ACEC.

The remaining 912,000 acres of PHMA on federal surface would become the GRSG habitat ACEC. Expansion of the area managed as an ACEC would increase protection for those resources that may exist both within and outside

of existing ACECs. For example, surveys conducted after the designation of existing ACECs may have located new cultural sites, paleontological sites, and special status plant populations that occur outside of ACECs but would be the same relevant and important values that are managed for within the ACECs. If these resources were to occur within PHMA, they would receive increased protection by being included in the proposed GRSG habitat ACEC.

Alternative D—Same as Alternative A.

Proposed LUPA—Same as Alternatives A and D.

Summary of Impacts on ACECs and Zoological Areas

Alternative A—Alternative A would recognize all of the existing ACEC designations, but no new ACECs are proposed. Alternative A puts very few restrictions on surface uses. This could result in the most modification of the landscape and consequently the most impacts on those ACECs with the following characteristics:

- Do not already have strict restrictions on travel management (e.g., East Douglas Creek)
- Are not managed as ROW exclusion areas (i.e., Anvil Points, Blue Hill, East Fork of Parachute Creek, Kremmling Cretaceous Ammonite, North Park Natural Area, White River Riparian, and East Douglas ACEC)
- Have NSO stipulations (i.e., Blue Hill, White River Riparian, and East Douglas Creek)

Alternative B—Alternative B would recognize all of the existing ACEC designations, but no new ACECs are proposed. Alternative B provides a greater level of protection for ACECs than Alternative A since additional restrictions would be in place to protect GRSG habitat. However, Alternative B would provide a lower level of protection than Alternative C. Both Alternatives B and C would prioritize management of GRSG. This could result in indirect negative impacts on the relevant and important values in the ACECs, especially for those values that do not occur within sagebrush communities.

New route construction would be limited within seven of the ACECs (8,300 acres). The Kremmling Cretaceous Ammonite, North Park Natural Area, and a portion of the East Douglas Creek ACEC would receive increased protection and would be managed as ROW exclusion areas. Grazing permittees could voluntarily retire grazing privileges. This could provide benefits to ACECs if those areas were retired, but this benefit would not be localized.

Alternative B would authorize new water developments only from seeps or springs in PHMA if they would benefit GRSG. This could negatively influence other important values outside of PHMA if there were inadequate distribution

of livestock due to the constraints of available water. Alternative B would close approximately 7,700 acres within five ACECs to fluid mineral leasing. PHMA would be a priority for fire suppression, as well as any areas within GHMA where a fire could threaten PHMA. While this could benefit the ACECs that contain GRSG habitat, it could result in irreparable damage to other ACECs; this would be the case if firefighting resources were diverted to suppress fires within GRSG habitat regardless of other irreplaceable resources that may be at risk. Additionally, native seed allocation would be prioritized for use within GRSG habitats, which could limit the availability of seed to be used in special status plant habitats.

Alternative C—Alternative C would recognize all of the existing ACECs. Approximately 11,200 acres of PHMA are within an existing ACEC: Bull Gulch, Kremmling Cretaceous Ammonite, North Park Natural Area, Irish Canyon, Moosehead Mountain, East Douglas Creek, or South Cathedral Bluffs. GRSG habitat would be added to the other reasons for designating those ACECs. The remaining 912,000 acres of PHMA would become the GRSG habitat ACEC. Alternative C would provide the most protection to the largest area; however, due to the focus on GRSG habitat without regard for other resources, Alternative C is also the most likely to cause resource conflicts and impacts on some relevant and important values within ACECs.

New route construction would be limited within 16 of the ACECs (32,900 acres) but it is possible that restrictions on road development in GRSG habitat would result in routing roads through non-sagebrush habitat, particularly within the Trapper/Northwater Creek, East Fork Parachute Creek, Yanks Gulch/Upper Greasewood Creek, and Deer Gulch ACECs.

Alternative C would provide increased protection for approximately 16,700 acres within 10 ACECs since these areas would be managed as ROW exclusion areas. However, this could result in more pressure to place ROWs within areas outside of GRSG habitat that are managed as avoidance areas (e.g., East Douglas and White River Riparian ACECs). Grazing would be excluded within the seven ACECs that contain PHMA, which would be an increase in protection for those areas. Restrictions on range improvements, such as fences and the location of water developments and supplements, could negatively affect ACECs. They would do this by hampering the ability to construct exclosures to protect sensitive resources and also by reducing the effectiveness of grazing management systems.

Alternative C would close 25,500 acres to fluid mineral leasing within 12 ACECs; however, those areas that are not within GRSG habitat would remain open for leasing and may experience increased development pressure. Alternative C is similar to Alternative B in regard to GRSG habitat receiving priority for fire suppression resources and native seed allocation.

Alternative D—Alternative D would recognize all of the existing ACEC designations, but no new ACECs are proposed. Alternative D would provide more protection for ACECs than Alternative A but would provide less protection than Alternatives B and C.

Alternative D acknowledges the BLM and Forest Service multiple-use mandate and considers GRSG habitat requirements in conjunction with all other resource values. Rather than a 3 percent cap on surface disturbance (which would include new route construction), Alternative D would allow up to 5 percent surface disturbance within a MZ. Both PHMA and GHMA would be managed as avoidance areas. This would still provide an increase in protection compared to Alternative A for the Kremmling Cretaceous Ammonite, North Park Natural Area, Anvil Points, and East Fort of Parachute Creek ACECs.

Similar to Alternative B, Alternative D would allow grazing permittees to voluntarily retire grazing privileges; however, under Alternative D these areas could be used as grass banks, which could benefit numerous ACECs that require rest due to fire, reclamation, or habitat treatments. In contrast to Alternative C, Alternative D would allow range improvements to enhance livestock distribution and to manage utilization for the benefit of other resources, in addition to GRSG.

Rather than close areas to fluid mineral leasing, Alternative D would manage PHMA with NSO stipulations. This is very similar to Alternative A, given the extent of ACECs that are currently managed with NSO stipulations. Similar to Alternatives B and C, Alternative D would prioritize fire suppression within GRSG habitat; however, it would also allow for exemptions, which would allow the BLM and Forest Service to focus on protecting other important resources in addition to GRSG habitat. Alternative D would also allow the use of other species in reclamation, so long as they met GRSG habitat objectives. This would afford the BLM and Forest Service the ability to prioritize use of native seeds in other areas when native seed is in short supply (e.g., habitat for listed plant species).

Proposed LUPA—Impacts on ACECs are similar to those under Alternative D for all resources. There would be slightly greater protection due to increased restriction on human disturbance under the Proposed LUPA.

4.16.2 Wilderness Study Areas

Impacts on Forest Service Special Interest Areas, Research Natural Areas, and Inventoried Roadless Areas would be the same as those described in this section; there is no separate discussion for these areas.

General Description

The analyses contained in this section are designed to portray possible impacts that could result from the management actions described in **Chapter 2**. Analyses for ranching operations, water quality, and wildlife rely on data for

areas larger than the wilderness and WSAs themselves. However, the data used for these analyses should not be considered precise forecasts, but rather what may occur. The professional judgment of specialists has been used to augment sparse data and to portray a realistic picture of what the future may hold.

Designated wilderness is managed in accordance with the Wilderness Act, which states that these areas shall be administered to "preserve wilderness characteristics." The Wilderness Act describes a variety of physical and social conditions that are desirable characteristics of wilderness. This includes characteristics such as being a natural area where the imprint of humans is substantially unnoticeable, being in a place where there are opportunities for solitude, and the ability to enjoy primitive and unconfined recreation.

For WSAs, FLPMA mandates that the BLM "not impair the suitability" of areas that have been identified as "having wilderness characteristics." All surface-disturbing activities, regardless of the alternative or management action, would be subject to the management objectives of the area where the activity takes place. Any surface-disturbing activities would be on a case-by-case basis, and all proposals for uses and facilities within WSAs would be reviewed by the BLM to ascertain if the proposal would impair the suitability of the WSA for preservation as wilderness. All uses and facilities must meet the nonimpairment standard (i.e., must be both temporary and not create surface disturbance), unless the use or facility meets one of the seven classes of allowable exceptions to the nonimpairment standards (one of which is to recover a threatened, endangered, or candidate species).

Methodology and Assumptions

General Impacts on Wilderness and WSAs

Indicators of impacts on wilderness and WSAs and the measurements used to describe the impacts (where available or appropriate) are as follows:

- Grandfathered uses (pre-FLPMA), which include grazing, mining, and mineral leases (would not include other uses such as recreational activities)
- Construction of structures, such as livestock developments, oil and gas facilities, recreation sites, communication sites, and water storage facilities
- Construction of roads and trails
- Restoration of roads and trails
- Earthwork construction, such as roads, trails, ROW development, oil and gas development, mineral development, and reclamation/restoration

- Vegetation treatments or wildland fire, such as range improvements, habitat improvements, and fuel treatments
- Recreation where areas are used frequently for such activities as camping, hiking, and climbing
- Acquisition of inholdings within Wilderness and WSAs

Assumptions

The analysis includes the following assumptions:

- All WSAs would be managed in accordance with BLM Manual 6330, *Management of Wilderness Study Areas* (BLM 2012d) until Congress either designates or releases all or portions of the WSA from further consideration.
- Management of WSAs is subject to valid existing rights and grandfathered uses under all alternatives, as consistent with BLM Manual 6330 (BLM 2012d).
- Maintenance of existing facilities and construction of new facilities necessary to manage permitted AUMs would be conducted in accordance with BLM Manual 6330 (BLM 2012d).
- Actions that would "impair the suitability of WSAs for preservation as wilderness" would not be permitted unless they were to meet one of the following exception criteria, described in BLM Manual 6330 (BLM 2012d)
  - Emergencies such as suppression activities associated with wildfire or search and rescue operations
  - Reclamation activities designed to minimize impacts on wilderness values created by Interim Management Policy violations and emergencies
  - Uses and facilities that are considered grandfathered or valid existing rights under the Interim Management Policy
  - Uses and facilities that clearly protect or enhance the land's wilderness values or that are the minimum necessary for public health and safety in the use and enjoyment of the wilderness values
  - Reclamation of pre-FLPMA impacts
- All activities approved in WSAs would be closely managed to ensure that they would not impair the area's wilderness characteristics and thus its suitability for designation as wilderness. Preservation of wilderness characteristics within WSAs is paramount and should be the primary consideration when evaluating any proposed action or use.

- Only those authorized uses that would result in negligible impacts would be authorized. Allowable uses in WSAs are permitted if they meet the "nonimpairment" standard.
- WSAs, if released by Congress, would still contain wilderness characteristics, and BLM management could impact those characteristics.
- Wilderness and WSAs are managed as ROW exclusion areas and are closed to new oil and gas leasing.

Implementing management actions for the following resources would have negligible or no impact on WSAs and are therefore not discussed in detail: recreation, wind energy development, industrial solar development, and wild horse management.

Direct and Indirect Impacts on WSAs

Human activities are the primary agents of change that could impact the management goals for WSAs. Indicators of whether these management goals are being met include whether these areas remain in a natural condition, whether they are free of significant evidence of permanent human-caused changes, whether they have nonconforming uses, such as motorized vehicle use, and whether they offer opportunities for solitude and primitive recreation.

Recreation use and grazing use are the primary resource uses that affect WSA resources. Recreation management actions tend to limit impacts on WSAs to small disturbances, distributed across the landscape, such as identifying different Recreation Management Zones. Grazing use is managed to minimize changes to species composition or vegetation cover in these areas through allotment management.

As preferences for recreation change over time, recreation use of WSAs would change, and the rate or direction of that change is highly unpredictable. Some low to minute level of negative impacts would continue to accrue over time on soils, vegetation, and wildlife from high levels of use in popular areas. The management actions that would continue under all alternatives are not likely to cause cumulative impacts on WSAs.

Impacts from Travel Management on WSAs

<u>Grandfathered Uses, including Use of Existing Routes of Travel</u>

Motorized travel on primitive roads and trails, unless specifically prohibited, would still be allowed but limited to designated routes. Administrative motorized use would be permitted, along with motorized use associated with grandfathered uses and valid existing rights, such as permitted livestock grazing. Closing WSAs to public motorized and mechanized use would protect the wilderness characteristic by restricting activities that could impact natural appearance and opportunities for solitude and primitive or unconfined

recreation. There is the potential for degradation of wilderness characteristics from motorized and mechanized travel on designated routes. Such travel could impact natural appearance and opportunities for solitude and primitive or unconfined recreation.

Alternative A—Alternative A would have the most areas open to motorized travel; however, the proposed management decisions would not replace existing decisions that are more restrictive and that WSAs currently closed to motorized vehicles would remain closed, unless Congress released the WSAs from wilderness study.

Alternative B—Alternative B, along with Alternatives C and D, would limit motorized travel to existing roads and trails within PHMA; this would not change management direction for those WSAs that are currently managed with designated routes year-round.

Alternatives C and D and the Proposed LUPA have the same level of beneficial impacts as Alternative B.

Construction of Roads and Trails

Surface-disturbing activities would be authorized depending on the degree and types of development, the date of the mineral right or activity, the date associated with the WSA designation, or valid existing rights. Pre-FLPMA developments may not have more physical or visual impact than they did when they were originally permitted.

Alternative A—Alternative A would have the most areas open to surface-disturbing activities; however, the proposed management decisions would not replace existing decisions that are more restrictive within WSAs, unless Congress released the WSAs from wilderness study.

Alternative B—Alternatives B, C, and D would limit new route construction within ADH. Restrictions on upgrading existing routes and limiting route construction within GRSG habitat would be beneficial for those relevant and important values that occur within GRSG habitat.

Alternative C—Alternative C has the same level of beneficial impacts as Alternatives B and D.

Alternative D—Alternative D has the same level of beneficial impacts as Alternatives B and C.

Proposed LUPA—Impacts from the Proposed LUPA would be the same as Alternative B.

Restoration of Roads and Trails

Beneficial impacts on restoring roads and trails would be that all disturbances must be restored as soon as possible after they occur, and all restoration should be to a level as close as possible to, or better than, that which existed at the site before the disturbance.

Alternative A—Alternative A would put the lowest priority on restoration and so would have the lowest beneficial impact on WSAs. However, the proposed management decisions would not replace existing decisions that are more restrictive within WSAs, unless Congress released the WSAs from wilderness study.

Alternatives B, C, and D and the Proposed LUPA have similar impacts on WSAs.

Impacts from Lands and Realty Management on WSAs

Rights-of-Way

Construction of Structures. Existing ROWs in WSAs may be renewed if they are still being used for their authorized purpose. However new, additional, or modified terms and conditions to minimize impacts on wilderness characteristics would be considered. Surface-disturbing activities and construction would be authorized to the extent that they meet the nonimpairment standard. The reason for the use or facility would have to be for a defined period to respond to a temporary need and would be terminated and removed before or on designation of the area as Wilderness.

Alternative A—WSAs are managed as ROW exclusion areas, so these management decisions would remain in place regardless of which decisions were adopted under this planning effort, unless Congress released the WSAs from wilderness study.

Alternative B—Alternative B's impact would be the same as the other alternatives.

Alternative C—Alternative C's impact would be the same as the other alternatives.

Proposed LUPA—Impacts would be similar to those for Alternative D. However, protections would be greater under the Proposed LUPA because both PHMA and GHMA would be managed as avoidance areas.

Construction of Roads and Trails. Surface-disturbing activities and construction of structures would be authorized only to the extent that they meet the nonimpairment standard. ROWs could be authorized for seasonal access only or limited to 1 or 2 years, and they would have to be terminated if the area is designated as a wilderness.

Alternative A—Alternative A would have the most areas available for ROWs and so would have the greatest impact on lands bordering WSAs. However, WSAs are managed as ROW exclusion areas, these management decisions would remain in place, regardless of which decisions were adopted under this planning effort unless Congress released the WSAs from wilderness study.

Alternative B—Alternative B's impact would be the same as the other alternatives.

Alternative C—Alternative C's impact would be the same as the other alternatives.

Alternative D—Alternative D would manage PHMA as avoidance areas. However, since WSAs are ROW exclusion areas, the proposed management decisions would not replace existing decisions that are more restrictive and, therefore, provide increased protection for GRSG habitat.

Proposed LUPA—Impacts would be similar to those for Alternative D. However, protections would be greater under the Proposed LUPA because both PHMA and GHMA would be managed as avoidance areas.

Land Tenure Adjustment

Acquisition of Inholdings in Wilderness Areas and WSAs. Retaining lands in public ownership would be encouraged. Land exchanges involving public lands for those that are not under federal ownership and that would benefit wilderness values or improve wilderness management would be considered if lands were within the same WSA or in two or more WSAs. Acquisition of inholdings not under federal ownership, consistent with LUP decisions, should be considered as an alternative to a potential access authorization.

Alternative A—Alternative A encourages retaining public ownership of public lands. It also encourages the acquisition of state and private lands and conservation easements more so than the other alternatives; therefore, it would have the greatest benefit on WSAs.

Alternative B—Alternative B has the same benefits as Alternative A. However, under Alternative B, prioritization of acquisitions in PHMA, regardless of whether that PHMA overlapped a WSA could impact future acquisitions of inholdings in WSAs.

Alternative C—Alternative C has the same benefits as Alternative A. However, under Alternative C, prioritization of acquisitions in ADH, regardless of whether that ADH overlapped a WSA could impact future acquisitions of inholdings in WSAs.

Alternative D—Alternative D has fewer benefits than the other alternatives. Under Alternative D, the BLM and Forest Service would consider GRSG habitat

values when evaluating land acquisitions in ADH but would not prioritize acquisitions in PHMA or ADH. Acquisitions in WSAs would be more likely to occur under Alternative D.

Proposed LUPA—Management of the lands program, specifically land tenure adjustments, would be the same under the Proposed LUPA as under Alternative D; impacts are therefore also the same as those under Alternative D.

Impacts from Range Management on WSAs

Earthwork and Vegetation Disturbance

Impacts associated with livestock management associated with WSAs would include surface-disturbing activities and structure construction. These activities would be authorized only if they meet the nonimpairment standard or one of the exceptions, such as protecting or enhancing wilderness characteristics, or if Congress were to release the area from wilderness study.

Alternative A—Under Alternative A, earthwork and vegetation disturbance are more likely to occur near a WSA, because there are fewer restrictions under Alternative A on such activities than under Alternatives B, C, and D.

Alternative B—Under Alternative B, impacts from earthwork and vegetation disturbance would be less than those for Alternative A. Under Alternative B, structural range improvements and location of supplements (salt or protein blocks) would be placed in PHMA to conserve, enhance, or restore GRSG habitat through an improved grazing management system relative to GRSG objectives. Important WSA values would benefit from this restriction.

Alternative C—Alternative C would exclude livestock grazing from ADH and would be a substantial change in management of the WSAs. Eliminating livestock grazing would remove impacts on cultural resources, special status plants, and wildlife habitat associated with livestock concentration areas, trailing, and trampling. Beneficial impacts on WSAs would be the greatest under Alternative C.

Also under Alternative C, avoidance of all structural range developments, including fences and exclosures, within ADH could negatively impact management of WSAs. Fences and exclosures can be long-term cost-effective means of minimizing impacts from livestock grazing on important values. Without fences in place, livestock could damage important WSA values.

Alternative C would not permit the use of salt or supplements within occupied habitat or the creation of new water developments from spring or seep sources. Rather than abandon the use of mineral supplements or water developments, livestock operators would be forced to place these range improvements outside of ADH, which could result in a less efficient grazing management system. WSAs

could be affected if they were to contain pastures that are both within and outside of GRSG habitat.

Alternative D—Alternative D would require design of range improvement projects to enhance livestock distribution and to control the timing and intensity of utilization. In contrast to Alternative B, there is no requirement to focus solely on what might benefit GRSG. Alternative D allows the BLM and Forest Service the flexibility to consider other important resources, such as those for which WSAs were designated. Mineral and salt supplements would be placed away from water sources and leks but could still be used within occupied GRSG habitat to enhance livestock distribution. Similarly, new water developments could be authorized if the project would not adversely impact GRSG from habitat loss and if the project were to meet the nonimpairment standard.

The Proposed LUPA has impacts similar to Alternative D.

Impacts from Fluid Minerals Management on WSAs

Construction of Structures

The degree and types of development allowed depend on the date of the mineral right or activity and the date associated with the WSA designation and if there is legal access to an existing lease. Surface-disturbing activities and construction of structures would be authorized only if they were to meet the nonimpairment criteria.

Alternatives A, B, C, and D and the Proposed LUPA—WSAs are managed as closed to oil and gas operations. These management decisions would remain in place regardless of which decisions were adopted under this planning effort unless Congress were to release the WSAs from wilderness study. WSAs are closed to fluid mineral leasing, so there would not be potential for construction of structures associated with extracting fluid mineral resources. Therefore, there would be no difference in impacts between the alternatives.

Construction of Roads and Trails

Surface-disturbing activities authorizations would depend on the degree and types of development, the date of the mineral right or activity, the date associated with the WSA designation, or valid existing rights. Pre-FLPMA developments may not have more physical or visual impact than they did when they were originally permitted. If there is no legal access to a pre-FLPMA lease, the lease may not be developable. Surface-disturbing activities and construction of roads and trails would be authorized only if they were to meet the nonimpairment criteria.

Alternatives A, B, C, and D and the Proposed LUPA—WSAs would continue to be managed as closed to oil and gas operations. These management decisions would remain in place regardless of which decisions were adopted under this planning effort unless Congress were to release the WSAs from wilderness

study. WSAs are closed to fluid mineral leasing, so there would not be potential for construction of roads and trails associated with extracting fluid mineral resources. Therefore, there would be no difference in impacts between the alternatives.

Earthwork Construction

Surface-disturbing activities and earthwork construction and vegetation disturbance would be authorized only if the use or facility would not create new surface disturbance; that is, there would be no new disruption of the rock, soil, or vegetation, including vegetation trampling, that would necessitate reclamation, rehabilitation, or restoration in order for the site to appear and function as it did before the disturbance. Surface-disturbing activities and structure construction would be authorized only if they were to meet the nonimpairment criteria.

Alternatives A, B, C, and D and the Proposed LUPA—WSAs would continue to be managed as closed to oil and gas operations. These management decisions would remain in place regardless of which decisions were adopted under this planning effort, unless Congress were to release the WSAs from wilderness study. WSAs are closed to fluid mineral leasing, so there would not be potential for earthwork construction associated with extracting fluid mineral resources. Therefore, there would be no difference in impacts between the alternatives.

Vegetation Disturbance

Surface-disturbing activities and vegetation disturbance would be authorized only if the use or facility would not create new surface disturbance; that is, in cases where there would be no new disruption of the rock, soil, or vegetation, including vegetation trampling, that would necessitate reclamation, rehabilitation, or restoration in order for the site to appear and function as it did before the disturbance. Surface-disturbing activities and structure construction would be authorized only if they were to meet the nonimpairment criteria.

Alternatives A, B, C, and D and the Proposed LUPA—WSAs would continue to be managed as closed to oil and gas operations. These management decisions would remain in place regardless of which decisions were adopted under this planning effort, unless Congress were to release the WSAs from wilderness study. WSAs are closed to fluid mineral leasing, so there would not be potential for vegetation disturbance associated with extracting fluid mineral resources. Therefore, there would be no difference in impacts between the alternatives.

Impacts from Solid Minerals, Locatable Minerals, Nonenergy Leasable Minerals, and Salable Minerals Management on WSAs

Impacts from management actions associated with these resource uses would be the same as the impacts described under the impacts from fluid minerals management on WSAs.

Impacts from Fuels Management on WSAs

Vegetation Disturbance

Surface-disturbing activities and vegetation disturbance would be authorized only if the fuel treatment were to make conditions possible for natural wildfire regimes to return to the WSA or to protect site-specific resources. The fuel treatment also would have to meet the nonimpairment standard or one of the exceptions.

Wildland fire can cause great contrast to the natural landscape, removing large swaths of vegetation and leaving behind visible scars. However, these impacts (when stemming from a natural fire regime) are generally short term; over the long term, fires allow for the regrowth of native or appropriate adapted vegetation and improved ecological health. This could benefit natural successional processes that have been disrupted by past human activity.

Alternative A—Impacts under Alternative A are negligible to management of WSAs from proposed fuels management and most fire operation decisions, with the exception of fuels suppression, native seed allocation, and livestock exclosures. Whenever possible, natural processes (e.g., fire, insect outbreaks, and droughts) would be relied on to maintain native vegetation and to influence natural fluctuations in populations. However, exceptions that may pertain to vegetation treatment would be actions taken to recover a federally listed threatened, endangered, or candidate species.

Alternative B—Alternative B would prioritize fire suppression in GRSG habitats and within GHMA if wildfires were to threaten PHMA. Prioritizing suppression affects decisions about where to position firefighting resources in advance of a fire. WSAs are already recognized to contain important resources and could be negatively impacted if firefighting resources were diverted to suppress fires within PHMA, regardless of what other values may be at risk.

Alternative C—Alternative C is similar to Alternative B, except that it would prioritize suppression only in PHMA and not in GHMA. Impacts from Alternative C are very similar to Alternative B because GRSG habitat would receive priority for suppression over other resources and for native seed allocation. Excluding livestock from burned areas until woody and herbaceous plants achieve GRSG habitat objectives would benefit any burned areas in WSAs that are also in GRSG habitat. This is because this management approach would likely reduce erosion. Alternatives B and D do not provide any similar management guidance.

Alternative D—Alternative D acknowledges the BLM and Forest Service multiple-use mandate and considers GRSG habitat requirements in conjunction with all other resource values. GRSG habitat would be given preference for fire suppression, but site-specific circumstances could warrant an exception. This would be to allow the BLM and Forest Service to focus on protecting other

important values should there ever arise a time when managers must choose between protecting GRSG habitat and irreplaceable resources within WSAs.

Alternative D is similar to Alternatives B and C in that it would require the use of native plant seeds within ADH. However, when native seed availability is low, Alternative D would allow for the use of other species, so long as they were to meet GRSG habitat objectives. Manipulation within WSAs would occur only when restoration by natural forces is no longer attainable and only to restore or maintain vegetation communities to the closest approximation of the natural range of conditions. All activities must meet the nonimpairment standard.

Proposed LUPA—Fuels Management under the Proposed LUPA would be the same as Alternative D; impacts on WSAs from fuels management are the same as for Alternative D.

Impacts from Fire Operations Management on WSAs
Impacts from fire operations management on Wilderness and WSAs would be the same as for fuels management.

Impacts from Emergency Stabilization and Rehabilitation on WSAs
Impacts from ESR on WSAs would be the same as for fuels management (see *Impacts from Fuels Management on WSAs*).

Impacts from Habitat Restoration on WSAs
Impacts from habitat restoration on WSAs would be the same as for fuels management (see *Impacts from Fuels Management on WSAs*). The BLM's goal is to immediately restore the impact caused by any unauthorized action to at least the condition that existed before the impact or that which existed in October 1976, the designation date for Section 202 WSAs not reported to Congress.

Summary of Impacts on WSAs
Alternative A—Alternative A puts very few restrictions on surface uses, which could result in the most indirect impacts on WSAs due to the most modification of the landscape. However, the proposed management decisions would not replace existing decisions that are more restrictive, and the nonimpairment standards for WSAs would be strictly adhered unless Congress released the WSAs from wilderness study.

Alternative B—Alternative B would put more restrictions on development than Alternative A, which would have an overall beneficial effect on WSAs.

Alternative C—Alternative C puts the most restrictions on development. This alternative would have the most beneficial impacts on WSAs.

Alternative D—Alternative D would put more restrictions on development than Alternative A but fewer than Alternatives B and C. This alternative would have a

beneficial effect on WSAs, but it would be less of a beneficial effect than Alternatives B and C.

Proposed LUPA—Impacts from the Proposed LUPA are similar to those for Alternative D. There would be slightly greater benefits to WSAs due to increased restrictions on disturbance and disruption in PHMA and PGMAs.

4.16.3 Wild and Scenic Rivers

General Description

This section discusses the impacts on wild and scenic rivers from proposed management actions of other resources and resource uses. Existing conditions concerning wild and scenic rivers are described in **Section 3.14**, Special Designations.

The potential impact on each stream segment depends on the outstandingly remarkable values identified for the segment and the tentative classification of the segment. Segments classified as recreational would allow for the greatest level of development in the study corridor, while segments classified as wild must remain relatively undeveloped; segments classified as scenic fall in between.

Management actions that prohibit surface-disturbing activities in the wild and scenic river study corridor would provide some amount of protection for the tentative classification and a number of outstandingly remarkable values, including cultural, vegetation, fish, scenic, wildlife, and geological. Restrictions on surface-disturbing activities may have the indirect benefit of additional protection for the wild and scenic river study corridor.

Methodology and Assumptions

General Impacts on Wild and Scenic Rivers

Indicators of impacts on wild and scenic rivers and the measurements used to describe the impacts (where available or appropriate) are as follows:

- Any change to the outstandingly remarkable values, tentative classification (i.e., wild, scenic, or recreational), or free-flowing nature of the river segment or corridor area from its current state
- Restoration of surface disturbance
- Construction of roads and trails
- Earthwork construction and vegetation disturbance
- Preclusion of surface disturbance

The preliminary classification and identified outstandingly remarkable values for each segment are summarized in **Chapter 3**.

Documentation of the process used to determine suitability and eligibility can be found in the draft or final wild and scenic river suitability/eligibility reports within the LUPs for each respective field office. The analysis examined a 0.25-mile study corridor (or modified suitable boundary) on BLM-administered and National Forest System land to analyze impacts.

Assumptions
The analysis was based on the following assumptions:

- All eligible and suitable stream segments under consideration for wild and scenic river designation would be managed under interim protective measures required by the Wild and Scenic Rivers Act and BLM Manual 6400, *Wild and Scenic Rivers—Policy and Program Direction for Identification, Evaluation, Planning, and Management* (BLM 2012). This procedure and the interim protective measures would ensure that the values for which these river segments were found eligible or suitable are not compromised until Congress makes a decision regarding wild and scenic river designation.
- The BLM and Forest Service would not permit any actions that would adversely affect the free-flowing nature, outstandingly remarkable values, or tentative classification of any eligible or suitable segments. As such, implementing management actions in this EIS would not adversely impact these segments; adverse impacts will not be discussed for any of the alternatives.

Based on BLM and Forest Service specialist input, implementing management actions for the following resources would have negligible or no impact on wild and scenic rivers and are therefore not discussed in detail: wind energy development, industrial solar development, range management, wild horse management, fluid minerals, solid minerals, locatable minerals, salable minerals, nonenergy leasable minerals, ESR, and habitat restoration.

Direct and Indirect Impacts on Wild and Scenic Rivers

Impacts from Travel Management on Wild and Scenic Rivers

<u>Any Change to the Outstandingly Remarkable Values, Tentative Classification, or Free-flowing Nature of the River Segment or Corridor Area</u>
Limiting cross-country travel would limit soil sedimentation and erosion into the river segments, increasing water quality for related outstandingly remarkable values. In addition, this would minimize scarring from new route creation in the river corridor. New route creation could negatively impact all outstandingly remarkable values if the creation was unauthorized. Outstandingly remarkable values that would be most affected include recreational, wildlife, scenic, and fish.

Alternative A—Alternative A would have the most areas open to motorized travel, which would have the most impacts on wild and scenic rivers.

Alternative B—Alternative B would limit motorized travel to existing roads and trails within PHMA and would require the use of existing roads or realignments for access to valid existing rights in PHMA, which would benefit wild and scenic river segment outstandingly remarkable values within PHMA.

Alternative C—Alternative C would limit motorized travel to existing roads and trails within PHMA and would limit route construction in ADH. No upgrading of routes would be allowed in ADH. Alternative C would have the greatest benefit on wild and scenic river segment outstandingly remarkable values.

Alternative D—Alternative D would allow upgrades to existing routes in PHMA if those upgrades were shown to not have adverse impacts on GRSG habitats. Alternative D would also apply a 5 percent disturbance cap to new road construction in each Colorado MZ. Route construction would also be limited in PHMA until travel management plans have been completed. Alternative D would have greater benefits on wild and scenic river segment outstandingly remarkable values than Alternative A, but would have fewer benefits than Alternatives B and C.

Proposed LUPA—Impacts on wild and scenic rivers from travel management would be similar to those under Alternative D.

Restoration of Surface Disturbance

Beneficial impacts on restoring roads and trails include limiting soil sedimentation and erosion in the river segments and increasing water quality for related outstandingly remarkable values. In addition, this would minimize scarring and allow regrowth, which would benefit other outstandingly remarkable values. Outstandingly remarkable values that would be most affected are recreational, wildlife, scenic, fish, botanical, and biodiversity.

Alternative A—Alternative A would put the lowest priority on restoration and so would have the lowest beneficial impact on wild and scenic rivers.

Alternative B—Alternative B would put a lower priority on restoration than Alternative C but would put a higher priority on restoration than Alternative D.

Alternative C—Alternative C would put the highest priority on restoration and would have the highest beneficial impact.

Alternative D—Alternative D would put a higher priority on restoration of roads and trails than Alternative A but would put a lower priority on restoration than Alternatives B and C.

Proposed LUPA—Impacts on wild and scenic rivers from travel management would be similar to those under Alternative D.

Impacts from Recreation Management on Wild and Scenic Rivers

Any Change to the Outstandingly Remarkable Values, Tentative Classification, or Free-flowing Nature of the River Segment or Corridor Area

SRPs that are in or near PHMA that are not neutral or beneficial to GRSG may be terminated or changed under Alternative B. Recreational outstandingly remarkable values associated with eligible or suitable wild and scenic rivers stream segments include float boating, trout fishing, and scenic driving. Any commercial competitive event or organized group permit or authorization that relates to this outstandingly remarkable value enhances recreational opportunities for the public. If these were cancelled, this would impact more than 50 outfitters, organized groups, and competitive event organizers. The largest impact would be along the Colorado River, North Platte River, Yampa River, and Blue River.

Alternative A—Alternative A would have the least impact, with no change in current management.

Alternative B—Alternatives B and C would have the greatest impact from terminating the most permits and authorizations, which would impact the level of use on wild and scenic rivers.

Alternative C—Alternatives C and B would have the greatest impact from terminating the most permits and authorizations, which would impact the recreational outstandingly remarkable value.

Alternative D—Alternative D is not as restrictive as Alternatives B and C, but it has a greater impact than Alternative A. Alternative D still has the likelihood to impact significant numbers of current permit or authorization holders.

Proposed LUPA—Impacts on wild and scenic rivers from travel management would be similar to those under Alternative D. Camping along river corridors that benefit the recreational outstandingly remarkable values, specifically those of the Colorado River, North Platte River, Yampa River and Blue River, may be seasonally prohibited if they are within 4 miles of active GRSG leks. This would be a negative impact on the recreational outstandingly remarkable values. This potential stipulation does not take into account other developments between the lek and the river corridor, such as roads and railroads, which would be barriers between the lek and the dispersed or developed recreation.

Alternative A—Alternatives A, B, and D would have the least impact, as this stipulation would not move forward under any of these alternatives.

Alternative B—Alternatives B, A, and D would have the least impact, as this stipulation would not move forward under any of these alternatives.

Alternative C—Alternative C would have the greatest negative impact.

Alternative D—Alternatives D, A, and B would have the least impact, as this stipulation would not move forward under any of these alternatives.

Proposed LUPA—Impacts on wild and scenic rivers from travel management would be similar to those under Alternative D.

Impacts from Lands and Realty Management on Wild and Scenic Rivers

Any Change to the Outstandingly Remarkable Values, Tentative Classification, or Free-flowing Nature of the River Segment or Corridor Area

Surface-disturbing activities and construction of structures would be authorized only if there were no negative impact on the free-flowing nature, outstandingly remarkable values, or tentative classification of the river segments. However, if the surface disturbance were to enhance the associated outstandingly remarkable value or if the impacts of all impacted outstandingly remarkable values were fully mitigated, the project may be allowed. This would most likely occur with projects that enhance the recreational outstandingly remarkable value, often in cooperation with other agencies or partners.

Alternative A—Alternative A would have the most areas available for ROWs and also construction of structures, with no restrictions in place to protect GRSG habitat specifically; therefore, Alternative A would have the greatest potential impact on wild and scenic rivers.

Alternative B—Alternative B would have fewer areas available for ROWs and also construction of structures, through restrictions to protect GRSG habitat. Therefore, benefits to wild and scenic rivers would be greater than Alternatives A and D but would be less than Alternative C.

Alternative C—Alternative C would have the fewest areas available for ROWs and also construction of structures, so it would have the most potential benefit to wild and scenic rivers.

Alternative D—Alternative D would have fewer impacts than Alternative A, but more impacts than Alternatives B and C.

Proposed LUPA—See below, *Earthwork Construction and Vegetation Disturbance*.

Construction of Roads and Trails

Surface-disturbing activities and road and trail construction would only be authorized if there were no negative impact on the free-flowing nature, outstandingly remarkable values, or tentative classification of the river segments.

However, if the surface disturbance enhanced the associated outstandingly remarkable value or if it were mitigated, this would be allowed. This would most likely occur with the recreational outstandingly remarkable value in cooperation with other agencies or partners.

Alternative A—Alternative A would have the most areas available for ROWs and also construction of structures, with no restrictions in place to protect GRSG habitat specifically; therefore, Alternative A would have the greatest impact on wild and scenic rivers through possible disruption of outstandingly remarkable values.

Alternative B—Alternative B would have fewer areas available for ROWs and also construction of structures, through restrictions to protect GRSG habitat; therefore, benefits to wild and scenic rivers would be more than Alternative A and D but would be less than Alternative C. Alternative B would have a greater probability of preservation of outstandingly remarkable values than Alternatives A and D. Alternative B would have a smaller probability of preservation of outstandingly remarkable values than Alternative C.

Alternative C—Alternative C would have the fewest areas available for ROWs and also construction of structures; therefore, Alternative C would have the most benefit to wild and scenic rivers. Alternative C would have the greatest probability of preservation of outstandingly remarkable values due restrictions on surface-disturbing activities, when compared to Alternatives A, B, and D.

Alternative D—Alternative D would have more benefits than Alternative A but fewer benefits than Alternatives B and C. Alternative D would have a greater probability of preservation of outstandingly remarkable values than Alternative A; however, it would have less probability of preservation of outstandingly remarkable values than Alternatives B and C.

Proposed LUPA—See below, *Earthwork Construction and Vegetation Disturbance*.

<u>Earthwork Construction and Vegetation Disturbance</u>

Surface-disturbing activities, earthwork construction, and vegetation disturbance would be authorized only if there were no negative impact on the free-flowing nature, outstandingly remarkable values, or tentative classification of the river segments. However, if the surface disturbance were to enhance the associated outstandingly remarkable value or if it were mitigated, this would be allowed. This would most likely occur with the recreational outstandingly remarkable value in cooperation with other agencies or partners.

Alternative A—Alternative A would have the most areas available for earthwork construction and vegetation disturbance; therefore, Alternative A would have the greatest impact on wild and scenic rivers through possible disruption of outstandingly remarkable values.

Alternative B—Alternative B would have fewer areas available for earthwork construction and vegetation disturbance through restrictions to protect GRSG habitat; therefore, benefits to wild and scenic rivers would be more than Alternative A and D but less than Alternative C. Alternative B would have a greater probability of preservation of outstandingly remarkable values than Alternatives A and D, and a smaller probability of preservation of outstandingly remarkable values than Alternative C.

Alternative C—Alternative C would have the fewest areas available for earthwork construction and vegetation disturbance; therefore, Alternative C would have the most benefit to wild and scenic rivers. Alternative C would have the greatest probability of preservation of outstandingly remarkable values due to restrictions on surface-disturbing activities, when compared to Alternatives A, B, and D.

Alternative D—Alternative D would have more benefits than Alternative A, but fewer benefits than Alternatives B and C. Alternative D would have a greater probability of preservation of outstandingly remarkable values than Alternative A, but would have less probability of preservation of outstandingly remarkable values than Alternatives B and C.

Proposed LUPA—Under the Proposed LUPA, impacts would be similar to those for Alternative D. However, additional restrictions on land use and other authorizations would be included under the Proposed LUPA. Both PHMA and GHMA would be managed as avoidance areas, with exceptions for pending large transmission lines. Aboveground structures would be prohibited within 1 mile of active leks, and surface disturbance would be limited to 3 percent in PHMA.

Impacts from Fuels Management on Wild and Scenic Rivers

Vegetation Disturbance

Surface-disturbing activities and vegetation disturbance would be authorized only if there were no negative impact on the free-flowing nature, outstandingly remarkable values, or tentative classification of the river segments.

Wildland fire can cause great contrast to the natural landscape, removing large swaths of vegetation and leaving behind visible scars. However, these impacts are generally short term because, over the long term, fires allow for the regrowth of native or appropriate adapted vegetation as improved ecological health. This could benefit botanical and biodiversity outstandingly remarkable values. However, any negative impact on associated scenic outstandingly remarkable values would have to be balanced out by the benefits in order for the project to be authorized.

Alternative A would not prioritize fuels projects in GRSG habitat, and therefore would have the most potential for vegetation disturbance to benefit outstandingly remarkable values.

Alternative B would prioritize fuels projects in PHMA only. Impacts on wild and scenic rivers would be less beneficial than Alternative A, and D, but would be greater than Alternative C.

Alternative C is would prioritize fuels projects in ADH, and therefore would have the fewest benefits on wild and scenic rivers.

Alternative D would have fewer benefits than Alternative A, but greater benefits than Alternative C and Alternative B, because it would prioritize fuels projects.

Fuels management under the Proposed LUPA would be the same as under Alternative D; impacts on Wild and Scenic Rivers from fuels management are the same as for Alternative D.

Impacts from Fire Operations Management on Wild and Scenic Rivers

Vegetation Disturbance

Outstandingly remarkable values prioritized for suppression would have fewer impacts on scenic outstandingly remarkable values and associated river segments than areas prioritized lower or not prioritized. Wildland fire can cause great contrast to the natural landscape, removing large swaths of vegetation and leaving behind visible scars. However, these impacts are generally short term as over the long term, fires allow for the regrowth of native or appropriate adapted vegetation and improved ecological health. This can benefit the botanical and biodiversity outstandingly remarkable values and associated river segments. Fire suppression techniques have the potential to impact scenic outstandingly remarkable values if fire lines are placed directly up slopes where they are visible for long distances.

Alternative A would not prioritize suppression of fire in GRSG habitat, and therefore would have the most potential for vegetation disturbance outside of GRSG habitat. Alternative A would have the most negative impacts on scenic outstandingly remarkable values.

Alternative B would prioritize suppression in PHMA only. Wild and scenic river segments that overlap PHMA would benefit from this prioritization. Benefits from Alternative B would be greater than Alternatives A and D but less than Alternative C.

Alternative C would also prioritize suppression in PHMA only; therefore, Alternative C would have the same impacts on scenic, botanical, and biodiversity outstandingly remarkable values as Alternative B.

Alternative D would prioritize suppression in PHMA immediately after firefighter and public safety. GRSG habitat requirements would be considered in conjunction with all resource values managed by the BLM and Forest Service. Preference would be given to GRSG habitat unless site-specific circumstances

warranted an exemption. Alternative D would benefit wild and scenic river segment outstandingly remarkable values more than Alternative A but less than Alternatives B and C.

Management of fire operations under the Proposed LUPA would be the same as under Alternative D; impacts on Wild and Scenic Rivers from fire operations are the same as for Alternative D.

Impacts from Habitat Restoration on Wild and Scenic Rivers

Restoration of Surface Disturbance

Any increase in restoration is expected reduce the levels of sedimentation, erosion, and vegetation loss. This would benefit water quality and associated outstandingly remarkable values, plus scenic, botanical, and biodiversity outstandingly remarkable values.

Alternative A would put the lowest priority on restoration of sagebrush habitat and therefore would have the lowest beneficial impact on outstandingly remarkable values in the planning area.

Alternative B would put a lower priority on restoration than Alternative C, but would put a higher priority on restoration than Alternative D.

Alternative C would put the highest priority on restoration of sagebrush habitat, which would have the highest beneficial impact on outstandingly remarkable values in the planning area.

Alternative D would put a higher priority on restoration of sagebrush than Alternative A, but would put a lower priority on restoration of sagebrush than Alternatives B and C.

Habitat restoration management under the Proposed LUPA would be the same as under Alternative D; impacts on terrestrial wildlife from habitat restoration are the same as for Alternative D.

Summary of Impacts on Wild and Scenic Rivers

Management of wild and scenic rivers can often find benefits for one outstandingly remarkable value, while negative impacts simultaneously occur to another outstandingly remarkable value. Because of this, resource impacts cannot be consistently summarized as beneficial or negative throughout the alternatives. Each alternative has its own merits for beneficial and adverse impacts on wild and scenic rivers depending on the river segments and associated outstandingly remarkable values. Actions can only be authorized in eligible or suitable wild and scenic river areas if there is no negative impact on the free flowing nature, outstandingly remarkable values, or tentative classification of the river segments.

Alternative A has greater adverse impacts from travel and transportation and habitat restoration because more areas are open to cross-country travel and restoration is not prioritized. These management actions would negatively impact most associated outstandingly remarkable values, including wildlife, scenic, fish, botanical, and biodiversity.

Alternative A would see greater beneficial impacts from recreation, lands and realty, and fuels management because those segments which contained the recreational outstandingly remarkable value would most likely benefit from recreation and lands and realty actions which allow for more options for development. Management actions associated with fuels management could benefit botanical and biodiversity outstandingly remarkable values because there would be the most potential for short-term vegetation disturbance, which would allow for long-term vegetation regrowth.

Alternative B would likely result in greater adverse impacts from recreation because restricting SRPs would negatively impact the recreational outstandingly remarkable value. Alternative B would also likely result in greater beneficial impacts from the potential PHMA ACEC because most associated outstandingly remarkable values such as botanical and biodiversity would benefit.

Alternative C would have greater impacts on wild and scenic rivers from restrictions on recreation. Restrictions on land use authorizations would benefit wild and scenic rivers by reducing potential impacts on outstandingly remarkable values. Alternative C would have greater beneficial impacts on wild and scenic rivers from travel and transportation from restrictions on route construction and upgrades. These restrictions would benefit wild and scenic rivers by reducing potential impacts on outstandingly remarkable values.

Alternative D would have fewer restrictions on surface-disturbing activities that could impact outstandingly remarkable values than Alternative B and C, but would have more restrictions than Alternative A. Restrictions on recreation use would be less under Alternative D than under Alternatives B and C.

Proposed LUPA—Overall impacts on Wild and Scenic Rivers from the Proposed LUPA are slightly greater than Alternative B and less than Alternative D.

4.16.4 National Trails and Byways

General Description

This section describes potential impacts on national trails and byways within the planning area that could result from the implementation of the management decisions proposed under the four alternatives in relation to other resources and resource uses.

Currently, there is one designated national trail on BLM-administered or National Forest System lands within the planning area: the Continental Divide National Scenic Trail. Portions of the Colorado River Headwaters National Scenic Byway and the Cache la Poudre-North Park National Scenic Byway are on BLM-administered lands within the planning area.

The Continental Divide National Scenic Trail, Colorado River Headwaters National Scenic Byway, and Cache la Poudre-North Park National Scenic Byway all are within the KFO in north-central Colorado. The Continental Divide National Scenic Trail is aligned on or along the Continental Divide and runs along the Colorado border north to south. The 69-mile Colorado River Headwaters National Scenic Byway traverses the KFO planning area from east to west along the Colorado River corridor in Grand and Eagle Counties. The 101-mile Cache la Poudre-North Park National Scenic Byway begins east of Walden on Colorado Highway 14 and extends east to downtown Fort Collins.

The Continental Divide National Scenic Trail is a congressionally designated trail that follows the Continental Divide corridor through several states, including Colorado. A final location for the trail in the Muddy Pass area of Grand and Jackson Counties has not yet been chosen. Currently, visitors hike along US Highway 14 between Rabbit Ears Pass and Indian Creek Road, which crosses BLM-administered lands. This includes traveling over Muddy Pass. The assumption is that in the foreseeable future a corridor and alignment away from US Highway 14 may cross additional BLM-administered lands, including those in GRSG habitat.

Alternatives for potential trail corridors to the north or south of private lands next to the Continental Divide have been considered; however, the pattern of diverse landownership has made it difficult to identify where the route would be established.

The Colorado River Headwaters National Scenic Byway is a National Scenic Byway that passes through several communities within the KFO planning area, including Grand Lake, Granby, Hot Sulphur Springs, Parshall, and Kremmling. Most of the Cache la Poudre-North Park National Scenic Byway runs along the Cache la Poudre River passing through the small communities of Gould, Kinikinik, Rustic, and Indian Meadows. Portions of the Colorado River Headwaters National Scenic Byway and the Cache la Poudre-North Park National Scenic Byway are within GRSG habitat.

This analysis identifies the impacts of management decisions across the alternatives in relation to the BLM's and Forest Service's ability to protect and prevent damage to the objectives, goals, and values associated with national trails and byways.

Methodology and Assumptions

Indicators

- BLM guidance for management of trails within the National Trail System is outlined in the BLM Manual Section 6280 (BLM 2012) and may have a specific management plan planned between partnering agencies. The Continental Divide National Scenic Trail Comprehensive Plan contains guidelines for trail management, completion of new segments of trail, and trail monitoring. Consideration is given to carrying capacity of the trail, motorized vehicle use, cultural sites, budget constraints, physical environment and resources (including wildlife and wildlife habitat, soil, vegetation, water quality, and air quality), existing ROWs, private landownership, and public safety hazards. The impacts on visual resources and quality recreational experiences, as well as the indirect impacts on the local economies, are relevant impact indicators for national trails and byways.

Assumptions

- The BLM, along with other agencies or interest groups, will cooperatively identify, plan, implement, and manage existing, potential or proposed national trails and byways within the planning area.
- BLM-administered or National Forest System lands within the planning area may be used for alignments of national trail and byway corridors, where appropriate.
- If BLM-administered or National Forest System lands are included, or are considered for inclusion, in national trail management corridors, those lands may be managed in order retain or improve the integrity of the associated settings and scenic values for which the National Scenic Trail was designated and to safeguard the nature and purposes of the Continental Divide National Scenic Trail.
- If BLM-administered or National Forest System lands are within corridors along BLM Byways including Backcountry Byways, All-American Roads, and National Scenic Byways those lands may be managed in order to retain their physical, social, and operational settings and to support the conservation, protection, restoration, enjoyment, and appreciation of the resources, qualities, and values of those corridors.
- Agreements will be pursued with the Continental Divide Society, private landowners, and other land management agencies in order to facilitate the routing of the Continental Divide National Scenic Trail and provide appropriate recreational experiences along the trail corridor.

- If an approved route or portion of the Continental Divide National Scenic Trail crosses BLM-administered lands, or lands overlying federal mineral estate, the BLM will implement the Continental Divide National Scenic Trail Comprehensive Plan in order to enhance recreational opportunities, and to protect the setting within the corridor.
- COAs, BMPs, and standard operating procedures may be applied to actions proposed in national trail and byways corridors where such stipulations are in place.
- The impacts on visual resources and quality recreational experiences, as well as the indirect impacts on the local economies, are relevant impact indicators for scenic trails and byways.
- Use of designated national or state trails and byways will increase over time.

Implementing management actions for the following resources would have negligible or no impact on national trails and byways and are therefore not discussed in detail: range management, wild horse and burro management, and emergency stabilization and rehabilitation.

Direct and Indirect Impacts on National Trails and Byways

Impacts from Travel Management on National Trails and Byways

The objectives of managing travel and transportation for the protection of the GRSG are to reduce the mortality from vehicle collisions; limit the change in GRSG behavior; avoid, minimize, and mitigate habitat fragmentation; limit the spread of noxious weeds; and limit disruptive activity associated with human access. Development or restriction of roads and trails and the associated human activity may have an impact on the setting and management of national trails and byways.

Management plans for national trails and byways may provide guidance for resource development and the development of transportation systems to manage and mitigate impacts associated with resource management. In areas with high potential for surface disturbance and development, creating roads and trails would have a greater impact on management corridors of national or state trails and byways than in areas with low potential for surface disturbance and development. Travel and transportation systems can cause visual intrusions in the form of vegetation removal, soil compaction, and linear disturbances across the landscape. The management and use of transportation systems by motorized modes of travel can also impact the physical, social, and administrative settings of national trail and byway corridors.

Management under Alternative A would have the greatest area available for the development of roads and trails with the least restrictions, and, therefore, would have the greatest impact on national or state trail and byway corridors.

Under Alternative B, management of travel and transportation would have fewer impacts than Alternatives A and D since existing roads or limited realignments would be used when possible, but would have greater impacts than Alternative C.

Management under Alternative C would result in impacts similar to Alternative B but with greater protection for leks by providing a 4-mile buffer. The fewest areas would be available for surface-disturbing activities; therefore, management under this alternative would have the fewest impacts on visual resources. Conversely, there could be an adverse impact on the National Trails program if a national trail or scenic byway existed or was proposed within the 4-mile buffer because there could be restrictions placed on activities authorized.

Management under Alternative D would have fewer impacts than Alternative A, but greater impacts than Alternatives B and C. Road development may occur if there would be less than 5 percent total disturbance for the priority area or if there is effective mitigation that offsets the loss of GRSG habitat. Additional development may occur under specific disturbance exception criteria, as defined in **Appendix E**.

Proposed LUPA—Travel management under the Proposed LUPA would be the same as under Alternative D; impacts on national trails and byways are the same as those for Alternative D.

Impacts from Recreation Management on National Trails and Byways

The objective of managing recreation for the protection of the GRSG is to manage BLM SRPs and Forest Service recreational SUAs to avoid activities that disrupt GRSG, fragment GRSG habitat, or spread noxious weeds.

SRPs and recreational SUAs are discretionary authorizations that are issued for a variety of recreational activities on BLM-administered or National Forest System lands to ensure public health and safety, to protect recreation and natural resources, and to ensure the public receives a fair monetary return for certain recreation uses.

SRPs and recreational SUAs are often required for commercial activities, competitive events, certain organized group activities, and in some designated special areas. SRPs or recreational SUAs may be issued within national trails and byways corridors and often include stipulations to protect physical, social, and administrative setting, and other natural resources. Since SRPs and recreational SUAs are discretionary, each proposal is evaluated on case-by-case basis.

Management under Alternative A would have no impacts on national trails and scenic byways from recreation since authorizations are discretionary and evaluated on its own merits.

Under Alternative B, the BLM and Forest Service would limit SRPs and recreational SUAs in PHMA to those that have a neutral or beneficial effect on PHMA areas. There is a potential impact on the National Trail System program through restrictions on recreational opportunities.

Under Alternative C, management would require the same limitations on SRPs and recreational SUAs as Alternative B. There is a potential impact on the National Trail System program through restrictions on recreational opportunities.

Under Alternative D, the BLM and Forest Service would limit SRP and recreational SUA to those proposals that would not adversely affect GRSG populations through habitat loss or disruptive activities. There is a potential impact on the National Trail System program through restrictions on recreational opportunities.

Proposed LUPA—Impacts from recreation management on national trails and byways are similar to those under Alternative D.

Impacts from Lands and Realty Management on National Trails and Byways

The objective of managing lands and realty for the protection of the GRSG is to avoid, minimize, and mitigate the loss of habitat and habitat connectivity through the authorizations of ROWs, land tenure adjustments, proposed land withdrawals, agreements with partners, and incentive programs.

Management under Alternative A would have the fewest restrictions or actions to protect landscapes from BLM ROWs or Forest Service SUAs, land tenure adjustments, and other lands and realty management authorizations. Under this alternative, there would be the greatest impacts on existing or future national trails and byways.

Under Alternative B, management actions would require new BLM ROWs or Forest Service SUAs associated with valid existing rights within PHMA to be collocated with existing ROWs or SUAs where it best minimizes impacts on GRSG. Existing roads or limited realignments would be used to access valid existing rights that are not yet developed. PHMA would be managed as exclusion areas for new ROWs or SUAs. Actions outline land tenure adjustments for the retention, acquisition, and land exchange guidance, providing for more contiguous federal ownership within PHMA.

Lands within PHMA would also be recommended for mineral withdrawal or managed with GRSG conservation measures. These actions would have beneficial impacts on existing or future national trails and byways because there

would be more acres protected from surface-disturbing and disruptive activities than Alternatives A or D; however, management under this alternative would protect fewer acres than Alternative C.

Under Alternative C, management would take actions similar to those outlined in Alternative B but would apply ROW and SUA exclusion to ADH. Additional actions to acquire important habitat on private lands, amending ROWs to require features to enhance habitat security. Under this alternative, there would be more actions to protect existing or future national trail and byway corridors from impacts than under Alternatives A, B, and D.

Alternative D would make PHMA avoidance areas for new ROW. ROWs would be issued only if they would not adversely affect GRSG populations and they were in compliance with the National Scenic Trail law, policy, and management plan.

Both GHMA and LCHMA would be managed as avoidance areas for new ROWs or SUAs. Isolated federal parcels would be considered for disposal for tracts that are not capable of altering GRSG populations and that would not negatively impact the National Scenic Trail, if disposed. Under this alternative, there would be more actions to protect existing or future national trail and byway corridors from impacts than Alternative A, but fewer than Alternatives B and C.

Proposed LUPA—Under the Proposed LUPA, both PHMA and GHMA would be managed as avoidance areas, with exceptions for pending large transmission lines. Aboveground structures would be prohibited within 1 mile of active leks, and surface disturbance would be limited to 3 percent in PHMA. Impacts would be similar to those described under Alternative D, with slightly greater benefits due to increased restrictions on disturbance.

Impacts from Wind Energy Development on National Trails and Byways

Actions related to wind energy development are to minimize or avoid GRSG habitat loss and disruption. Development requires ROWs or SUAs and typically involves large structures and access routes that can fragment habitat and impact landscapes. Wind energy development can have impacts on national trails or byway corridors by altering landscapes that are within the viewshed. Not all occupied habitat areas would have the potential for wind energy development due to topography and other natural factors. These areas, and any associated national trails or byways, would not be impacted due to limited potential for development.

Management under Alternative A would have the fewest restrictions or actions to protect landscapes from wind energy development. There would be the greatest impacts on existing or future national trails and byways under this alternative.

Under Alternative B, management would have no specific actions related to the protection of GRSG, resulting in impacts the same as or similar to those under Alternatives A and D.

Management under Alternative C would have protective actions to prevent siting of wind energy development in ADH or within 5 miles of leks, providing greater protections to the landscape. Under this alternative there would be more actions to protect existing or future national trail and byway corridors from impacts than Alternatives A, B, and D.

Under Alternative D, management would have no specific actions related to the protection of GRSG, resulting in impacts the same as or similar to those under Alternatives A and B.

Under the Proposed LUPA, wind energy development would be excluded from PHMA; impacts on national trails and byways therefore would be similar to those under Alternative C. However, the impacts from wind energy development are not expected to vary between alternatives because the potential for wind energy in northwest Colorado is very limited.

Impacts from Industrial Solar Development on National Trails and Byways

Actions related to industrial solar development are to minimize or avoid GRSG habitat loss and disruption. Development requires ROWs or SUAs and typically involves large structures and access routes that can fragment habitat and impact landscapes. Industrial solar development can have impacts on national trails or byway corridors by altering landscapes that are within the viewshed. Not all occupied habitat areas would have the potential for industrial solar development due to topography and other natural factors. These areas, and any associated national trails or byways, would not be impacted due to limited potential for development.

Management under Alternative A would have the fewest restrictions or actions to protect landscapes from industrial solar development. Management under this alternative would result in the greatest impacts on existing or future national trails and byways.

Under Alternative B, management would have no specific actions related to the protection of GRSG and would have impacts the same as or similar to those under Alternative A and D.

Under Alternative C, protective actions would prohibit industrial solar projects in ACECs and occupied habitat. Under this alternative, there would be more protections for existing or future national trail and byway corridors from impacts than under Alternatives A, B, and D.

Management under Alternative D would include no specific actions to protect GRSG, resulting in impacts the same as or similar to those under Alternatives A and B.

Under the Proposed LUPA, wind energy development would be excluded from PHMA; impacts on national trails and byways therefore would be similar to those under Alternative C. However, impacts from wind energy development are not expected to vary between alternatives because the potential for wind energy in northwest Colorado is very limited.

Impacts from Fluid Minerals Management on National Trails and Byways

The objectives of actions related to fluid minerals management are to avoid, minimize, and mitigate direct disturbance, displacement, or mortality of GRSG; to prevent loss of habitat, or loss of effective habitat through fragmentation; and to minimize cumulative landscape-level impacts. Development typically requires ROWs or SUAs and involves structures and access routes that can fragment habitat and impact landscapes. Linear features, such as primitive roads or trails, could be improved impacting the dispersed and unimproved nature of the existing transportation system. Maintenance requirements for such development also creates additional disturbance and impacts if they were to occur within national trail or byway corridors.

Management under Alternative A would have the fewest restrictions or actions to protect landscapes from fluid minerals management actions that may alter national trail or byway corridors or have direct impacts. Management under this alternative would result in the greatest impacts on existing or future national trails and byways.

Under Alternative B, management would close PHMA to fluid mineral leasing and would not entertain opening areas where leases expire or terminate. Geophysical exploration would be permitted in areas under existing leases with protective stipulations. Additional mitigation and stipulations such as applying a 4-mile NSO around leks, limiting disturbances to one per section with no more than 3 percent disturbance for the area, and COAs provide additional protections to landscapes. Under this alternative, there would be more protections for existing or future national trail and byway corridors from impacts than under Alternatives A and D but fewer than under Alternative C.

Under Alternative C, management would close ADH to fluid mineral leasing and would not entertain opening areas where leases expire or terminate. Geophysical exploration would be permitted in areas where existing leases with protective stipulations greater than those in Alternative B, including seasonal restrictions. Additional mitigation and stipulations for leased fluid minerals within ADH, such as seasonal restrictions for exploratory drilling, limiting disturbances to no more than 3 percent for the area, and exploring options to amend or cancel leases in ACECs and occupied habitats provide the greatest protections for landscapes. PDFs and RDFs would also apply. Management

under this alternative would result in the greatest protections for existing or future national trail and byway corridors.

Management under Alternative D would manage PHMA as NSO areas for fluid mineral leasing. Exception criteria would allow the BLM Authorized Officer to authorize disturbance in excess of the 5 percent under certain conditions with the concurrence of CPW. Additional mitigation and stipulations are proposed for leased fluid minerals within Alternative D, which would be similar to those under Alternative B. However, under Alternative D, additional exceptions are provided, and the disturbance cap is increased to 5 percent. Under this alternative there would be more protections for existing or future national trail and byway corridors from impacts than Alternative A but less than Alternatives B and C.

Proposed LUPA—Under the Proposed LUPA, management of fluid minerals would be similar to Alternative D; however, disturbance would be managed at 3 percent of PHMA instead of 5 percent under Alternative D. Impacts are similar to those under Alternative D, with slightly greater benefits to national trails and byways due to additional restrictions on surface disturbance.

Impacts from Solid Mineral Management on National Trails and Byways

The objective of actions related to solid mineral management is to manage solid mineral programs to avoid, minimize, and mitigate adverse impacts on GRSG habitat to the extent practical under the law and BLM and Forest Service jurisdiction. Similar to fluid minerals management, development of solid minerals typically requires ROWs or SUAs and typically involves structures and access routes that can fragment habitat and impact landscapes. Linear features such as primitive roads or trails could be improved impacting the dispersed and unimproved nature of the existing transportation system. Maintenance requirements for such development also creates additional disturbance and impacts if they were to occur within national trail or byway corridors.

Management under Alternative A would include the fewest restrictions or actions to protect landscapes from solid mineral management actions that may have direct impacts on national trail or byway corridors. Under this alternative, there would be the greatest impacts on existing or future national trails and byways.

Under Alternative B, management would find all surface mining unsuitable within PHMA under criteria set forth in 43 CFR, Part 3461.5. Within plans of operations, additional effective mitigation for conservation would be required and seasonal restrictions would be considered. New nonenergy leasable minerals would not be leased and there would be no authorization to expand existing mines. Salable minerals within PHMA would also be closed. Under this alternative, there would be more protections for existing or future national trail and byway corridors from impacts than under Alternatives A and D. Impacts would be similar to those in Alternative C.

Management actions under Alternative C would be the same as or similar to those under Alternative B. PDFs and RDFs would also apply. Impacts would be the same as or similar to those under Alternative B.

Under Alternative D, management would allow for greater development of solid minerals than Alternatives B and D. Actions for PHMA and ADH related to CFRs would be put in place to mitigate for disturbance up to 5 percent of an area. If disturbance was to exceed 5 percent, additional effective mitigation to offset such disturbance would be required. Under this alternative, there would be more protections for existing or future national trail and byway corridors from impacts than under Alternative A but fewer than under Alternatives B and C.

Proposed LUPA—Under the Proposed LUPA, management of solid minerals would be similar to Alternative D; however, disturbance would be managed at 3 percent of PHMA instead of 5 percent under Alternative D. Impacts are similar to those described under Alternative D, with slightly greater benefits to national trails and byways due to additional restrictions on surface disturbance.

Impacts from Locatable Mineral Management on National Trails and Byways

Similar to fluid and solid mineral management, locatable mineral management typically requires ROWs or SUAs and involves structures and access routes that can fragment habitat and impact landscapes. Linear features such as primitive roads or trails could be improved, impacting the dispersed and unimproved nature of the existing transportation system. Maintenance requirements for such development also creates additional disturbance and impacts if they were to occur within national trail or byway corridors.

Management under Alternative A would have the fewest restrictions or actions to protect landscapes from locatable mineral management actions that may directly impact national trail or byway corridors. Under this alternative, there would be the greatest impacts on existing or future national trails and byways.

Under Alternative B, management would withdraw PHMA from mineral entry based on risk to GRSG. Existing claims would be subject to validity exams, including claims to be found null and void. Under this alternative there would be more protections for existing or future national trail and byway corridors from impacts than under Alternatives A or D. Impacts would be similar to those under Alternative C.

Management under Alternative C would include actions the same as or similar to Alternative B. PDFs and RDFs would also apply. Impacts would be the same as or similar to Alternative B.

Under Alternative D and the Proposed LUPA, no withdrawals would be proposed within PHMA; instead validity exams, effective mitigation measures, and potential seasonal restrictions would be required as deemed necessary.

Under this alternative, there would be more protections for existing or future national trail and byway corridors from impacts than under Alternative A but fewer than under Alternatives B and C.

Impacts from Nonenergy Leasable Minerals Management on National Trails and Byways

Similar to fluid, solid, and locatable mineral management, nonenergy leasable minerals development typically requires ROWs or SUAs and involves structures and access routes that can fragment habitat and impact landscapes. Linear features such as primitive roads or trails could be improved, impacting the dispersed and unimproved nature of the transportation system. Maintenance requirements for such development also create additional disturbance and impacts if they occur within national trail or byway corridors.

Management under Alternative A would have the fewest restrictions or actions to protect landscapes from nonenergy leasable minerals actions that may have direct impacts on national trail or byway corridors. Under this alternative, there would be the greatest impacts on existing or future national trails and byways.

Under Alternative B, management would withdraw PHMA from mineral entry based on risk to GRSG. Existing claims would be subject to validity exams, including claims to be found null and void. PDFs and RDFs would also apply as outlined for fluid and solid minerals. Impacts would be the same as or similar to those under Alternative C but fewer than under Alternatives A and D.

Management under Alternative C would include actions the same as or similar to Alternative B. PDFs and RDFs would also apply. Impacts would be the same as or similar to those under Alternative B but fewer than under Alternatives A and D.

Under Alternative D, management would consider allowing expansion of existing nonenergy mineral leases up to 5 percent disturbance for the area. If disturbance were to exceed 5 percent, then additional effective mitigation to offset such disturbance would be required. PDFs and RDFs would also apply. Under this alternative, there would be more protections for existing or future national trail and byway corridors from impacts than under Alternative A but fewer than under Alternatives B and C.

Proposed LUPA—Under the Proposed LUPA, PHMA would be closed to nonenergy leasable minerals and existing development. Impacts from managing nonenergy leasable minerals would be similar to Alternative D, but disturbance would be managed at 3 percent of PHMA instead of 5 percent for Alternative D. Impacts are similar to those under Alternative D, with slightly greater benefits to national trails and byways due to additional restrictions on surface disturbance.

Impacts from Salable Minerals Management on National Trails and Byways
Similar to fluid, solid, and locatable mineral management and nonenergy leasable minerals, salable minerals development typically requires ROWs or SUAs and involves structures and access routes that can fragment habitat and impact landscapes. Linear features such as primitive roads or trails could be improved impacting the dispersed and unimproved nature of the existing transportation system. Maintenance requirements for such development also creates additional disturbance and impacts if they occur within national trail or byway corridors.

Management under Alternative A would have the fewest restrictions or actions to protect landscapes from salable minerals actions that may directly impact national trail or byway corridors. Under this alternative, there would be the greatest impacts on existing or future national trails and byways.

Under Alternative B, management would close PHMA to mineral material sales and salable mineral pits would be restored to meet GRSG habitat conservation objectives. Impacts would be the same as or similar to those under Alternative C but less than under Alternatives A and D.

Management under Alternative C would include actions the same as or similar to Alternative B. PDFs and RDFs would also apply. Impacts would be the same as or similar to Alternative B but fewer than under Alternatives A and D.

Under Alternative D, management would consider allowing existing mineral material sale sites to continue operations and possibly expand up to 5 percent disturbance for the area. If disturbance were to exceed 5 percent, then additional effective mitigation to offset such disturbance would be required. Within ADH, salable mineral pits no longer in use would be restored to meet GRSG habitat conservation objectives. Under this alternative, there would be more protections for existing or future national trail and byway corridors from impacts than under Alternative A but fewer than Alternatives B and C.

Proposed LUPA—Under the Proposed LUPA, PHMA would be closed to salable minerals, but disturbance would be managed at 3 percent of PHMA instead of 5 percent. Impacts are similar to those described under Alternative D, with slightly greater benefits to national trails and byways due to additional restrictions on surface disturbance.

Impacts from Mineral Split-Estate Management on National Trails and Byways
The objective of mineral split-estate for GRSG conservation is to use federal authority to protect GRSG habitat on split-estate lands to the extent provided by law. Limited control of private lands can occur, but stipulations related to leases for minerals owned by the federal government can be used as a condition of leases or sales. Similar to fluid, solid, and locatable mineral management and nonenergy leasable and salable minerals development, mineral split-estate typically requires ROWs or SUAs and involves structures and access routes that can fragment habitat and impact landscapes. Linear features such as primitive

roads or trails could be improved, impacting the dispersed and unimproved nature of the existing transportation system. Maintenance requirements for such development also creates additional disturbance and impacts if they occur within national trail or byway corridors.

Management under Alternative A would have the fewest restrictions or actions to protect landscapes from mineral split-estate that may impact national trail or byway corridors. Under this alternative, there would be the greatest impacts on existing or future national trails and byways.

Under Alternative B, management would require the conservation measures that would be applied to lands when the federal government owns the mineral estate and the surface is not in federal ownership. Where the federal government owns the surface and the mineral estate is not in federal ownership, the appropriate fluid mineral PDFs would be applied to surface development. Impacts would be the same as or similar to those under Alternative C but fewer than under Alternatives A and D.

Management under Alternative C would have the same actions as Alternative B. Impacts would be the same as or similar to those under Alternative B but less than Alternatives A and D.

Under Alternative D, management would apply conservation measures within PHMA to the developer (lessee) of the mineral as allowable when the federal government owns the mineral estate and the surface is not in federal ownership. Where the federal government owns the surface and the mineral estate is not in federal ownership, the appropriate PDFs to surface development would be applied. Under this alternative, there would be more protections for existing or future national trail and byway corridors from impacts than under Alternative A and slightly less than under Alternatives B and C.

Proposed LUPA—Under the Proposed LUPA, management of split estate would be similar to Alternative D, except disturbance would be managed at 3 percent of PHMA instead of 5 percent for Alternative D. Impacts are similar to those described under Alternative D, with slightly greater benefits to national trails and byways due to additional restrictions on surface disturbance.

Impacts from Wildfire Suppression, Fuels Management, and Fire Rehabilitation on National Trails and Byways

The objective of managing the fuels program is to avoid GRSG habitat loss and restore damaged habitat. Fire can have an impact on landscapes but often is a part of natural succession. Areas that are prioritized for suppression efforts would be impacted less than those that are of lower priority. Prescribed fire or mechanical treatments to reduce fuel loads may mimic fuel reduction from natural causes. Natural prescribed fires and mechanical treatments allow for the healthy reestablishment of forested and vegetated areas. While there may be

impacts on national trail and byway corridors, they are often short-term disturbances.

Management under Alternative A would have the fewest protections for naturally occurring landscapes and would have the greatest impacts on existing or future national trail and byway corridors.

Under Alternative B, fuels management actions and guidance would provide protections within PHMA while allowing for promoting area health. Treatments would be allowed when actions would meet strategic protection and preservation of habitat, including seasonal restrictions, reseeding with native seed, monitoring and controlling invasive species, and not reducing the sagebrush canopy to less than 15 percent unless objectives require additional reductions to protect habitat. Suppression would be prioritized immediately after life and property to conserve PHMA and also within GHMA if it were to threaten PHMA areas. Impacts would be less than those under Alternatives A and D but would be greater than under Alternative C.

Management under Alternative C would include actions the same as or similar to those under Alternative B but would be applied to ADH. Impacts would be less than those under Alternatives A and D. Impacts would be the same as or similar to Alternative B over a greater portion of habitat.

Under Alternative D, management would include actions the same as or similar to those of Alternatives B and C but would be applied to a mix of PHMA and ADH. Fuels management projects may involve spatially arranging new vegetation treatments to constrain potential fire spread and growth. During fire suppression, prioritization would consider GRSG habitat requirements in conjunction with all resource values and may limit prioritization of GRSG habitat when site-specific circumstances warrant an exemption. Under this alternative, there would be fewer impacts than Alternative A but greater impacts than Alternatives B and C. This is because there would be greater flexibility for fuels management projects and take into account all resource values.

Wildfire suppression and fuels management and fire rehabilitation under the Proposed LUPA would be the same as those for Alternative D. Impacts from the Proposed LUPA, therefore, would be the same as for Alternative D, above.

Impacts from Habitat Restoration on National Trails and Byways

The objectives of habitat restoration for the GRSG are to create and maintain landscapes that benefit GRSG and to use integrated vegetation management to control, suppress, and eradicate, where possible, noxious and invasive species per BLM Handbook H-1740-2. Habitat restoration would primarily benefit national trail and byway corridors by returning impacted landscapes to a more natural state.

Management under Alternative A would place the least priority on the restoration of sagebrush habitat with nonnative vegetation and impacts from other resource objectives. Under this alternative, there would be the greatest impacts on existing or future national trail and byway corridors.

Under Alternative B, management would have actions and guidance to prioritize restoration for PHMA and ADH to restore desirable native plants and create landscape patterns that most benefit GRSG. Under this alternative, there would be a greater priority in restoration of GRSG habitat and fewer impacts on national trail and byway corridors than under Alternatives A and D, but lower priority and more impacts than under Alternative C.

Management under Alternative C would include actions the same as or similar to Alternative B but would be applied over ADH. Efforts would be made to recover declining sagebrush habitat in areas to expand occupied habitat. Sagebrush reduction and treatments would be avoided to increase forage for livestock and big game to reduce grazing impacts on sagebrush. Under this alternative, there would be the greatest priority on restoration of GRSG habitat and the fewest impacts on national trail and byway corridors compared with Alternatives A, B, and D.

Under Alternative D, management would include actions the same as or similar to Alternatives B and C, but these would be applied to a mix of PHMA and ADH. GRSG habitat requirements would be considered in conjunction with all resource values managed by the BLM and Forest Service and would be given priority unless site-specific requirements warrant an exemption. Certain criteria would count against the 5 percent disturbance cap, including mappable stands of cheatgrass and pinyon-juniper encroachment. Under this alternative, there would be low priority in restoration of GRSG habitat and greater impacts on national trail and byway corridors than under Alternatives B and C, but fewer impacts than under Alternative A.

Management of habitat restoration under the Proposed LUPA would be the same as under Alternative D; impacts on terrestrial wildlife from habitat restoration are the same as for Alternative D.

Impacts from ACECs/Zoological Areas Management on National Trails and Byways

The objective of managing lands as ACECs is to designate special management areas to protect significant historic, cultural, or scenic values; fish and wildlife resources; natural process or systems; and/or natural hazards. Designating habitat as an ACEC for the protection and management of the GRSG would provide additional constraints on other resources uses in such areas. Prohibition of surface-disturbing activities would have a beneficial impact on the protection of national trail and byway corridors.

Management under Alternative A would not designate an ACEC for the GRSG and its habitat. Under this alternative, there would be the least protections and beneficial impacts on national trail and byway corridors.

Under Alternative B, management would not designate an ACEC for the GRSG and its habitat. Under this alternative, on national trail and byway corridors would be the same as or similar to those under Alternatives A and D, with greater impacts than Alternative C.

Management under Alternative C would make all PHMA an ACEC for protection of sagebrush habitat and GRSG. Beneficial impacts would be the greatest for national trail and byway corridors since this would provide the most protection to the most areas. Under this alternative, there would be fewer impacts than under Alternatives A, B, and D.

Management under Alternative D and the proposed LUPA would not designate an ACEC for the GRSG and its habitat. Under this alternative, impacts on national trail and byway corridors would be the same as or similar to Alternatives A and B, with greater impacts than Alternative C.

Summary of Impacts on National Trails and Byways

Management under Alternative A would continue with the current conditions and existing plans and would have the least restrictions on changes that may occur across the landscape which could impact national trails and byways. National trails and byways often are designated to provide opportunities for activities such as recreation and education dependent on physical settings. With fewer protections for landscapes within national trail and byway corridors, experiences could also be diminished.

Under Alternative B, management would provide a greater level of protection for the landscape, which would benefit existing or future national trail and byway corridors. Under this alternative, there would be greater benefits and fewer impacts than under Alternatives A and D, but fewer benefits than under Alternative C.

Management under Alternative C would provide the greatest level of protection for the landscape, which would benefit existing or future national trail and byway corridors. Under this alternative there would be greater benefits and fewer impacts than under Alternatives A, B, and D.

Under Alternative D, management would provide protections for the landscape that would benefit existing or future national trail and byway corridors while allowing greater flexibility for managing multiple resources. Under this alternative, there would be greater benefits and fewer impacts than Alternatives A, but fewer benefits than under Alternatives B and C.

Under the Proposed LUPA, impacts would be similar to those under Alternative D, with slightly greater benefits to national trails and byways due to increased restrictions on surface disturbance.

4.17 Soil and Water Resources

4.17.1 General Description

This section discusses impacts on soil and water resources from proposed management actions of other resources and resource uses. Existing conditions concerning soils and water are described in **Section 3.15**, Water Resources, and **Section 3.16**, Soil Resources.

4.17.2 Methodology and Assumptions

General Impacts on Soils and Water Resources

Data in **Appendix F**, Disturbance Cap Management, was used to compare impacts on soil and water resources across all alternatives. Calculations were made, where possible, to capture the maximum potential number of acres that could be disturbed under each alternative.

Indicators of impacts on soil and water resources and the measurements used to describe the impacts (where available or appropriate) are as follows:

- Impacts on water quality
  - Miles of river and stream segments meeting state and federal water quality standards
  - Miles of river and stream segments meeting BLM Colorado Public Land Health Standard #55 or Routt National Forest Plan Standards and Guidelines
- Impacts on soil health
  - Ability of soils to support vegetation and crust and to meet site potential based on ecological site conditions (e.g., vegetation type, diversity, density, and vigor)
  - Acres meeting BLM Colorado Public Land Health Standard #1 or Routt National Forest Plan Standards and Guidelines
  - Changes to erosion rates when compared to natural conditions based on ecological site descriptions
- Impacts on water quantity
  - Changes to the availability of water resources

Assumptions

The analysis includes the following assumptions:

- Soil and water resources would be managed to meet Standards 1 (upland soils) and 5 (water quality) of the BLM Colorado Public Land Health Standards (BLM 1997) and Routt Forest Plan Water and Aquatic and Soils Standards and Guidelines (Forest Service 1997).
- Where impacts may be shifted outside of GRSG habitat, the BLM would still be required to meet BLM Colorado Public Land Health Standards and Routt Forest Plan Standards. These standards would apply to project design and may require additional BMPs or other mitigations to ensure compliance with these standards.
- Methods and projects (e.g., vegetation treatments, grazing systems, and prescribed and natural fire use) that help restore watersheds, desirable vegetation communities, or wildlife habitats would benefit soil and water over the long term.
- Soils would be managed to minimize erosion (relative to natural erosion rates) and to maintain soil productivity.
- The degree of impact attributed to any 1 disturbance or series of disturbances would be influenced by several factors; these are proximity to drainages and existing groundwater wells, location within the watershed, time of year and extent of disturbance, reclamation potential of the affected area, existing vegetation, precipitation, and mitigating actions applied to the disturbance.
- Transportation facilities and infrastructure would be properly designed to meet BLM and Forest Service standards for transportation systems.
- At higher risk for erosion from surface-disturbing activities are areas of low reclamation potential, such as sensitive soils, including those described as "fragile," "steep slopes," and "saline," and those with landslide potential, or those in sensitive areas, such as stream channels, floodplains, and riparian habitats. Such actions as range improvements and construction that require water use, dust abatement, or reclamation irrigation would deplete water in the Colorado River and North Platte River Basins.
- All current soil and water protections (e.g., NSO and CSU) would remain in place.

Implementing management for the following resources would have negligible or no impacts on soil and water quality and are therefore not discussed in detail: wind energy development, industrial solar, habitat restoration, and ACECs.

4.17.3 Direct and Indirect Impacts on Soil and Water Resources

General Impacts from Surface Disturbance on Soil and Water Resources

Impacts on Water Quality and Soil Health

Impacts on soil health and water quality from this EIS are largely a result of variations in restrictions on surface disturbance. Management actions that minimize, preclude, or stipulate surface disturbance would help maintain or improve soil and water quality conditions.

Soil resources, especially soils on steep slopes, saline soils, or Mancos Shale areas, are susceptible to impacts from surface disturbance and compaction; this can lead to accelerated erosion, soil loss, and reduced productivity. Increased erosion leads to increased sedimentation of area streams, which decreases water quality and contributes to morphologic instability. In addition, soils on steep slopes or those soils identified as fragile or saline can be more difficult to reclaim once disturbed. Nonpoint source contribution of sediment and associated mineral constituents (e.g., selenium) to area streams through natural erosional processes can be magnified and accelerated as a result of surface disturbance.

Surface-disturbing activities in areas of low reclamation potential or in sensitive areas, such as stream channels, floodplains, and riparian habitats, are at higher risk for erosion. Disturbance in these areas creates greater potential for erosion and sediment delivery to surface waters, thereby degrading water quality.

No disturbance caps currently exist under Alternative A. This would allow for potential surface disturbance across all 4,148,500 acres of GRSG habitat. As a result, impacts on water quality and soil health would be greater under Alternative A than under the other alternatives.

Alternative B would apply a 3 percent disturbance cap within PHMA, leaving a maximum of 71,000 acres available for surface disturbance in these habitats. The application of this disturbance cap would provide greater protection to soil and water than Alternative A.

Alternative C would also apply the same 3 percent disturbance cap as Alternative B, allowing for a maximum of 71,000 acres available for surface disturbance in PHMA. However, under Alternative C this disturbance cap would also apply to ADH. As a result, this alternative would prevent more surface disturbance than Alternative B and would provide greater protection to soil and water than Alternative B.

Alternative D would apply a 5 percent disturbance cap to PHMA that support sagebrush communities, allowing a maximum of 84,500 acres of surface disturbance. Alternative D would be more protective of soil and water than Alternative A, but less protective than Alternatives B and C.

The Proposed LUPA would apply a 3 percent disturbance cap in PHMA; surface disturbance and impacts on soil and water resources are similar to those for Alternative B.

Impacts from Travel Management on Soil and Water Resources

Impacts on Water Quality and Soil Health

Decommissioning roads or trails, rerouting roads away from streams and riparian areas, and maintaining or improving road/stream crossings have direct benefits to water quality by reducing sediment transport to water bodies. Minimizing road density in a watershed (e.g., reclaiming routes or clustering route development) can help to maintain or improve hydrologic function by reducing surface compaction and surface runoff, which benefit water quality over time.

Reductions in route density also have benefits for soil health due to reductions in soil displacement, compaction, erosion, and vegetation loss.

Under Alternative A there is no prioritization established for restoration or maintenance of travel routes within GRSG habitat. Restoration of travel routes would continue to be within existing authorities.

Alternatives B, C, and D and the Proposed LUPA would reduce the acreage open to cross-country travel, which would protect water quality and soil health to a greater extent than Alternative A. These four action alternatives would also require travel management planning and potential reductions in miles of routes and route traffic. Alternatives B, C, and D and the Proposed LUPA equally call for restoring undesignated routes in PHMA, which would improve hydrologic function and water quality over time.

New road construction would be limited within the planning area under Alternatives B, C, and D and the Proposed LUPA, but particularly under Alternatives B and C and the Proposed LUPA. In some cases, this could shift road development to areas outside of GRSG habitat. Depending on the nature of the areas to which this development would be shifted, this could increase routes across areas of low reclamation potential.

Impacts from Recreation Management on Soil and Water Resources

Impacts on Water Quality and Soil Health

Recreation actions authorized under BLM SRPs or Forest Service recreation SUPs can result in adverse impacts on soil and water through surface disturbance from motorized and mechanized travel and large group activities, such as hiking, biking, and camping. See discussion under general impacts from surface disturbance on soil and water regarding the impacts of surface disturbance on water quality and soil health. On the other hand, SRPs and SUPs

can benefit soil and water by establishing areas where these disturbances can occur and by providing public education about land stewardship.

Water quality can also be degraded from land uses associated with SRPs and SUPs, such as improper garbage and human waste disposal. The extent of these impacts would depend on the proximity to water resources (surface and ground), the type of activity authorized, and the number of recreationists associated with the permitted activity.

Alternatives B, C, and D and the Proposed LUPA all would reduce SRPs and SUPs in GRSG habitat to a greater extent than Alternative A, thus indirectly benefitting soil resources by reducing surface disturbance. Alternatives B, C, and D and the Proposed LUPA also would provide indirect protection to soil health and water quality by limiting the type and timing of permitted use associated with SRPs or SUPs.

Impacts from Lands and Realty Management on Soil and Water Resources

Impacts on Water Quality and Soil Health

Rights-of-Way

ROW actions could degrade water quality and soil resources through surface disturbance and potential leaks or spills from maintenance and construction. See discussion under general impacts from surface disturbance on soil and water about the impacts of surface disturbance on water quality and soil health. The proximity of ROW activities to water resources would ultimately determine the severity of impact from leaks or spills associated with ROWs.

Alternatives B, C, and D provide greater levels of indirect protections to soil and water than Alternative A. All three alternatives would indirectly benefit soil resources by reducing the future issuance of ROWs in GRSG habitat. However, because this disturbance could be shifted outside of GRSG habitat, the total net effect on these resources may be negligible, or it could vary, depending on the MZ in which the action is proposed. In the different MZs, the percentage of soils affected by these alternatives would vary greatly, as would the options for relocating proposed ROWs. Disturbances that are shifted outside of GRSG habitat could occur in soils more difficult to stabilize or reclaim than those within the protected habitat.

Alternative B identifies PHMA as exclusion areas. This would protect 2,294,200 more acres of PHMA than Alternative A. As mentioned above, this could shift ROW development outside of GRSG habitat, where soils may or may not be more difficult to stabilize or reclaim.

Alternative C identifies ADH as exclusion areas. This would protect 4,024,000 more acres of ADH than Alternative A. Similar to Alternative B, this could shift

ROW development outside of GRSG habitat where soils may or may not be more difficult to stabilize or reclaim.

Alternative D identifies sagebrush-occupied PHMA as avoidance areas. This would reduce but not preclude new ROW construction through PHMA. Similar to Alternatives B and C, but to a lesser extent, this could shift ROW development outside of GRSG habitat, where soils may or may not be more difficult to stabilize or reclaim

Under the Proposed LUPA, impacts would be similar to those described above for Alternative D. However, additional restrictions on land use and other authorizations would be included. Both PHMA and GHMA would be managed as avoidance areas (with exceptions for pending large transmission lines), aboveground structures would be prohibited within 1 mile of active leks, and surface disturbance would be limited to 3 percent in PHMA. Impacts on soil and water are similar to those described for Alternative D, with greater overall protection for soil and water, due to increased restrictions on disturbance and disruption. However, large local impacts are possible under the Proposed LUPA because PHMA and GHMA are open to pending large transmission lines.

Proposed Land Withdrawals

Mineral development could impact soil health and water quality through surface disturbance and potential leaks or spills from maintenance and construction. See discussion under general impacts from surface disturbance on soil and water about the impacts of surface disturbance on water quality and soil health. The proximity of mineral development to water resources would ultimately determine the severity of any impact from leaks or spills. Measures to propose land withdrawals would reduce the threat of adverse impacts on soil and water quality from mineral development.

Under Alternatives A and D, the BLM and Forest Service would not propose new mineral closures for GRSG conservation and protection.

Under Alternative B, the BLM and Forest Service would propose lands within PHMA for mineral withdrawal. In doing so, the BLM and Forest Service would protect soil resources and water quality by reducing the potential for surface disturbance and leaks and spills from mineral development. Assuming minerals could be developed across all PHMA, under Alternative B, the BLM and Forest Service would protect more acres from future additional disturbance than Alternatives A and D.

Under Alternative C, the BLM and Forest Service would propose all lands within GRSG habitat for mineral withdrawal. This would protect soil resources and water quality by reducing the potential for surface disturbance and leaks and spills from mineral development. Assuming minerals could be developed across all PHMA, under Alternative C, the BLM and Forest Service would protect

4,024,000 more acres from future disturbance than Alternatives A and D and 1,729,800 more acres than Alternative B.

Management of the lands program, specifically land tenure adjustments, would be the same under the Proposed LUPA as under Alternative D; impacts are therefore the same as those described under Alternative D.

Impacts from Range Management on Soil and Water Resources

Impacts on Water Quality and Soil Health

General Impacts from Range Management and Retirement of Grazing Privileges

If managed improperly, livestock grazing can remove effective ground cover (vegetation and litter accumulation). This can elevate potential soil erosion and result in indirect impacts on water quality. Grazing can alter reproduction capabilities in desirable vegetation communities. This effect can increase the potential for the establishment of undesirable species, which may lack soil stabilizing characteristics, over desirable vegetation species.

Grazing animals also can impair water quality by the following:

- Directly depositing manure and urine into surface water
- Depositing manure and urine near surface water where runoff and leaching can transport these materials into the water
- Accelerating erosion and sedimentation
- Altering aquatic habitat and stream flow
- Reducing the capacity of riparian vegetation to provide shade, filter contaminants, and stabilize stream banks and shorelines.

The impacts of livestock grazing on water quality can be managed by controlling the timing, intensity, duration, and spatial distribution of grazing.

Under Alternatives A, B, and D and the Proposed LUPA, livestock grazing would continue to be managed in the context of achieving BLM Colorado Public Land Health Standards. Grazing practices would be used that minimize impacts on soils and water quality.

Elimination of livestock grazing under Alternative C would maintain or improve overall watershed health and water quality on up to 4,148,500 acres (ADH). Elimination of livestock grazing would decrease hoof compaction of soil surfaces. When combined with the annual freeze-thaw cycle, this may decrease soil bulk density and improve soil moisture conditions, which facilitates vegetation germination and root development.

Removing livestock would also increase plant litter and live vegetation ground cover, which would provide more protection from wind and water erosion.

Eliminating livestock grazing under Alternative C would also eliminate water quality impacts associated with the deposition of manure and urine into surface water. However, there still could be degradation from wildlife use. Over time, riparian conditions would also improve under Alternative C. This alternative would provide more beneficial impacts on soil and water than Alternatives A, B, and D.

Riparian Areas and Wet Meadows. Riparian vegetation is essential for maintaining or improving water quality because it provides shade, filters contaminants, and stabilizes stream banks and shorelines. Management actions that maintain or enhance properly functioning riparian conditions would directly benefit soil and water.

Under Alternative A, riparian areas would continue to be managed to achieve BLM Colorado Public Land Health Standards and proper functioning condition or Forest Plan standards and guidelines.

Under the four action alternatives, the BLM and Forest Service would introduce additional guidelines for improving riparian health. This new guidelines would provide greater protection to riparian areas than Alternative A.

Structural Range Improvements and Livestock Management Tools. Developing water sources for livestock grazing can lead to changes in livestock distribution. This in turn can degrade soil health, increase erosion potential, and reduce water quality in area streams. Restricting or limiting water developments and diversions or decommissioning existing infrastructure may benefit water quality by maintaining or restoring natural biotic and hydrologic functions. On the other hand, better grazing plans that improve grazing on public lands often require range improvements or new stock water sources to better distribute livestock across a larger landscape.

Under Alternative B, the BLM and Forest Service would limit new water developments to only those that benefit PHMA. This would likely result in fewer water developments than under Alternative A and would result in a beneficial impact on soil health and water quality. However, restricting these developments would also reduce the tools available to the BLM and Forest Service to improve livestock distribution and use across an allotment. Under this alternative, there would be fewer tools available to improve vegetation and therefore soils within GRSG habitat.

Because all livestock would be eliminated under Alternative C, no new water developments are allowed within ADH. This alternative would have the greatest beneficial impact on soil and water.

Alternative D would limit new water developments to only those that do not result in GRSG habitat loss. This would likely result in fewer water developments than under Alternative A, but more than under Alternative B, and would result in a beneficial impact on soil health and water quality. However, restricting these developments would also reduce the tools available to the BLM and Forest Service to improve livestock distribution and use across an allotment. Under this alternative, there would be fewer tools available to improve vegetation and therefore soils within GRSG habitat.

The Proposed LUPA has impacts similar to Alternative D.

Impacts from Wild Horse Management on Soil and Water Resources

Impacts on Water Quality and Soil Health

Wild horses can have an adverse impact on water quality and soil health if populations reach levels above established management objectives. Impacts from improper management of wild horse would be similar to those described under impacts from range management on soil and water.

Under Alternative A, the BLM would prioritize wild horse gathers to protect a range of resource values, including soil and water.

Under Alternatives B and C, the BLM would prioritize gathers in PHMA. This includes 94,300 acres within two HMAs. If PHMA are a priority for horse gathers, wild horse populations in adjacent non-PHMA could reach levels above management objective. As a result, soil and water on 313,200 acres of non-PHMA (which includes all landownership within two HMAs and two herd areas) would be vulnerable to impacts from improper management of wild horses.

Under Alternative D, the BLM would prioritize gathers and herd management in ADH (184,200 acres), leaving 223,300 acres of undesignated habitat within HMAs and herd areas vulnerable to impacts from improper management of wild horses.

For the Proposed LUPA, wild horse management would be the same as Alternative D; impacts are therefore the same as those under Alternative D.

Impacts from Fluid Minerals Management on Soil and Water Resources

Unleased Fluid Minerals

Impacts on Water Quality and Soil Health

Fluid mineral development leads to impacts on soil and water through both surface disturbance and subsurface disturbance. See discussion under *General Impacts from Surface Disturbance on Soil and Water Resources* regarding the impacts of surface disturbance on water quality and soil health. Management actions that result in longer reaches for directional well drilling due to limits on

surface infrastructure could make impacts on groundwater quality more likely due to the longer distance required from the surface to the production zone.

Such subsurface disturbances as well construction and water developments can alter natural aquifer properties (e.g., enhance hydraulic conductivity of existing fractures, breach confining units, and change hydraulic pressure gradients). This can increase the potential for contamination of surface and groundwater resources along fractures or faults (BLM 2001). In near-stream alluvial aquifers (typical of groundwater in the planning area), groundwater contamination can be a major and potentially long-term contributor to contamination of surface water (US Geological Survey 2002). Furthermore, altering natural aquifer properties can result in dewatering of locally important freshwater sources, such as groundwater, springs, seeps, fens, and streams.

Impacts on groundwater can occur during drilling and completion activities due to surface spills, loss of drilling fluids, and loss of completion and hydraulic fracturing fluids into groundwater. Drilling fluids may be lost at any time in the drilling process due to changes in porosity or other properties of the rock being drilled through for both the surface casing and the production hole. When this occurs, drilling fluids may be introduced into the surrounding formations; this could, depending on local geology, include freshwater aquifers.

Chemical additives used in drilling, completion, and hydraulic fracturing may include acids, alcohols, hydrocarbons, thickening agents, lubricants, and other additives. These chemicals are used, and in some cases stored, on well pads. Fluids are forced into the production zone during completion and hydraulic fracturing. A portion of these fluids is sometimes retrieved and can be reused in other wells, but a portion of these fluids is likely to remain in the producing formations.

Proper well design typically involves setting surface casing and cementing behind the casing in the well ring to protect freshwater aquifers. With proper drilling and completion practices, it is highly unlikely that groundwater from different horizons would mix (commingling of aquifers) or that groundwater resources would be contaminated from drilling, completion, and hydraulic fracturing.

Alternative B closes PHMA to future fluid mineral leasing and development, which would protect all PHMA from additional future fluid mineral development. This would reduce soil erosion potential and sedimentation to area water bodies and would ultimately reduce impacts on water quality on 2,294,200 more acres than Alternative A. However, some of these impacts may be shifted to adjacent areas from PHMA. In some cases, this shifting of surface disturbance would be beneficial to water quality when disturbance is shifted farther from drainages and water resources. On the other hand, when this action shifts development closer to water sources and drainages it would create greater potential for water quality contamination.

Limitations on surface disturbance associated with fluid mineral development under Alternative B would likely result in longer reaches for directional well drilling. In turn, this could increase the likelihood of drilling and completion impacts on water quality, as described above.

Alternative C would apply restrictions similar to Alternative B except that these restrictions would apply to ADH. This would result in the same positive impacts as Alternative B on 4,024,000 more acres than Alternative A. A similar shift of impacts would occur under Alternative C as described for Alternative B. Limitations on surface disturbance associated with fluid mineral development under Alternative C would likely result in impacts similar to Alternative B. Because these surface restrictions cover ADH, instead of PHMA, these impacts would be greater under Alternative C than under Alternative B.

Alternative D would continue to allow development of fluid minerals in PHMA, but the BLM or Forest Service would apply NSO stipulations to protect sites that support sagebrush communities. As a result, 1,604,700 acres within PHMA would receive some protection from surface disturbance. Alternative D would be more protective of soil and water than Alternative A but less protective than Alternatives B and C. A similar shift of impacts would occur under Alternative D as described for Alternative B. Limitations on surface disturbance associated with fluid mineral development under Alternative D would likely result in impacts similar to those described for Alternative B. However, because the cap on surface disturbance under Alternative D allows for more surface disturbance than under Alternative B, this impact also would be less under Alternative D.

Proposed LUPA—Impacts from fluid minerals management on soil health and water quality would be similar to those under Alternative D, with greater protections for areas that overlap PHMA because disturbance would be managed not to exceed 3 percent.

Impacts on Water Quantity

Fluid mineral development requires substantial amounts of freshwater. If actions to limit oil and gas development were to reduce overall well numbers, there would be less need for freshwater for drilling. The likelihood of reduced well numbers is largely tied to the extent of restrictions on oil and gas development.

Under Alternatives A and D, the BLM and Forest Service management of oil and gas would be less restrictive, and it is unlikely that water depletions could be avoided. Under Alternatives B, C, and D and the Proposed LUPA, oil and gas development would likely be reduced, resulting in less demand for freshwater and a beneficial impact on water quantity in the region.

Leased Fluid Minerals

Impacts on Water Quality and Soil Health

Impacts on soil health and water quality from actions proposed for leased fluid minerals would be similar to those described above for unleased fluid minerals. Management actions that reduce surface disturbance would reduce some of these adverse impacts. However, management actions that result in longer reaches for directional well drilling due to limits on surface infrastructure could make impacts on groundwater quality more likely due to the longer distance required from the surface to the production zone.

Water resource values are not evenly distributed across the landscape. Limitations on surface disturbance may shift development away from GRSG habitat but could put water resources outside of habitat at higher risk of contamination. Depending on accessibility, quality, and quantity of the mineral resources present, shifting development outside of habitat may or may not put water resources at greater risk than if that same development occurred within habitat.

Because there is no development cap in habitat in current LUPs, Alternative A would afford the least protection (no acres protected from development) for soil and water from surface disturbance.

Because all action alternatives would require a full reclamation bond ensuring full and proper reclamation following approved disturbances, Alternatives B, C, and D would all be more protective than Alternative A. Under Alternative B, the BLM and Forest Service would protect 2,294,200 acres across PHMA. Seasonal restrictions in Alternatives B would protect more PHMA than Alternative A. These seasonal restrictions would offer additional protection to soils by reducing the potential for soil compaction during the spring.

Under Alternative C, the BLM and Forest Service would protect 4,024,000 acres across ADH and would not grant any waivers to new stipulations or disturbance caps. Alternative C identifies the same seasonal protection measures as Alternative B but extends them to ADH.

Alternative C also would prohibit evaporation ponds and infiltration reservoirs for coal bed methane wastewater in ADH. This would preclude impacts from surface disturbance and leaking ponds and reservoirs and overspray (vegetation and soil degradation caused by concentration of salts at the surface that leads to water quality degradation). However, Alternative C may increase the likelihood that water resources outside of GRSG habitats could be adversely impacted. This is because the greatest number of acres would be protected from development within habitats. Alternative C is more protective of soil and water than the other alternatives.

Alternative D would protect 1,604,700 acres of PHMA that is capable of supporting sagebrush communities only (a subset of PHMA). Seasonal restrictions in Alternative D would provide greater protection to PHMA than Alternative A by reducing potential soil compaction during the spring. However, Alternative D would provide fewer protections to soil and water than Alternatives B and C.

Proposed LUPA—Impacts from leased fluid minerals management on soil health and water quality provide more protections to GRSG and its habitat than Alternatives A and D. Because all of PHMA would be managed as no surface occupancy, with very rare exceptions, impacts would be similar to those for Alternative B.

Impacts from Solid, Locatable, and Salable Minerals Management on Soil and Water Resources

Impacts on Water Quality and Soil Health

Impacts on soil health and water quality from actions proposed for solid, locatable, and salable minerals are largely caused by surface disturbance. See discussion under *General Impacts from Surface Disturbance on Soil and Water* regarding the impacts of surface disturbance on water quality and soil health.

Management actions that reduce surface disturbance would also reduce adverse impacts on soil and water. Actions to restrict solid mineral extraction in GRSG habitat could shift development to other locations (assuming solid minerals are available in other locations) or could result in fewer new coal leases. Spills or leaks from mining equipment could contaminate surface water and groundwater.

Overall, the stipulations proposed under Alternatives B, C, and D would be more protective of soil and water from surface disturbance from surface mining than Alternative A. These stipulations would not preclude development of coal resources, most of which occurs underground. Still present under all alternatives are impacts on water quality from underground mining, such as mine dewatering, stormwater runoff from waste piles, subsidence, and reduced stream and spring flows (capture); however, the extent of impacts would vary, depending on the ability to secure new coal leases. Alternatives B, C, and D would promote reclamation of mineral pits no longer in use in PHMA, thus improving soil health and water quality in those areas.

Under Alternative B, the BLM and Forest Service would find PHMA unsuitable for surface mining, thus protecting 2,294,200 acres more than Alternative A. Also, the BLM and Forest Service would not allow new mineral material sales on this same number of acres. These measures could shift development outside of PHMA, with resulting impacts on soil and water in those areas.

Under Alternative C, ADH would be unsuitable for surface mining, protecting 4,024,003 more habitat than Alternative A. Also, the BLM and Forest Service

would not allow new mineral material sales on these same acres. These measures could lead to a shift in development outside of GRSG habitat, with resulting impacts on soil and water in those areas.

Under Alternative D, the BLM and Forest Service would institute a 5 percent surface disturbance cap where practical, protecting soil health and water quality on 1,604,700 more acres than under Alternative A. The development shift described above for Alternatives B and C would be less pronounced under Alternative D. Alternative D also emphasizes reclamation and restoration of unused pits. It also would promote reclamation of sites no longer in use and within ADH, while allowing existing facilities to expand under the 5 percent disturbance cap.

Proposed LUPA—Impacts on soil health and water quality under this alternative would be similar to those for Alternative D. However, there would be greater protection for soil health and water quality. This would be due to additional restrictions on surface disturbance (3 percent in PHMA instead of 5 percent under Alternative D).

Impacts on Water Quantity

Mineral extraction requires freshwater use and leads to some surface water depletions. If actions to limit surface disturbance in GRSG habitat have the effect to reduce overall mineral development, there would be less need for freshwater for mineral extraction; this could result in less surface water depletion.

The development caps proposed under action Alternatives B, C, and D and the Proposed LUPA would limit mineral extraction in GRSG habitat. This would reduce demand for freshwater in those areas.

Impacts from Mineral Split-Estate Management on Soil and Water Resources

Impacts on Water Quality and Soil Health

Impacts from mineral split estate management on soil and water would be the same as those described above for solid, locatable, and salable minerals management.

Alternatives B and C would apply the same conservation measures for mineral development on private surface ownership that are applied to public surface ownership in PHMA. This would protect soil and water in these areas. Surface disturbance footprints would likely be smaller to avoid disturbance cap thresholds, which would reduce the potential for erosion and sedimentation and would benefit water quality and soil health. Development could be shifted outside of GRSG habitat, with subsequent impacts in those areas. Alternative D would be more protective than Alternative A but less protective than Alternatives B and C.

Proposed LUPA—Impacts from managing fluid mineral split estate on soil health and water quality would be similar to those described under Alternative D, with greater protections for those areas that overlap PHMA. This is because disturbance would be managed not to exceed 3 percent.

Impacts from Wildfire Suppression on Soil and Water Resources

Impacts on Water Quality and Soil Health

Impacts on soil and water from planned and unplanned wildland fires are complex and involve changes in nutrient cycling, water infiltration and runoff, and erosion potential (Moody et al. 2008; Martin and Moody 2001). Fire-induced increases in runoff and sediment yield from wildlands are generally greatest 1 to 2 years following fire (Helvey 1980; Inbar et al. 1998; Robichaud 2005) and are typically reduced to background conditions within 10 years (Robichaud 2000).

Research has demonstrated that increases in post-fire runoff and sediment yield decline over time. Recovery of post-burn runoff and erosion rates to pre-fire conditions usually occurs within 5 years on rangeland sites (Wright and Bailey 1982); it depends on burn severity, vegetation recovery, litter deposition, debris recruitment, and soil water repellency (Pierson et al. 2008). Use of heavy equipment during surface-disturbing tactics to suppress fires can compact and displace soil. Also, adverse impacts on soil food webs and aquatic organisms are likely if ammonia-based fire retardant is misapplied. Effective fire prescriptions and post-fire rehabilitation can minimize these impacts.

In the short term, suppressing unplanned fires in areas of excessive fuel buildup can minimize high-severity fires and the associated impacts of vegetation loss and erosion. However, continued suppression of fires can result in increased fuel loading and can increase the risk of high-severity unplanned fires and related soil impacts in the long term.

Under Alternatives B, C, and D and the Proposed LUPA, the BLM and Forest Service would prioritize suppression in PHMA. This would reduce the impacts described above but could shift these impacts to areas outside of PHMA.

4.17.4 Summary of Impacts on Soil and Water Resources

Under Alternative A, soil and water would be the most adversely impacted of all four alternatives. This is because no additional stipulations and caps on surface disturbance would be introduced under this alternative.

Under Alternative B, the BLM and Forest Service would institute a 3 percent cap on surface disturbance. This would limit surface-disturbing activities, which have an adverse impact on soil and water. Also, compared to Alternative A, Alternative B would reduce impacts on soil and water by restrictions on existing surface-disturbing activities, a closure to new oil and gas leasing in PHMA, and proposed mineral withdrawals. In some cases, these actions may shift

development to areas outside of PHMA, with subsequent impacts on soil and water in those areas.

BLM and Forest Service management under Alternative C would be the most protective of soil and water. Under this alternative, the BLM and Forest Service would eliminate livestock grazing in the planning area, which would yield beneficial impacts over time on soil and water. The BLM and Forest Service would institute a 3 percent disturbance cap under Alternative C, which would cover a larger area than Alternative B. Thus, this alternative would protect soil and water over a larger area as well. In some cases, these actions may shift development to areas outside of PHMA, with subsequent impacts on soil and water in those areas.

BLM and Forest Service management under Alternative D would be less protective than Alternatives B and C but more protective than Alternative A. The BLM and Forest Service would institute a 5 percent disturbance cap in PHMA under Alternative D, which would allow for more development than Alternatives B and C. The resulting shift in development discussed above for Alternatives B and C would be less pronounced under Alternative D.

Impacts on soil and water from the Proposed LUPA would be similar to those described under Alternative D, with additional protections due to increased restrictions on disturbance in PHMA.

4.18 AIR QUALITY

4.18.1 General Description

This section is an analysis of potential impacts on air resources from implementing management actions and allowable uses to meet BLM and Forest Service resource and resource use objectives for the various programs. Actions that initiate or increase emissions of air pollutants can result in negative impacts on air resources, including increased concentrations of air pollutants, decreased visibility, increased atmospheric deposition on soils and vegetation, and acidification of sensitive water bodies. Actions that reduce or control emissions of air pollutants can be very effective at improving air quality and preventing degradation.

This section addresses the potential impacts of emissions of air pollutants from specific activities authorized, allowed, or performed by the BLM and Forest Service under each alternative. This analysis is derived from data available within the current draft and final EISs for the RMPs and RMP amendments for the planning area BLM field offices. For more detailed information regarding air resource impacts, refer to the Chapter 4 discussions within available draft and final EISs for the Northwest District field offices (**Table 4.8**).

Table 4.8
Documents Incorporated by Reference for Environmental Consequences—Air Resources

NEPA Document	Publication Year
Colorado River Valley RMP (Draft EIS)	2011
Grand Junction RMP (Draft EIS)	2013
Kremmling RMP (Draft EIS)	2011
Little Snake RMP (Final EIS)	2010
White River RMP (Final EIS)	1996
White River RMP Amendment (Draft EIS)	2012

4.18.2 Methodology and Assumptions

In general, the air resource impact analysis contained in each draft and final EIS referenced above consisted of an emissions approach to evaluate existing emissions levels and air quality conditions. These levels and conditions were compared with estimated future emissions for each alternative, based on predicted rates of growth and decline and the potential for impacts on future air quality conditions.

The purposes of conducting the emissions-based analysis were to evaluate the magnitude of emissions of each pollutant from BLM and Forest Service-authorized activities and to identify the potential for those emissions to cause adverse impacts on air quality in the context of existing air quality conditions. By identifying those activities with significant estimated emissions, the BLM and Forest Service can focus its air resource protection efforts more effectively. The emissions-based analysis was also used to evaluate increases in emissions from each activity over a base year for each alternative. This information is useful for evaluating the effect of various management actions on air emissions and for evaluating the effect of emission control strategies. This approach included the following steps:

1. Evaluate existing air quality conditions based on available air monitoring data and identify air quality issues
2. Identify management actions and activities in the planning area, authorized, permitted, or allowed by the BLM or Forest Service, that generate air pollutant emissions
3. Compile base year operational and production data for each identified emission-generating activity
4. Compile projected future development, operational, and production data for each identified emission-generating activity for the selected future years over the life of the plan

5. Calculate estimated current and projected future emissions of specific air pollutants for identified management actions and activities for each alternative and compile the calculations in an emissions inventory
6. Analyze the magnitude of predicted emissions for each activity and changes in estimated emissions over the base year and between alternatives to determine the potential for future impacts on air quality
7. Evaluate increases in estimated emissions from future BLM or Forest Service actions in the context of potential cumulative emissions within the planning area over the life of the plan to determine the potential for future impacts on air quality and the BLM or Forest Service incremental contribution
8. Model the emissions inventories and assumptions to predict potential direct, indirect, and cumulative impacts (where applicable)

The following emission-generating activities were identified as those management actions and activities authorized, permitted, allowed, or performed under the above draft and final EISs. These activities could emit regulated air pollutants and cause impacts on planning area air quality and in class I areas within 62 miles of the planning area:

- Fluid leasable minerals—Conventional oil and gas
- Fluid leasable minerals—Coal bed natural gas
- Fluid leasable minerals—Shale gas
- Solid leasable minerals—Coal
- Locatable minerals—Uranium and vanadium
- Salable minerals—Sand and gravel
- Lands and realty—ROWs
- Livestock grazing
- Comprehensive travel and transportation management
- Vegetation—Prescribed fire and mechanical treatment

Listed below are the identified air pollutants that could be emitted by management actions and activities authorized, permitted, allowed, or performed under the draft and final EISs identified above. Emissions of each of these pollutants were estimated for each identified activity and addressed for each alternative in the referenced analyses.

- Carbon monoxide (CO)
- Nitrogen oxides (NO_X)

- Particulate matter < 10 microns in diameter (PM_{10})
- Particulate matter < 2.5 microns in diameter ($PM_{2.5}$)
- Sulfur dioxide (SO_2)
- Volatile organic compounds (VOCs)
- Hazardous air pollutants (HAPs)

The analyses focused on estimating emissions from peak construction, production, and operations associated with the identified emissions-generating management actions and pollutants listed above. Future estimated emissions were calculated, and in general, management actions associated with oil and gas development represent the largest single sector of emissions for most of the air pollutants; therefore, peak development years for this sector were considered most conservative for calculating the maximum future year emissions.

The potential emissions were estimated for several BLM and Forest Service management actions and activities likely to occur under each alternative analyzed in the various draft and final EISs for each field office. Activities or management actions that could generate quantifiable emissions of regulated air pollutants are included.

Emissions from the following management actions were not estimated because the level of activity is not expected to change significantly between alternatives, and the magnitude of emissions from the activity is considered to be very small in comparison to other management activities: wild (unplanned) fires, fire suppression aircraft, invasive species and pest management, grassland and shrubland management, wild horse management, and activities related to heritage and visual resources, socioeconomic resources, and fish and wildlife resources.

For these management actions, sufficient operational or production data were not available to reliably quantify emissions.

For additional information on the emissions inventory, or a more detailed description of the methodologies and assumptions used in these analyses, refer to the individual RMP Technical Support Document for Air Resources, available on request from the BLM.

Methods of Analysis/Assumptions

Given the uncertainties concerning the number, nature, and specific location of future emission sources and activities, an oil and gas projected development comparison approach was used to provide an appropriate basis for analyzing potential impacts under the various alternatives. Any changes in emissions profiles for any planning area field office are based on the following major assumptions:

- Because oil and gas operations represent the largest portion of the emissions mass for the analyzed pollutants, only changes to these resources are analyzed to derive potential impacts relative to those described under existing and ongoing planning area field office RMPs.
- Emissions estimates are based on predictions of future mineral resource development potential scenarios, rather than on actual development projects.
- Any changes in potential air pollutant emissions presented in this analysis are useful for comparing the relative impacts of each alternative (as compared to planning area RMPs) and may not represent actual future emissions.
- Emissions from the following management actions were not estimated because the potential for development was considered low or speculative: oil shale research and development; geothermal, potash, gold, copper, and silver exploration and development; and miscellaneous gems and other salable materials development.

  Activities associated with underground coal mining and surface mining of uranium and vanadium can be major contributors to particulate matter emissions. Activities associated with travel management and road maintenance are predicted to contribute to some pollutant emissions as well.

  Each of the aforementioned authorized activities not related to oil and gas vary significantly within the planning area. Development impacts from GRSG management actions are too speculative to support a planning level, air quality analysis at this time. Further, emissions of pollutants from these activities unrelated to oil and gas did not contribute significantly to the degradation of air quality, as analyzed under the respective LUPs. In most cases the emissions were considered de minimis; therefore, no further analysis is warranted, given that GRSG management actions would likely be more restrictive on these activities; that is, they would reduce emissions.
- Surface area disturbances for oil and gas development are conservatively estimated at 5- and 10-acre increments to accommodate the well pad, access roads, and infrastructure development for single-well and multi-well pads. This assumes that restrictions placed on travel management would provide priority to already-disturbed project area reuse.
- The analysis presented is simplified and does not consider other Colorado MZ habitat TLs, CSU, stipulations, or other site-specific criteria for analyzing oil and gas development that may further restrict or shift the resource development.

The potential for management actions to contribute to future significant adverse impacts on air quality was analyzed in the context of existing air quality conditions within the planning area and predicted future growth or decline in emission-generating activities from GRSG management actions.

The estimated emissions (five criteria pollutants, volatile organic compounds, and hazardous air pollutants) from each RMP were compiled in an emissions inventory that represents the maximum future year emissions. Future emissions were based on the current management situation or baseline, depending on the current state of development of each field office's RMP. Where the RMP for a field office is final, Alternative A is the preferred or selected alternative, as described in the RMP's ROD. Where the RMP has not yet been finalized, Alternative A emissions from that analysis are shown below to illustrate the continuance of the current RMPs for those field offices. (Analyzing the preferred alternative from draft or proposed RMPs in this analysis would be pre-decisional.)

Baseline emissions represent Alternative A for this EIS (see **Table 4.9**). Estimated changes in emissions from BLM and Forest Service GRSG management actions over baseline levels vary by alternative. This comparative analysis relies on the impacted acres of federal mineral lands resulting from the GRSG management actions within the Colorado MZs as the primary indicator for quantifying emissions levels and relative air quality impacts.

Colorado Management Zone Analysis

The Colorado MZ analysis has been included to provide additional context and to act as the baseline indicator by which management alternatives can be analyzed. In some cases the Colorado MZs break across several different field office boundaries; while this may not cause significant analysis issues for other resources as a whole within the planning area, air resource analysis is complicated by this fact, given that the analysis is field office-specific and not landscape or regional in nature.

Every effort has been made to provide consistency between the Colorado MZ data and field office data; however, the weighted averaging methods used to split Colorado MZ areas into representative field office areas is not absolute in terms of GIS accuracy and may conflict with numbers presented in other EIS sections. The step was necessary, however, to ensure the highest-quality analysis, given the available data.

The Colorado MZ data in **Appendix E** provide the baseline data from which the air analysis begins. To determine the potential impacts on federal minerals development (the major emissions activity assumed to have the most influence on planning area air quality for this EIS), the anthropogenic and total GRSG habitat disturbance caps for each alternative had to be quantified (based on analyzed GIS data). The data also provide limited federal mineral potential for unleased lands within the Colorado MZs as well as the type of habitat.

Table 4.9
Baseline Pollutant Emissions

Field Office	Pollutants (Tons Per Year)							Notes
	PM_{10}	$PM_{2.5}$	Nitrogen Oxide	Sulfur Dioxide	CO	Volatile Organic Compounds	Hazardous Air Pollutants	
LSFO	1,977	1,511	8,643	80	15,930	16,476	1,648	Alternative C, emissions year 2026
CRVFO	1,950	200	423	1	805	3,382	418	Alternative A—no action, maximum planning emissions year 2028
KFO	795	182	449	5	700	5,914	117	Alternative B (surrogate for Alternative A—no action) emissions year 2028
WRFO	4,174	512	2,181	8	4,016	17,052	1,164	Alternative A—no action, emissions year 2028
GJFO	3,705	695	1,608	49	1,811	934	98	Alternative A—no action, planning year 2021

Sources: CRVFO Draft RMP Table 4.2.1-3, GJFO Draft RMP Table 4-2, KFO Draft RMP Table 4-3, LSFO Approved RMP Table 4-2, WRFO Draft RMP Amendment Table 4-16

Colorado MZs 18 through 21 do not contain PHMA or GHMA. These numbers represent LCHMA covered under ADH.

For each alternative, the applicable habitat cap was calculated as 3 percent of the total Colorado MZ area designated as the target habitat. Additionally, the remaining cap percent was calculated by dividing the existing disturbed Colorado MZ habitat area by the total target habitat area within each Colorado MZ. For each alternative, the theoretical well counts were calculated by dividing the remaining cap acres by the assumed disturbance factors outlined above (i.e., 5 or 10 acres per well). The theoretical well counts are then compared to the alternative RFD to see whether or not they can be supported in the given field office by considering the alternative's habitat area in relation to the field office's overall mineral lands, and an even distribution of the RFD across the area.

Development constraints are said to occur when the theoretical RFD in a designated habitat varies considerably from the overall percent of federal

minerals in the habitat. The analysis is simplified to account for only federal mineral lands, and not fee lands, since the necessary data were unavailable. The analysis further assumes that the GRSG RFD considered the mineral potential of the area as a whole to produce the new well counts.

4.18.3 Direct and Indirect Impacts on Air Quality

Impacts Common to All Alternatives

Air quality impacts can include changes in air pollutant concentrations, visibility, and lake chemistry and atmospheric deposition on soils and vegetation. Several key factors play a role in determining the severity of these impacts, such as the magnitude and chemistry of the air emissions, meteorological conditions, and topography.

Potential emissions changes were quantified for each of the alternatives as an indication of the potential magnitude of impacts on air quality, relative to those impacts described for each planning area field office's RMP analysis. No increases in potential emissions from the baseline are expected from any of the GRSG habitat management alternatives. All of the alternatives result in changes to emissions of air pollutants relative to the baseline that are either less than or equal to those annual mass emissions described under the planning area RMPs; therefore, the potential impacts that are described in the above-mentioned RMP analyses are considered conservative, based on the Colorado MZ restrictions analyzed for each alternative below.

All of the planning area field offices have conducted or are conducting planning-level air quality modeling to support their draft and final EISs from a cumulative analysis standpoint. Given that none of the alternatives in this analysis increase mass emissions previously analyzed under the planning area RMPs, those analyses and model results (if currently applicable) are incorporated by reference. This is to establish the representative or upper bounds of planning-level emissions impacts on air resources for this EIS. (Refer to those field office documents for a complete description of the impacts disclosed for the baseline alternative shown for this EIS.)

Although air quality modeling can be used to determine ambient concentrations of air pollutants and to assess potential impacts on air quality, the models depend on specific input data to predict these impacts. The input data include actual meteorological data, actual emissions data, emission source spatial and temporal data, and actual topographic data. At this stage of the planning process, project-specific data sets are not known; therefore, it is unforeseeable and unreasonable to model near field or far field impacts from development at this time.

Proponents of future mineral development projects would be requested to provide this data to the BLM and Forest Service to analyze project impacts on ambient air resources at the time that a project is proposed. This would be

accomplished through an appropriate and required NEPA analysis. The analysis may include air quality modeling (where emissions are significant) to determine whether the project could exceed or violate any ambient standards or cause significant adverse impacts on air quality, including air quality-related values.

Implementing the resource area closures and maintaining the disturbance caps as outlined in each of the alternatives could drive oil and gas resource development into more concentrated areas. In most cases more compact development is highly desirable from both an environmental and economic standpoint. The most obvious benefits include less overall surface disturbance and traffic within the planning area and collocated or centralized collection, processing, and distribution facilities. Potential benefits may include the ability to remotely monitor using telemetry operations on economies of scale that make such options feasible.

Another potential side effect of implementation is more careful planning and coordination among proponents for resource development. Independently owned adjacent parcels could be unified to facilitate more efficient planning and conservation for activities that would count against the disturbance caps. Concentrating development can result in greater local air quality impacts.

The BLM and Forest Service would continue to review actual projects on a case-by-case basis to determine appropriate mitigation from such developments as they occur. Additionally, more concentrated facilities may also subject operators to more stringent permitting requirements because their sites as a whole may exceed permitting thresholds on a more regular basis. This would have the result of providing additional emissions oversight for the project beyond what is required for NEPA.

The remainder of this document focuses on determining whether or not the projected GRSG RFD can be accommodated under the proposed CAP limits and how potential reductions in development (if any) from the alternatives compare to potential impacts from the referenced RMP air quality analyses.

Alternative A

Under Alternative A, resource management objectives described under the planning area's existing RMPs would continue. All the current surface protections and mitigation measures would be stipulated or conditioned for approval and required on a case-by-case basis, without specific and further consideration of GRSG, unless already explicitly included in any planning area RMP (**Table 4.10**).

Little Snake Field Office and Routt National Forest

The GRSG RFD for Alternative A represents a 59 percent decrease in total development from that considered as part of the baseline inventory for the LSFO. Thus, it can be reasoned that there could be a corresponding drop in

Table 4.10
Alternative A GRSG RFD

Field Office	Baseline RFD Total Wells	20-Year RFD Federal Wells	20-Year RFD Total Wells	Percent RFD Change	Change Type
LSFO	2,425	585	983	59	Decrease
CRVFO	12,072	3,480	14,318	118	Increase
KFO	192	131	179	7	Decrease
WRFO	4,603	3,844	4,620	0.4	Increase
GJFO	1,480	1,365	2,532	171	Increase

emissions by a similar fraction. The alternative in the final LSFO EIS that best approximates the impacts associated with the GRSG RFD is Alternative D. However, Alternative D anticipated approximately 1,682 wells, and thus the impacts are probably still over-predicted by up to 9 percent. The reduced GRSG RFD would reduce impacts on air quality within the LSFO.

Colorado River Valley Field Office

The GRSG RFD for Alternative A represents a 118 percent increase in total development from that considered as part of the baseline inventory for the CRVFO. Thus, it can be reasoned that there could be a corresponding increase in emissions by a similar fraction. The alternative in the draft CRVFO EIS that best approximates the impacts associated with the GRSG RFD is Alternative D. However, Alternative D anticipated approximately 15,664 wells, and thus the impacts are probably over-predicted by approximately 9 percent.

Kremmling Field Office

The GRSG RFD for Alternative A represents a 7 percent decrease in total development from that considered as part of the baseline inventory for the KFO. Although the development deviates from the baseline, it is not significant enough to provide a reasonable correlation to another draft EIS alternative that was analyzed and referenced here. Therefore, the baseline emissions and subsequent impacts analyzed under the referenced RMP (Alternative B) is representative of this GRSG alternative.

White River Field Office

The GRSG RFD for Alternative A represents a 0.4 percent increase in total development from that considered as part of the baseline inventory for the WRFO. The development does not deviate significantly from the baseline for this GRSG alternative. Therefore, the baseline emissions and subsequent impacts analyzed under the referenced RMP (Alternative A) is representative of this GRSG alternative.

Grand Junction Field Office

The GRSG RFD for Alternative A represents a 171 percent increase in total development from that considered as part of the baseline inventory for the GJFO. Thus, it can be reasoned that there could be a corresponding increase in

emissions by a similar fraction. The alternative in the draft GJFO that best approximates the impacts associated with the GRSG RFD is Alternative B. However, Alternative B anticipated approximately 2,040 wells, and thus the impacts are probably under-predicted by approximately 20 percent.

Colorado Air Resources Management Modeling Study

In an effort to obtain region-wide projected impacts from applicable land management activities, the BLM has initiated the Colorado Air Resources Management Modeling Study (CARMMS). The study used the Comprehensive Air-quality Model with extensions (CAMx) to predict statewide impacts on air quality and air quality related values (AQRVs) from projected oil and gas development out to year 2021 for three development scenarios (low, medium, and high).

Each BLM field office was modeled with the source apportionment option, meaning that incremental impacts on regional ozone and AQRVs from development in these areas are essentially tracked to better understand the significance of such development on impacted resources and populations. With respect to each field office in the GRSG planning area, current development rates have been tracking along the low development scenario analyzed by CARMMS.

In addition to the individual field offices, the study also contains groups of rolled-up emissions source apportionment source categories to disclose quasi-cumulative impacts up to and including all of the modeled sources within the domain. Given that CAMx is a one-atmosphere model, this includes all of the sources of known emissions within the nested domains, including the global inputs, the continental US 22-mile and 7-mile emissions inventories, and the 2-mile inventories relative to Colorado and neighboring states. All of the CARMMS study data (full report and results data) is available on the BLM website:
http://www.blm.gov/co/st/en/BLM_Information/nepa/air_quality/carmms.html.

Alternative B

Under Alternative B, the unleased PHMA identified for each Colorado MZ in the planning area would be closed to future leasing. Any currently leased PHMA would be subject to anthropogenic disturbance caps set at 3 percent of the total habitat area (**Table 4.11** and **Table 4.12**).

Little Snake Field Office and Routt National Forest

An analysis of unleased mineral potential within the Colorado MZs contained either wholly or partially within the LSFO suggests that approximately 56 percent of these mineral lands have been rated as either high or medium in relation to their economic mineral potential (development potential given current technology and market conditions). No data are available for the currently leased portions of the Colorado MZs, but those data are assumed to

Table 4.11
Alternative B Field Office Colorado Management Zone Analysis of PHMA

Field Office	RMP Acres Available for Lease	Colorado MZ Federal Mineral Acres	Colorado MZ Total Federal PHMA Acres	Unleased Colorado MZ Federal PHMA Acres	Disturbance Cap Acres (3 Percent)	Existing Human Disturbance	Remaining Cap Acres
LSFO	1,900,280	1,407,324	1,336,750	749,165	40,103	13,761	26,342
CRVFO	679,200	99,580	94,767	40,110	2,843	1,771	1,072
KFO	642,900	355,875	591,805	176,225	17,754	10,560	7,194
WRFO	1,240,500	586,918	294,534	148,886	8,836	4,378	4,458
GJFO	961,600	23,256	47,301	22,385	1,419	741	678

Table 4.12
Alternative B GRSG RFD Analysis

Field Office	20-Year RFD Federal	20-Year RFD Fee	Theoretical Cap Well Counts		Percent PHMA of Field Office Mineral (Federal)	Can the Well Counts be Accommodated?		Field Office RFD Impact Based on PHMA Per-cent?	RFD Disturb-ance within PHMA
			5-Acre	10-Acre		5-Acre	10-Acre		
LSFO	552	343	5,268	2,634	70	True	True	N/A	NA
CRVFO	3,286	9,754	214	107	14	False	False	Yes	1.64%
KFO	124	39	1,439	719	92	True	True	Na	NA
WRFO	3,630	577	892	446	24	False	False	No	21.19%
GJFO	1,289	1,017	136	68	5	False	False	No	5.88%

be similar for this analysis. Application of this assumption would suggest that approximately 329,305 acres of federal minerals within the currently leased portions of the Colorado MZs could be ripe for mineral extraction.

The current estimate of anthropogenic habitat disturbance within the applicable Colorado MZs is equal to approximately 13,800 acres, which represents about 34 percent of the available cap. Using the disturbance area per well assumptions of 5 and 10 acres per well for access, pad, and infrastructure, the projected development could result in surface disturbance areas of between 4,475 and 8,950 acres within the LSFO for the Alternative B RFD.

There is no way to know how, where, and when RMP-projected development would occur within the LSFO, and actual development would depend highly on the site-specific factors of accessibility, actual mineral potential, and other resource concerns for existing Colorado MZ leases and non-MZ mineral lands (i.e., federal, state, and private). Even though 70 percent of the LSFO federal oil

and gas is within PHMA, the projected disturbance from the RFD wells could still be accommodated within the 3 percent cap on either the 5- or 10-acre per well basis. This is primarily due to the fact that there is so much habitat land within the field office, and the projected 20-year development is relatively low.

The RMP air resource impacts analyses that most closely approximate this alternative are the same as those described under Alternative A.

Colorado River Valley Field Office

An analysis of unleased mineral potential within the Colorado MZs contained either wholly or partially within the CRVFO suggests that approximately 42 percent of these mineral lands have been rated as either high or medium in relation to their economic mineral potential (development potential given current technology and market conditions). No data are available for the currently leased portions of the Colorado MZs, but those data are assumed to be similar for this analysis. Application of this assumption would suggest that approximately 23,134 acres of federal minerals within the currently leased portions of the Colorado MZs could be ripe for mineral extraction.

The current estimate of anthropogenic habitat disturbance within the applicable Colorado MZs is equal to approximately 1,771 acres, which represents about 62 percent of the available cap. Using the disturbance area per well assumptions of 5 and 10 acres per well for access, pad, and infrastructure, it can be estimated that the projected development could result in surface disturbance areas of between 65,200 and 130,400 acres within the CRVFO for the Alternative B RFD.

Only 14 percent of the CRVFO federal oil and gas is within PHMA, and thus there is no way to accommodate all of the projected development within the Colorado MZ's 3 percent disturbance cap (which would be an unreasonable assumption to begin with). If we assume an even distribution of development across the field office mineral resources, the projected disturbance from the RFD wells could still be accommodated within the field office on either the 5- or 10-acre per well basis. This is primarily due to the fact that there is relatively little habitat land within the field office, even though there is an appreciable amount of projected development (most of which is not federal). The remaining cap acres in PHMA suggest that an additional 214 or 107 wells could be supported on a 5- or 10-acre per well disturbance allocation basis, respectively. This represents a maximum of 1.64 percent of the GRSG RFD.

There is no way to know how, where, and when RMP-projected development would occur within the CRVFO, and actual development would depend highly on the site-specific factors of accessibility, actual mineral potential, and other resource concerns for existing Colorado MZ leases and non-MZ mineral lands (i.e., federal, state, and private). Maintaining the 3 percent cap within PHMA has a high likelihood of decreasing, shifting, or concentrating development onto non-PHMA lands that could have been accommodated within the Colorado MZ;

however, the extent and relative impacts are unforeseeable absent specific development plans. The high likelihood assessment is based on the fact that the supported RFD in the PHMA cap is much lower than the percent of oil and gas resources within PHMA (assumes an even distribution of wells across the resource at the lower per well disturbance allocation basis).

The draft RMP air resource impacts analyses that most closely approximate this alternative are the same as those described under Alternative A.

Kremmling Field Office

An analysis of unleased mineral potential within the Colorado MZs contained either wholly or partially within the KFO suggests that approximately 30 percent of these mineral lands have been rated as either high or medium in relation to their economic mineral potential (development potential given current technology and market conditions). No data are available for the currently leased portions of the Colorado MZs, but those data are assumed to be similar for this analysis. Application of this assumption would suggest that approximately 123,750 acres of federal minerals within the currently leased portions of the Colorado MZs could be ripe for mineral extraction.

The current estimate of anthropogenic habitat disturbance within the applicable Colorado MZs is equal to approximately 10,560 acres, which represents about 59 percent of the available cap. Using the disturbance area per well assumptions of 5 and 10 acres per well for access, pad, and infrastructure, it can be estimated that the projected development could result in surface disturbance areas of between 815 and 1,630 acres within the KFO for the Alternative B RFD.

There is no way to know how, where, and when RMP-projected development would occur within the KFO, and actual development would depend highly on the site-specific factors of accessibility, actual mineral potential, and other resource concerns for existing Colorado MZ leases and non-MZ mineral lands (i.e., federal, state, and private). Even though 92 percent of the KFO federal oil and gas is within PHMA, the projected disturbance from the RFD wells could still be accommodated within the 3 percent disturbance cap on either the 5- or 10-acre per well basis. This is primarily due to the fact that there is so much habitat land within the field office, and the projected 20-year development is extremely low.

The draft RMP air resource impacts analyses that most closely approximate this alternative are the same as those described under Alternative A.

White River Field Office

An analysis of unleased mineral potential within the Colorado MZs contained either wholly or partially within the WRFO suggests that approximately 51 percent of these mineral lands have been rated as either high or medium in relation to their economic mineral potential (development potential given current technology and market conditions). No data are available for the

currently leased portions of the Colorado MZs, but those data are assumed to be similar for this analysis. Application of this assumption would suggest that approximately 73,625 acres of federal minerals within the currently leased portions of the Colorado MZs could be ripe for mineral extraction.

The current estimate of anthropogenic habitat disturbance within the applicable Colorado MZs is equal to approximately 4,378 acres, which represents about 50 percent of the available cap. Using the disturbance area per well assumptions of 5 and 10 acres per well for access, pad, and infrastructure, the projected development could result in surface disturbance areas of between 21,035 and 42,070 acres within the WRFO for the Alternative B RFD.

Approximately 24 percent of the WRFO federal oil and gas is within PHMA, and thus there is no way to accommodate all of the projected development within the Colorado MZ's 3 percent cap (which would be an unreasonable assumption to begin with). The remaining cap acres in PHMA suggest that an additional 892 or 446 wells could be supported on a 5- or 10-acre per well disturbance allocation basis, respectively. This represents a maximum of 21 percent of the projected GRSG RFD development (5-acre spacing basis) within the field office.

There is no way to know how, where, and when RMP-projected development would occur within the WRFO, and actual development would depend highly on the site-specific factors of accessibility, actual mineral potential, and other resource concerns for existing Colorado MZ leases and non-MZ mineral lands (i.e., federal, state, and private). Maintaining the 3 percent disturbance cap within PHMA has a moderate likelihood of shifting or concentrating development onto non-PHMA lands that could have been accommodated within the Colorado MZ; however, the extent and relative impacts are unforeseeable absent specific development plans. The moderate likelihood assessment is based on the fact that the supported RFD in the PHMA cap is approximately the same percentage as the oil and gas resources within PHMA (assumes an even distribution of wells across the resource at the lower per well disturbance allocation basis).

The draft RMP air resource impacts analyses that most closely approximate this alternative are the same as those described under Alternative A.

Grand Junction Field Office

An analysis of unleased mineral potential within the Colorado MZs contained either wholly or partially within the GJFO suggests that approximately 47 percent of these mineral lands have been rated as either high or medium in relation to their economic mineral potential (development potential given current technology and market conditions). No data are available for the currently leased portions of the Colorado MZs, but those data are assumed to be similar for this analysis. Application of this assumption would suggest that approximately 11,792 acres of federal minerals within the currently leased portions of the Colorado MZs could be ripe for mineral extraction.

The current estimate of anthropogenic habitat disturbance within the applicable Colorado MZs is equal to approximately 741 acres, which represents about 48 percent of the available cap. Using the disturbance area per well assumptions of 5 and 10 acres per well for access, pad, and infrastructure, it can be estimated that the projected development could result in surface disturbance areas of between 11,530 and 23,060 acres within the GJFO for the Alternative B RFD.

Only 5 percent of the GJFO federal oil and gas is within PHMA, and thus it is unlikely to accommodate all of the projected development within the Colorado MZ's 3 percent cap (which would be an unreasonable assumption to begin with). The remaining cap acres in PHMA suggest that an additional 136 or 68 wells could be supported on a 5- or 10-acre per-well disturbance allocation basis. This represents a maximum of 6 percent of the projected GRSG RFD development (5-acre spacing basis) within the field office.

There is no way to know how, where, and when RMP-projected development would occur within the GJFO, and actual development would depend highly on the site-specific factors of accessibility, actual mineral potential, and other resource concerns for existing Colorado MZ leases and non-MZ mineral lands (i.e., federal, state, and private).

Maintaining the 3 percent cap within PHMA has a low likelihood of shifting or concentrating development onto non-PHMA lands that could have been accommodated within the Colorado MZ; however, the extent and relative impacts are unforeseeable absent specific development plans. The low likelihood assessment is based on the fact that the supported RFD in the PHMA cap is approximately the same percentage as the oil and gas resources within PHMA (assumes an even distribution of wells across the resource at the lower per well disturbance allocation basis).

The draft RMP air resource impacts analyses that most closely approximate this alternative are the same as those described under Alternative A.

Alternative C

Under Alternative C, ADH, which includes PHMA, GHMA, and any associated LCHMA identified for each Colorado MZ in the planning area, would be closed to future leasing. Any currently leased ADH would be subject to the anthropogenic disturbance cap defined as 3 percent of the respective GRSG habitat (**Table 4.13** and **Table 4.14**).

Little Snake Field Office and Routt National Forest

An analysis of unleased mineral potential within the Colorado MZs contained either wholly or partially within the LSFO suggests that approximately 51 percent of these mineral lands have been rated as either high or medium in relation to their economic mineral potential (development potential given current technology and market conditions).

Table 4.13
Alternative C Field Office Colorado Management Zone Analysis of All Designated Habitat

Field Office	RMP Acres Available for Lease	Colorado MZ Federal Mineral Acres	Colorado MZ Total Federal ADH Acres	Unleased Colorado MZ Federal ADH Acres	Disturbance Cap Acres (3 Percent)	Existing Human Disturbance	Remaining Cap Acres
LSFO	1,900,280	1,407,324	2,349,477	770,021	70,484	53,987	16,498
CRVFO	679,200	99,580	145,980	66,177	4,379	2,642	1,738
KFO	642,900	355,875	711,478	229,833	21,344	13,527	7,817
WRFO	1,240,500	586,918	862,634	218,943	25,879	14,980	10,899
GJFO	961,600	23,256	78,617	11,002	2,359	1,270	1,089

Table 4.14
Alternative C GRSG RFD Analysis

Field Office	20-Year RFD Federal	20-Year RFD Fee	Theoretical Cap Well Counts		Percent ADH of Field Office Mineral (Federal)	Can the Well Counts be Accommodated?		Field Office RFD Impact Based on ADH Percent?	RFD Disturbance within ADH
			5-Acre	10-Acre		5-Acre	10-Acre		
LSFO	548	345	3,300	1,650	124	TRUE	TRUE	NA	NA
CRVFO	3,259	9,740	348	174	21	FALSE	FALSE	YES	2.67%
KFO	123	40	1,563	782	111	TRUE	TRUE	NA	NA
WRFO	3,600	595	2,180	1,090	70	FALSE	FALSE	YES	51.96%
GJFO	1,278	1,020	218	109	8	FALSE	FALSE	NO	5.88%

No data are available for the currently leased portions of the Colorado MZs, but those data are assumed to be similar for this analysis. Application of this assumption would suggest that approximately 587,123 acres of federal minerals within the currently leased portions of the Colorado MZs could be ripe for mineral extraction.

The current estimate of anthropogenic habitat disturbance within the applicable Colorado MZs is equal to approximately 53,987 acres, which represents about 77 percent of the available cap. Using the disturbance area per well assumptions of 5 and 10 acres per well for access, pad, and infrastructure, the projected development could result in surface disturbance areas of between 4,460 and 8,920 acres within the LSFO for the Alternative C RFD.

There is no way to know how, where, and when RMP-projected development would occur within the LSFO, and actual development would depend highly on the site-specific factors of accessibility, actual mineral potential, and other resource concerns for existing Colorado MZ leases and non-MZ mineral lands (i.e., federal, state, and private).

Even though essentially all of the LSFO federal oil and gas is within ADH habitat, the projected disturbance from the RFD wells could still be accommodated within the 3 percent cap on either the 5- or 10-acre per well basis. This is primarily due to the fact that there is so much habitat land within the field office, and the projected 20-year development is relatively low.

The draft RMP air resource impacts analyses that most closely approximate this alternative are the same as those described under Alternative A.

Colorado River Valley Field Office

An analysis of unleased mineral potential within the Colorado MZs contained either wholly or partially within the CRVFO suggests that approximately 55 percent of these mineral lands have been rated as either high or medium in relation to their economic mineral potential (development potential given current technology and market conditions). No data are available for the currently leased portions of the Colorado MZs, but those data are assumed to be similar for this analysis. Application of this assumption would suggest that approximately 36,199 acres of federal minerals within the currently leased portions of the Colorado MZs could be ripe for mineral extraction.

The current estimate of anthropogenic habitat disturbance within the applicable Colorado MZs is equal to approximately 2,642 acres, which represents about 60 percent of the available cap. Using the disturbance area per well assumptions of 5 and 10 acres per well for access, pad, and infrastructure, the projected development could result in surface disturbance areas of between 65,000 and 130,000 acres within the CRVFO for the Alternative C RFD. Approximately 21 percent of the CRVFO federal oil and gas is within ADH habitat.

There is no way to accommodate all of the projected development within the Colorado MZ's 3 percent cap (which would be an unreasonable assumption to begin with). The remaining cap acres in ADH suggest that an additional 384 or 174 wells could be supported on a 5- or 10-acre per well disturbance allocation basis, respectively. This represents a maximum of 2.67 percent of the GRSG RFD.

There is no way to know how, where, and when RMP-projected development would occur within the CRVFO, and actual development would depend highly on the site-specific factors of accessibility, actual mineral potential, and other resource concerns for existing Colorado MZ leases and non-MZ mineral lands (i.e., federal, state, and private). Maintaining the 3 percent cap within the ADH habitat has a high likelihood of decreasing, shifting, or concentrating development onto non-PHMA lands that could have been accommodated within the MZ; however, the extent and relative impacts are unforeseeable without specific development plans. The high likelihood assessment is based on the fact that the supported RFD in the ADH Cap is much lower than the percent of oil and gas resources within ADH (assumes an even distribution of wells across the resource at the lower per well disturbance allocation basis).

The draft RMP air resource impacts analyses that most closely approximate this alternative are the same as those described under Alternative A.

Kremmling Field Office

An analysis of unleased mineral potential within the Colorado MZs contained either wholly or partially within the KFO suggests that approximately 27 percent of these mineral lands have been rated as either high or medium in relation to their economic mineral potential (development potential given current technology and market conditions). No data are available for the currently leased portions of the Colorado MZs, but those data are assumed to be similar for this analysis. Application of this assumption would suggest that approximately 140,812 acres of federal minerals within the currently leased portions of the MZs could be ripe for mineral extraction.

The current estimate of anthropogenic habitat disturbance within the applicable Colorado MZs is equal to approximately 13,527 acres, which represents about 63 percent of the available cap. Using the disturbance area per well assumptions of 5 and 10 acres per well for access, pad, and infrastructure, it can be estimated that the projected development could result in surface disturbance areas of between 815 and 1,630 acres within the KFO for the Alternative C RFD.

There is no way to know how, where, and when RMP-projected development would occur within the KFO, and actual development would depend highly on the site-specific factors of accessibility, actual mineral potential, and other resource concerns for existing Colorado MZ leases and non-MZ mineral lands (i.e., federal, state, and private).

Even though essentially all of the KFO federal oil and gas is within ADH habitat, the projected disturbance from the RFD wells could still be accommodated within the 3 percent cap on either the 5- or 10-acre per well basis. This is primarily due to the fact there is so much habitat land within the field office, and the projected 20-year development is extremely low.

The draft RMP air resource impacts analyses that most closely approximate this alternative are the same as those described under Alternative A.

White River Field Office

An analysis of unleased mineral potential within the Colorado MZs contained either wholly or partially within the WRFO suggests that approximately 56 percent of these mineral lands have been rated as either high or medium in relation to their economic mineral potential (development potential given current technology and market conditions). No data are available for the currently leased portions of the Colorado MZs, but current data are assumed to be similar for this analysis. Application of this assumption would suggest that approximately 212,692 acres of federal minerals within the currently leased portions of the MZs could be ripe for mineral extraction.

The current estimate of anthropogenic habitat disturbance within the applicable Colorado MZs is equal to approximately 14,980 acres, which represents about 58 percent of the available cap. Using the disturbance area per well assumptions of 5 and 10 acres per well for access, pad, and infrastructure, the projected development could result in surface disturbance areas of between 20,975 and 41,950 acres within the WRFO for the Alternative C RFD.

Approximately 24 percent of the WRFO federal oil and gas is within ADH habitat, and thus there is no way to accommodate all of the projected development within the MZ's 3 percent cap (which would be an unreasonable assumption to begin with). The remaining cap acres in ADH suggest that an additional 2,180 or 1,090 wells could be supported on a 5- or 10-acre per well disturbance allocation basis, respectively. This represents a maximum of 52 percent of the projected GRSG RFD development (5-acre spacing basis) within the field office.

There is no way to know how, where, and when RMP-projected development would occur within the WRFO, and actual development would depend highly on the site-specific factors of accessibility, actual mineral potential, and other resource concerns for existing Colorado MZ leases and non-MZ mineral lands (i.e., federal, state, and private).

Maintaining the 3 percent cap within the ADH habitat has a high likelihood of shifting or concentrating development onto non-PHMA lands that could have been accommodated within the MZ; however, the extent and relative impacts are unforeseeable absent specific development plans. The moderate likelihood assessment is based on the fact that the supported RFD in the ADH cap is significantly less than the percentage of oil and gas resources within ADH (assumes an even distribution of wells across the resource at the lower per well disturbance allocation basis).

The draft RMP air resource impacts analyses that most closely approximate this alternative are the same as those described under Alternative A.

Grand Junction Field Office

An analysis of unleased mineral potential within the Colorado MZs contained either wholly or partially within the GJFO suggests that approximately 61 percent of these mineral lands have been rated as either high or medium in relation to their economic mineral potential (development potential given current technology and market conditions). No data are available for the currently leased portions of the MZs, but current data are assumed to be similar for this analysis. Application of this assumption would suggest that approximately 18,713 acres of federal minerals within the currently leased portions of the MZs could be ripe for mineral extraction.

The current estimate of anthropogenic habitat disturbance within the applicable Colorado MZs is equal to approximately 1,270 acres, which represents about

54 percent of the available cap. Using the disturbance area per well assumptions of 5 and 10 acres per well for access, pad, and infrastructure, it can be estimated that the projected development could result in surface disturbance areas of between 11,495 and 22,990 acres within the GJFO for the Alternative C RFD.

Only 8 percent of the GJFO federal oil and gas is within ADH habitat, and thus there is no way to accommodate all of the projected development within the MZ's 3 percent cap (which would be an unreasonable assumption to begin with). The remaining cap acres in ADH suggest that an additional 218 or 109 wells could be supported on a 5- or 10-acre per well disturbance allocation basis, respectively. This represents a maximum of 9.47 percent of the projected GRSG RFD development (5-acre spacing basis) within the field office.

There is no way to know how, where, and when RMP-projected development would occur within the GJFO, and actual development would depend highly on the site-specific factors of accessibility, actual mineral potential, and other resource concerns for existing MZ leases and non-MZ mineral lands (i.e., federal, state, and private).

Maintaining the 3 percent cap within the ADH habitat has a low likelihood of shifting or concentrating development onto non-ADH lands that could have been accommodated within the MZ; however, the extent and relative impacts are unforeseeable absent specific development plans. The low likelihood assessment is based on the fact that the supported RFD in the ADH cap is approximately the same percentage as the oil and gas resources within ADH (assumes an even distribution of wells across the resource at the lower per well disturbance allocation basis).

The draft RMP air resource impacts analyses that most closely approximate this alternative are the same as those described under Alternative A.

Alternative D

Under Alternative D, the unleased PHMA identified for each Colorado MZ in the planning area would be subject to an NSO for any future leasing. Any currently leased PHMA would be subject to anthropogenic disturbance caps set at 3 percent of the total habitat area.

For the purposes of this analysis, Alternative D is considered to be identical to Alternative B. There is no way to predict with any degree of confidence how an NSO stipulation would or could affect development for a planning-level analysis. For more information on Alternative D potential impacts, refer to the Alternative B analysis. (Refer to **Table 4.15** and **Table 4.16**.)

Proposed LUPA

Under the Proposed LUPA, the unleased PHMA identified for each Colorado MZ in the planning area would be subject to a NSO for any future leasing.

Table 4.15
Alternative D Field Office Management Zone Analysis of PHMA NSO

Field Office	RMP Acres Available for Lease	Colorado MZ Federal Mineral Acres	Colorado MZ Total Federal PHMA Acres	Unleased Colorado MZ Federal PHMA Acres	Disturbance Cap Acres (3 Percent)	Existing Human Disturbance	Remaining Cap Acres
LSFO	1,900,280	1,407,324	1,336,750	749,165	40,103	13,761	26,342
CRVFO	679,200	99,580	94,767	40,110	2,843	1,771	1,072
KFO	642,900	355,875	591,805	176,225	17,754	10,560	7,194
WRFO	1,240,500	586,918	294,534	148,886	8,836	4,378	4,458
GJFO	961,600	23,256	47,301	22,385	1,419	741	678

Table 4.16
Alternative D GRSG RFD Analysis

Field Office	20-Year RFD Federal	20-Year RFD Fee	Theoretical Cap Well Counts		Percent PHMA of Field Office Mineral (Federal)	Can the Well Counts be Accommodated?		Field Office RFD Impact Based on PHMA Percent?	RFD Disturbance within PHMA
			5-Acre	10-Acre		5-Acre	10-Acre		
LSFO	552	343	5,268	2,634	70	TRUE	TRUE	NA	NA
CRVFO	3,286	9,754	214	107	14	FALSE	FALSE	YES	1.64%
KFO	124	39	1,439	719	92	TRUE	TRUE	NA	NA
WRFO	3,630	577	892	446	24	FALSE	FALSE	NO	21.19%
GJFO	1,289	1,017	136	68	5	FALSE	FALSE	NO	5.88%

Additionally, there would be no leasing within 1 mile of any GRSG lek. Any currently leased PHMA would be subject to anthropogenic disturbance caps set at 3 percent of the total habitat area.

For the purposes of this analysis, the Proposed LUPA is considered the same as Alternative B. There is no way to predict with any degree of confidence how an NSO stipulation would or could affect development for a planning-level analysis. Additionally, unless a lek was located within 1 mile of a habitat boundary, the practical effect of the stipulation would be the same as those described under Alternative B.

It is impossible to predict what impacts on development might result from the lek buffer stipulation, if any leks (current or future) are found to be within 1 mile of a habitat boundary. For more information on the Proposed LUPA potential impacts, refer to the Alternative B analysis. (Refer to **Table 4.17** and **Table 4.18**.)

Table 4.17
The Proposed LUPA Field Office Management Zone Analysis of PHMA NSO with Lek Buffer

Field Office	RMP Acres Available for Lease	Colorado MZ Federal Mineral Acres	Colorado MZ Total Federal PHMA Acres	Unleased Colorado MZ Federal PHMA Acres	Disturbance Cap Acres (3 Percent)	Existing Human Disturbance	Remaining Cap Acres
LSFO	1,900,280	1,407,324	1,336,750	749,165	40,103	13,761	26,342
CRVFO	679,200	99,580	94,767	40,110	2,843	1,771	1,072
KFO	642,900	355,875	591,805	176,225	17,754	10,560	7,194
WRFO	1,240,500	586,918	294,534	148,886	8,836	4,378	4,458
GJFO	961,600	23,256	47,301	22,385	1,419	741	678

Table 4.18
The Proposed LUPA GRSG RFD Analysis

Field Office	20-Year RFD Federal	20-Year RFD Fee	Theoretical Cap Well Counts		Percent PHMA of Field Office Mineral (Federal)	Can the Well Counts be Accommodated?		Field Office RFD Impact Based on PHMA Percent?	RFD Disturbance within PHMA
			5-Acre	10-Acre		5-Acre	10-Acre		
LSFO	545	341	5,268	2,634	70	TRUE	TRUE	NA	NA
CRVFO	3,240	9,665	214	107	14	FALSE	FALSE	YES	1.66%
KFO	122	39	1,439	719	92	TRUE	TRUE	NA	NA
WRFO	3,579	585	892	446	24	FALSE	FALSE	NO	21.19%
GJFO	1,271	1,011	136	68	5	FALSE	FALSE	NO	5.88%

Summary of Impacts on Air Quality

None of the alternatives analyzed in this EIS is statistically better or worse with respect to impacts on air quality. The changes in each alternative's RFD are relatively minor, which produces a result that suggests air quality is not a primary driver for decision-making.

As previously stated, the various alternatives have different capacities to concentrate development in the future; however, the extent of such concentration would be highly dependent on the temporal or incremental changes to the disturbance caps in relation to the mineral potential of any leased lands. The management actions that would be implemented to effectively manage the caps are not known at this time; there is no way of predicting how oil and gas could be corralled within or beyond the RMP lifetimes to analyze specific impacts on air quality from such concentrations. Regardless, all future projects would be analyzed, based on the actual development proposals, to ensure that air quality is adequately protected and fully considers all contemporaneous development at appropriate scales.

4.19 CLIMATE CHANGE

Impacts on GRSG (and all other resources) from climate change would be the same under each of the alternatives. Climate change is a global phenomenon that affects resources at the local level.

Assessing climate change impacts is difficult due to the uncertainty of what the climate may actually be in the future. If greenhouse gas emissions remain at current levels, temperatures could increase by as much as 10° Fahrenheit by the end of the century (National Fish, Wildlife and Plants Climate Adaptation Partnership 2012). If these changes were to occur, it could have profound impacts on GRSG within the planning area.

Vulnerability of resources from climate change is based on exposure, sensitivity, and the adaptive capacity of the resource (Glick et al. 2011). Exposure is the nature and degree to which a resource is exposed to climate variations. Sensitivity is the degree to which a resource is affected, either adversely or beneficially, by climate change. Adaptive capacity is the ability of a resource to adjust to climate change, including climate variability and climate extremes, to take advantage of opportunities, or to cope with the consequences. With each of these factors there is always some uncertainty.

The main impacts of climate change on GRSG would be the possibility of loss of sagebrush vegetation communities. It is likely that local extirpations of GRSG could occur as vegetation communities change from shrublands to either grasslands or woodlands.

The Colorado Plateau Rapid Ecological Assessment Report (Bryce et al. 2012) indicated that under climate change scenarios, intermountain basins big sagebrush plant communities were at a relatively high risk of being impacted. A loss of sagebrush communities due to climate change would directly impact GRSG. Compounding this issue is that the planning area is at the southern edge of the range for GRSG, and species at the edge of their range are typically at a higher risk. If plant communities shift north in latitude, it is possible that local populations of GRSG could be extirpated by the end of the century due to habitat loss attributed to climate change.

4.20 VISUAL RESOURCES

4.20.1 General Description

This section describes potential impacts of the alternatives on visual resources, specifically the potential for management decisions to create visual changes or contrasts in the existing landscape. Visual resources are impacted by surface-disturbing activities that introduce new visual elements (in form, line, color, and texture) into the landscape, changing the features that characterize the landscape, including landform, water, vegetation, and structures.

The BLM's VRM system consists of two stages: inventory (visual resource inventory) and development of VRM objectives. The visual resource inventory process provides BLM managers with a means for determining visual values. The inventory consists of a scenic quality evaluation, sensitivity level analysis, and a delineation of distance zones. Based on these three factors, BLM-administered lands are placed into one of four visual resource inventory classes, representing the relative value of visual resources.

Classes I and II are the most valued, class III represents a moderate value, and class IV is of least value. The visual resource inventory classes are informational and provide the basis for considering visual values in the RMP process. Visual resource inventory classes do not establish management direction and should not be used as a basis for constraining or limiting surface-disturbing activities. VRM classes are established through the RMP process for all BLM-administered lands. VRM management classes may differ from visual resource inventory classes, based on management priorities for land uses. During the RMP process, the class boundaries are adjusted as necessary to reflect the resource allocation decisions made in RMPs. VRM objectives are established for each class.

The visual resource contrast rating system, described in the 1986 BLM Manual Handbook H-8431-1 Visual Resource Contrast Rating, is a systematic process used by the BLM to analyze potential visual impacts of proposed projects and activities and for identifying measures to mitigate these impacts. The RMP-generated VRM objectives, when available, are used in analyzing impacts on visual resources. The VRM objectives provide a baseline for determining how much a proposed management action would affect the visual values (scenic quality, sensitivity, and distance zones) of visual resources, as well as determining the level of disturbance an area can support while meeting VRM objectives.

Where there are no RMP-approved objectives, interim VRM classes would be developed, except the inventory would be limited to the area affected by the project, and VRM classes would reflect the management decision made in existing RMPs. An RMP amendment is not required unless the project that is driving the evaluation requires an amendment. All surface-disturbing activities, regardless of the alternative or management action, would be subject to the VRM objectives of the area within which the activity takes place.

The analysis assumes that areas managed according to VRM Class III and IV objectives would permit more surface-disturbing impacts and could allow for greater adverse impacts on visual resources and scenic quality than those areas managed according to VRM Class I and II objectives.

4.20.2 Methodology and Assumptions

General Impacts on Visual Resources

There are no specific management goals, objectives, or actions being proposed for visual resources related to the protection of GRSG in this EIS. Impacts on visual resources would result from some of the actions proposed under other resources and uses.

Indicators of impacts on visual resources and the measurements used to describe the impacts (where available or appropriate) are as follows:

- Alteration of landscape character, public visual sensitivity, and visibility from surface occupancy and surface-disturbing activities
  - Changes to form, line, color, and texture of a landscape
  - Impacts on visual resources would occur if a proposed project changed the landscape or introduced new features that contrast with the natural physical character of the landscape, diminish the overall scenic quality, and exceed the allowable levels associated with the VRM Class objective
  - Impacts on visual resources would occur if a proposed project design integrates repetition of form, line, color, and texture from the local setting and expresses the natural visual characteristics and improves or enhances the scenic quality of a landscape
  - Project Examples
    - Earthwork construction—Roads, trails, ROW development, oil and gas development, mineral development, and renewable energy development
    - Construction of structures—Oil and gas facilities, renewable energy facilities, recreation sites, communication sites, and water storage
    - Vegetation treatments—Range improvements, habitat improvements, and fuel treatments
- Preservation or restoration and enhancement of landscape character
  - Changes to form, line, color, and texture of a landscape
  - Impacts on visual resources would occur if surface land use restrictions forced project relocation and concentration of development to areas with higher scenic quality
  - Impacts on visual resources would occur if a proposed project design integrates repetition of form, line, color, and

texture from the local setting and expresses the natural visual characteristics and improves or enhances the scenic quality of a landscape

- Project examples
  - Special designations (e.g., ACECs and WSAs) or stipulations (e.g., NSOs and CSUs) that prohibit or limit surface occupancy or surface-disturbing activities
  - Enhancement or restoration of disturbed or degraded lands due to vegetation treatments or reclamation

Assumptions

- As the population continues to grow and more people move into the wildland-urban interface, scenic resources within the planning area would become more important to adjacent communities. The importance of scenic values, natural appearing landscapes, and unaltered open space is expected to increase in value to residents and visitors.
- As development increases in the wildland-urban interface, the visual intrusion of nighttime "light pollution" from aboveground facilities is also expected to increase.
- Visitors to BLM-administered and National Forest System lands or residents living near BLM-administered and National Forest System lands are sensitive receptors to changes in scenic quality.
- The greater the size and severity of surface disturbance and degree of air quality degradation, the greater the impact there would be on scenic quality.
- Specific viewer variables have an effect on the magnitude of a visual impact and which element of form, line, color, or texture is most dominant and will aid in defining which mitigation techniques will be the most effective. Viewer variables include the viewer's distance, the viewing angle, motion, speed, and length of time in view, and the scale of the proposed project.
- Management actions that provide additional protection. such as cultural resources, special designations, and stipulations, could indirectly limit the level of change to characteristic landscapes and scenic quality, which would preserve the existing character of the landscape.
- VRM class objectives apply to all resource uses. Class objectives would be adhered to through application of fundamental design

techniques, BMPs, PDFs, and RDFs, which could include special project design, avoidance, or mitigation.

- All management and resource uses would be subject to NEPA analysis, which would include completing a VRM visual resource contrast rating analysis to determine conformance to VRM objectives in the RMP and to identify measures to minimize or mitigate potential impacts on visual resources. The visual contrast rating system would be used as a guide to analyze site-specific visual impacts from proposed projects, including project design and placement. This analysis would also consider the interrelationship of the underlying visual values (scenic quality, sensitivity, and distance zone) and if the proposed action and alternatives would alter the visual resource inventory classes. Environmental factors should also be considered when assessing visual impacts of a proposed project, including season of use, light conditions, vegetation recovery time, spatial relationships, atmospheric conditions, and motion.
- Additional surface disturbance or structures would contribute to the cumulative impacts of resource development on the landscape. This would increase industrialization of the landscape, would diminish visual quality, and would increase visual contrast. Although surface disturbance can be quantified in most cases, the indirect impacts from surface disturbance, such as fugitive dust and smoke, are not easily quantified and would require a more qualitative approach.
- Changes in air quality from smoke, dust, haze, or other pollutants could reduce or degrade scenic quality by obscuring views both in the short term and long term.
- Valid existing leases would be managed under the stipulations in effect when the leases were issued, and new stipulations proposed under the RMP would apply if leases were renewed.
- VRM class objectives apply only to federal surface lands. On split-estate lands, VRM objectives can be adopted for private surface land with a landowner's consent.
- Proposed activities that could not be effectively mitigated would not be authorized.

4.20.3 Direct and Indirect Impacts on Visual Resources

Impacts from Travel Management on Visual Resources

Alteration of Landscape Character from Surface Occupancy and Surface-Disturbing Activities and Preservation or Restoration and Enhancement of Landscape Character

Management actions for resources and resource uses could adversely affect visual resources when they result in surface occupancy and surface disturbance

activities or relocation or concentration of development to areas with higher scenic quality because of restrictions on surface land use.

Management actions for resources and resource uses could beneficially affect visual resources when they increase surface area protected from surface occupancy and surface disturbance activities due to special designations or stipulations, or when they enhance or restore disturbed or degraded lands due to vegetation treatments or reclamation. The potential indirect impacts of limiting motorized travel and upgrades to existing routes in PHMA and ADH on visual resources are summarized below by alternative.

Alternative A—Compared to all the alternatives, Alternative A has the most surface acres open to cross-country travel in PHMA. The designation of OHV open areas could have adverse impacts on visual resources. The level of use, type of soil, and vegetation community all could influence the amount of change to the landscape. Although the landscape in many areas would not be impacted by cross-country travel use because of topographic and vegetation constraints, continuing to manage large areas as open would allow the greatest potential for changes to the landscape and impacts on visual resources because of the loss of vegetation and surface disturbance created by cross-country travel and hill climbs. Tire tracks, erosion, and loss of vegetation would be evident and would contrast with the surrounding natural landscape.

Upgrading existing designated routes could also have indirect impacts on visual resources because it could make routes more accessible to a greater capacity of users, and fugitive dust may become more of an issue unless the upgrade includes paving. Alternative A has the fewest surface acres, with a limited travel designation.

The amount of surface acres with a closed travel designation would be the same across all alternatives. Alternative A has fewer restrictions and would allow unplanned expansion of routes. Over time, this would cause the most direct and indirect impacts on visual resources.

Within the planning area, mineral (fluid and solid) and ROW development often leads to the improvement of existing routes or the construction of new routes. Realigning existing routes would be considered if routes were damaging resources. New route construction or realignment of existing routes would be mitigated by design features to reduce the impact of surface-disturbing activities on visual resources.

Project-specific design would be required to meet the objectives of the established VRM class for the project area. Transportation actions would be limited in VRM Class I and II areas, and new routes would be restricted in areas identified for such development (SRMAs, for example). Impacts on visual resources would be analyzed in subsequent NEPA documents.

Existing routes that are causing damage to resources and routes that are no longer used would be restored using desirable vegetation when the native plant community cannot recover and occupy the site sufficiently. These measures would indirectly restore and enhance visual resources because the restored areas would more closely resemble the surrounding natural landscape.

Alternative B—Alternative B would limit motorized travel and would prohibit upgrades to existing designated routes within PHMA. Under Alternative B, the surface area with an open travel designation (in Alternative A) would be changed to a limited travel designation in PHMA. This would indirectly, but beneficially, contribute to the protection of visual resources because no new surface disturbance would occur from inappropriate or unplanned expansion of routes, and upgrades to routes would be prohibited. However, depending on the type of surface, use, and amount of use there could still be indirect visual impacts from fugitive dust.

Alternative B would have more surface acres with a limited travel designation. This provides more restrictions than Alternative A and would indirectly protect visual resources by reducing the potential for additional routes and changes to the landscape. The amount of surface acres with a closed travel designation would remain the same as Alternative A.

Alternative B would limit route construction to realigning existing designated routes in PHMA, except if valid existing rights cannot be accessed using existing designated routes, then new route construction, using the absolute minimum standard necessary, would be permitted. The impacts of limiting new route construction to the realignment of existing designated routes or construction of new routes to access existing rights would vary, depending on the location, amount of surface disturbance, and current VRM objective. For example, areas managed as VRM Class III or IV would permit more surface-disturbing impacts than areas managed as VRM Class I or II. However, the landscape itself may dictate what is feasible, and many areas would not be impacted because of topographic and vegetation constraints.

Requiring only minimum standards for new road construction could adversely affect visual resources. This is because the new routes may not be suitable for the intended use, may not comply with road and safety standards, and may not be designed and constructed to allow for successful reclamation. For example, excessive cut and fill slopes would not be conducive to vegetation establishment. This could result in unstable soils, erosion, noxious weed growth, and thus a decline in scenic quality.

Alternative B would also require a 3 percent disturbance cap, which may push development and associated infrastructure (e.g., new routes) to other areas that have not reached the disturbance cap. This could indirectly impact areas with higher scenic quality. However, there could also be direct benefits to visual resources if an area has exceeded the 3 percent disturbance cap because no

further surface disturbance associated with new route construction would be permitted until enough habitat is restored to maintain the area under this cap.

Alternative B would require that all routes not designated in a travel management plan, WSA, or lands with wilderness characteristics (that have been selected for protection in previous RMPs) in PHMA be restored using appropriate seed mixes and to consider transplanted sagebrush. Reclaiming unnecessary routes, in general, would indirectly benefit visual resources. These areas would be recontoured to mimic the surrounding natural topography and revegetated, which would make the area blend with the surrounding natural landscape, thus enhancing scenic quality.

The use of "appropriate seed mixes" under Alternative B is not clearly defined. This could have an adverse effect on visual resources by introducing species that are not native to a site, creating a monoculture of one species of grasses, for example, or introducing noxious weeds that could over time dominate the site. As a result, the restored site would contrast with the surrounding natural vegetation. For example, restoring a route in an area predominantly composed of conifers or deciduous trees with a monoculture of grasses would not blend in well with the surrounding landscape; it would contrast in form, line, color, and texture.

Using transplanted sagebrush would be appropriate only if there is sagebrush in the adjacent undisturbed landscape. In this scenario, using sagebrush would provide texture and color to the restored site that would mimic the texture and color in the surrounding landscape.

Alternative B would be less beneficial to visual resources because the type of seed mixes specified would not necessarily be native or species that would blend well with the surrounding native vegetation.

Alternative C—Impacts on visual resources would be similar to Alternative B, except upgrading existing designated routes would be prohibited in ADH, versus PHMA under Alternative B. Also, route construction would be limited to the alignment of existing designated routes in ADH. This would cover more acreage than PHMA under Alternative B.

Alternative C would also require a 4-mile buffer from leks in PHMA to determine the realignment of a route and would prohibit new route construction within 4 miles of active GRSG leks in ADH. Although the overall acreage would increase from PHMA under Alternative B to ADH under Alternative C, it is difficult to determine if Alternative C would be more beneficial or detrimental to visual resources without project-specific information: location, extent of surface disturbance, and current VRM objective. Impacts on visual resources would need to be subjected to subsequent NEPA analysis.

Impacts on visual resources would be similar to Alternative B, except Alternative C would require the use of appropriate native seed mixes in ADH. By specifying native seed mixes, the restored route would more closely resemble the surrounding natural environment, thus enhancing scenic quality. Again, like Alternative B, the use of "appropriate" is unclear. The native seed mixes selected should be site specific. What works in one location may not work in another and may ultimately contrast with existing native vegetation.

Alternative C would indirectly benefit visual resources more than any other alternative because the use of native plants would be specified.

Alternative D—Impacts on visual resources would be similar to Alternative B, except that upgrades to existing designated routes in PHMA would be permitted, provided they do not adversely affect GRSG populations or habitat. Also, Alternative D would apply a 5 percent disturbance cap, which would be less restrictive than Alternative B. Alternative D would require proponents to use Gold Book standards for new road construction. This would indirectly, but beneficially, contribute to the protection of visual resources. The Gold Book provides guidelines and standards for roads and access ways, including guidelines for planning, location, design, construction, maintenance, and operations. The intent is that all roads be designed, constructed, and maintained to ensure public safety and the protection of resources.

The Proposed LUPA impacts are similar to those under Alternative D, with additional protection for visual resources due to the increased restriction of 3 percent disturbance in PHMA.

Impacts from Lands and Realty Management on Visual Resources

Preservation or Restoration and Enhancement of Landscape Character

Alternative A—This alternative has the fewest acres of exclusion and avoidance areas. Under Alternative A, there are some protective stipulations for other resources, such as threatened and endangered species habitat, soils, and water resources, and special designations, such as WSAs and ACECs, that would prohibit surface occupancy and surface-disturbing activities. These actions would indirectly benefit visual resources because these areas would be protected from new surface disturbance. However, Alternative A has the fewest restrictions to locating ROW corridors and ROWs. It has the fewest restrictions for construction (including burying power lines) and requirements for collocating ROWs and reclaiming unused ROWs.

Alternative B—Under Alternative B, PHMA would be managed as ROW exclusion areas, and GHMA would be managed as ROW avoidance areas. Exceptions to exclusion areas would be considered where, in the case of a valid existing right not yet developed, a new ROW could be completed entirely within the disturbance footprint of an existing ROW (e.g., locating a pipeline beneath a power line or along an existing road), or, in the case of a valid

developed right, the new ROWs could be collocated with an existing ROW. If a new access road or other ROW could not be collocated with an existing ROW, it may be constructed only if impacts are minimized and disturbance remains within a 3 percent cap. If the cap could not be avoided, mitigation would be required.

ROW or SUA authorizations for roads, utilities, communication facilities, and energy development could indirectly impact visual resources by necessitating surface occupancy and surface-disturbing activities. By excluding areas in PHMA from ROW or SUA authorizations under Alternative B, this would indirectly protect visual resources because no new surface disturbance would occur in these areas. Although, this could also have an adverse effect on visual resources because there may be fewer areas where ROW or SUA development could be relocated, and these areas may be more visually sensitive. However, the landscape itself may dictate what is feasible, and many areas would not be impacted because of topographic and vegetation constraints.

Creating avoidance areas in GHMA would benefit visual resources because these areas would be avoided for any new ROWs or SUAs, if at all possible; thus, no new surface disturbance would occur in these areas. However, an important point is "if at all possible" because there may be times when some areas cannot be avoided and surface disturbance would still occur. This might include a large transmission corridor or pipeline corridor that may need to cross a GHMA area because of other constraints, such as topography land use agreements.

The 3 percent disturbance cap may push development and associated infrastructure (e.g., new routes) to other areas and zones that have not reached the 3 percent disturbance cap. This could indirectly impact areas with higher scenic quality. However, there could also be direct benefits to visual resources if an area or zone has exceeded the 3 percent disturbance cap because no further surface disturbance associated with new ROWs would be permitted until enough habitat is restored to maintain the area under this 3 percent cap.

Collocating new ROWs or SUAs within existing ROW or SUA corridors would benefit visual resources because the new surface disturbance would not be associated with prior surface disturbance. The entire footprint of a proposed project would have to be within the existing disturbance. Burying power lines would also benefit visual resources in the long term because there would no longer be a three-dimensional structure in the landscape that could be seen from greater distances, depending on topography. However, in the short term, the linear corridor created by the surface disturbance from burying the power lines would contrast with the existing natural landscape because of the exposed bare soil, texture, and color. Reclaiming any unused development, such as a road or fence line, associated with a ROW or SUA would also benefit visual

resources by removing contrasting elements in the landscape, which would make the area blend with the surrounding natural landscape.

Even with these exceptions, there would be indirect protection of visual resources. For example, with a conservation easement, a landowner would retain private ownership but would be limited to the amount of development that could occur on the land in perpetuity. By limiting development, this would limit the amount of surface disturbance that could occur, thus indirectly protecting visual resources.

In general, retaining public ownership of PHMA would be beneficial to visual resources because there would be indirect protection from the land being under BLM and Forest Service administration. As such, visual resources may be protected by other resource management actions. Land exchanges, acquisitions, and disposals would add or remove land from BLM and Forest Service administration. Land disposals could result in the loss of the indirect protection of visual resources provided by other resource management actions, whereas acquisitions could indirectly, but beneficially, provide protections that would not be afforded under private or state ownership.

Withdrawing lands within PHMA from mineral development would be beneficial to visual resources because mineral exploration and development would necessitate surface occupancy and surface disturbance activities that would contrast with the existing landscape. By withdrawing these lands, no new surface disturbance from mineral development would occur. However, this could also have an adverse effect on visual resources because there may be fewer available areas where mineral development could be relocated, and these areas may be more visually sensitive.

Alternative C—Impacts on visual resources would be similar to Alternative B, except the amount of acreage protected from surface disturbance would be greater. ADH would become exclusion areas for new ROWs under Alternative C, compared to PHMA under Alternative B. Alternative C would have fewer acres available for ROWs through restrictions to protect GRSG. Conservation measures would be indirectly more protective to visual resources under Alternative C. Also, there would be no exceptions for any disposal of federal land to consolidate ownership that would benefit GRSG. Acquisition of private lands within in ADH would be prioritized over conservation easements. The amount of acreage proposed for mineral withdrawal under Alternative C would also be greater because it would include ADH versus PHMA.

Alternative D—Alternative D is similar to Alternative B, except PHMA would become avoidance areas under Alternative D versus exclusion areas under Alternative B. This would not necessarily guarantee that an area would be protected from surface disturbance. Alternative D would be less protective of visual resources than Alternative C.

Alternative D is similar to Alternative B, except that, in isolated federal parcels, disposal of tracts that are not capable of altering GRSG populations would be allowed, and GRSG habitat values would be considered in acquisitions. There are no specific measures for proposing lands for mineral withdrawal as under Alternatives B and C.

Proposed LUPA—Impacts would be similar to those described above for Alternative D. However, additional restrictions on land use and other authorizations would be included under the Proposed LUPA. Both PHMA and GHMA would be managed as avoidance areas, with exceptions for pending large transmission lines. Aboveground structures would be prohibited within 1 mile of active leks, and surface disturbance would be limited to 3 percent in PHMA. Impacts on visual resources are similar to those for Alternative D, with the potential for large local impacts due to pending transmission lines.

Impacts from Wind Energy and Industrial Solar Development on Visual Resources

Alteration of Landscape Character from Surface Occupancy and Surface-disturbing Activities

Alternative A—Alternative A does not preclude wind energy development or industrial solar specifically within GRSG habitat. In addition, Alternative A would have the most areas available for ROWs that could lead to more impacts on visual resources.

Alternative B—Alternative B has no specific measures for wind energy development or industrial solar, but this does not preclude wind energy development or the associated impacts on visual resources from new surface disturbance and structures. However, there may be existing land use restrictions and constraints in place that prohibit wind energy development, which would indirectly protect visual resources.

Alternative C—Under Alternative C, wind energy development and industrial solar would be prohibited within ADH. This would create a larger surface acreage that would be protected from surface disturbance and impacts on visual resources associated with wind energy development. However, this could also have an adverse effect on visual resources because there may be fewer available areas where wind energy development and industrial solar (and associated infrastructure like roads and structures) could be relocated; these areas may be more visually sensitive, for example, ridgelines. The overall surface area that could be protected could become much larger in some areas if leks are located near the edge of ADH. This could extend the surface area up to 5 miles beyond ADH from known leks.

Alternative D—Alternative D has no specific measures for wind energy development or industrial solar, but this does not preclude wind energy or industrial solar development or the associated impacts on visual resources from

new surface disturbance and structures. However, there may be existing land use restrictions and constraints in place that may prohibit wind energy and industrial solar development, which would indirectly protect visual resources.

Proposed LUPA—Wind and solar energy development would be excluded from PHMA; impacts on visual resources therefore would be similar to those under Alternative C. However, impacts from wind and solar energy development are not expected to vary between alternatives; this is because the potential for wind or solar energy in northwest Colorado is very limited.

Impacts from Range Management on Visual Resources

Preservation or Restoration and Enhancement of Landscape Character

Alternative A—Grazing would continue to be managed based on BLM Colorado Public Land Health Standards, Guidelines for Livestock Grazing Management, and proper functioning condition monitoring results.

Alternative B—Depending on the magnitude, degraded lands may contrast with the surrounding natural and healthy landscapes. The proposed range management measures would indirectly, but beneficially, contribute to maintaining scenic quality because lands would be closely monitored to ensure they are meeting range health standards. If the standards are not being met, grazing may be modified, allowing degraded lands to recover and to return to a condition that more closely resembles the surrounding natural landscape.

Alternative B would allow vegetation treatments only to improve forage for livestock and wild ungulates that conserves, enhances, or restores GRSG habitat in PHMA. This would also apply to the design of any new structural range improvements and evaluation of existing structural range improvements. Some structural range improvements, such as water development, would require the application of PDFs or RDFs to mitigate potential impacts from West Nile virus.

Alternative B would also require monitoring and treatment of invasive species associated with construction, post-construction, and existing range improvements in PHMA. The proposed measures would indirectly, but beneficially, contribute to maintaining scenic quality and visual resources in the long term. This is because vegetation treatments that enhance or restore GRSG habitat would blend in with the adjacent natural landscape, repeating the basic elements in form, line, color, and texture. Well-designed and -sited structural range improvements would disperse the impact of the livestock on the landscape, preventing concentrated areas of surface disturbance, spread of weeds, and soil compaction.

Alternative C—Impacts on visual resources would be similar to Alternative B, except vegetation treatments that conserve, enhance, or restore GRSG habitat would be permitted in ADH under Alternative C versus PHMA under Alternative B. Treatments must also include pretreatment data on wildlife and

habitat condition and must monitor the area for 3 years before grazing returns. New structural range improvements would be avoided unless independent peer-reviewed studies show that the range improvement structure benefits GRSG. Grazing management changes would be considered instead of constructing additional range improvements. Restrictions on range improvements would reduce potential for visual contrast.

Alternative D—Impacts on visual resources would be similar to Alternative B, except completion of land health assessments would be prioritized in ADH versus in PHMA under Alternative B; riparian and wet meadow areas would be managed for proper functioning condition in ADH under Alternative D, versus PHMA under Alternative B. When a permittee or lessee voluntarily relinquishes grazing preference, converting the allotment to a reserve allotment (grass bank) would be considered.

Alternative D would require a specific vegetation composition, with a less than 30 percent disturbance cap for loss of sagebrush. Structural range improvement design would be permitted only to enhance livestock distribution and to control the timing and intensity of utilization. Under Alternative D, there would be fewer restrictions on range improvements and therefore impacts on visual resources would be greater than under Alternatives B and C, but less than Alternative A.

The Proposed LUPA's impacts would be similar to Alternative D.

Impacts from Wild Horse Management on Visual Resources

Preservation or Restoration and Enhancement of Landscape Character

Alternative A—Wild Horses would be managed at an appropriate management level and would be monitored to ensure the appropriate management level is compatible with other resources. The long-term appropriate management level would be adjusted based on the results of the monitoring.

Alternative B—Measures for wild horse management are similar to measures for range management, and wild horse grazing is similar to permitted livestock grazing. Land health assessments would be conducted in ADH to determine if standards of rangeland health are being met; if not, populations would be managed to achieve GRSG habitat objectives. Wild horse gathers in ADH could create short-term localized surface disturbance, but over the long term the impacts would be negligible.

The proposed wild horse management measures would indirectly, but beneficially, contribute to maintaining scenic quality because lands would be closely monitored and managed to ensure they are meeting range health standards. If the standards are not being met, the BLM can adjust appropriate management levels of wild horses if resource damage is occurring, allowing

degraded lands to recover and to return to a condition that more closely resembles the surrounding natural (and healthy) landscape.

Alternative C—Impacts on visual resources would be the same as Alternative B because the measures for wild horse management are the same.

Alternative D—Impacts on visual resources would be similar to Alternative B, except GRSG habitat requirements, in conjunction with all resources values, would be considered in wild horse gathers in ADH. Preference would be given to GRSG habitat unless site-specific circumstances warrant an exemption. Alternative D would have more indirect impacts on visual resources than Alternatives B and C because it would allow more flexibility in managing wild horses.

For the Proposed LUPA, wild horse management would be the same as Alternative D, so impacts are the same as those under Alternative D.

Impacts from Fluid Minerals Management on Visual Resources

Preservation or Restoration and Enhancement of Landscape Character

Alternative A—Impacts on visual resources would vary across the planning area, but overall, Alternative A would provide the fewest protective measures that would indirectly or directly protect visual resources. Protective measures include stipulations that would limit or prohibit surface occupancy and surface-disturbing activities, special designations, and PDFs as COAs for drilling applications. Alternative A is less restrictive on fluid mineral development.

Alternative B—Measures under Alternative B would close PHMA to fluid mineral leasing. Closing off these areas to new leasing would indirectly protect visual resources; this is because there would be no new surface disturbance or other visual impacts associated with fluid mineral development. This could also have an adverse effect on visual resources because there may be fewer available areas for leasing to relocate development, and these areas may be more visually sensitive. However, the potential for fluid mineral development would dictate what is feasible, and many areas would not be impacted because of the low potential for fluid mineral development.

Geophysical exploration would be allowed only within PHMA using helicopter-portable drilling, wheeled, or tracked vehicles on existing roads. Geophysical exploration, in general, creates negligible temporary impacts on visual resources. These additional measures would ensure that no impacts on visual resources would be created.

The restrictions listed above would limit the amount of surface area available for fluid mineral development, similar to closing lands to leasing. These measures could benefit or adversely affect visual resources. However, it is difficult to determine the overall impacts on visual resources without project-specific

information. Fluid mineral development is dictated by the downhole geology of a specific lease, which determines the potential number of wells that could be reached from one pad. The number of wells and type (horizontal or directional), type of drilling rig, whether completions would occur on-site or remotely would all contribute to the amount of surface disturbance needed to accommodate drilling and completion operations and safety requirements.

Topography and other resource constraints would also come into play and would require special design measures and mitigation. Alternative B has more restrictions on fluid mineral leasing and development than Alternative A, which would indirectly protect visual resources. However, this may cause these impacts to be moved out of GRSG habitat to areas that are more visually sensitive.

Alternative C—Impacts on visual resources would be similar to Alternative B, except some of the measures under Alternative C would be within ADH, versus PHMA under Alternative B. Measures under Alternative C would close leasing and would prohibit new or reissued leases in ADH. This would create a larger surface area that would be protected from surface disturbance, which would benefit visual resources. However, this may further restrict the available areas for leasing or where fluid mineral development could be relocated within a valid existing lease. As described under Alternative B, the impacts on visual resources cannot be adequately assessed without project-specific information. Alternative C applies the most restrictions on fluid mineral leasing and development, but this may cause more adverse visual impacts outside of GRSG habitat.

Alternative D—Impacts on visual resources would be similar to Alternatives B and C, except some measures would be applied in different types of habitat or would be a less restrictive version of a measure. Under Alternative D, future leasing or reissuing expired leases would not be prohibited; instead, PHMA would be leased with an NSO stipulation. The NSO would allow an exception if GRSG populations were stable or increasing and GRSG populations would not be adversely affected by habitat loss or disruptive activities. If a development were allowed under an exception, mitigation would be required for impacts beyond a 5 percent disturbance cap. Visual impacts would not occur on federal lands because of the NSO; however, visual impacts may get offset to private lands or non-NSO federal lands to allow directional drilling into materials underlying an NSO area. This could affect the scenic quality of the federal lands because of the cultural modifications that would occur on adjacent lands.

For valid existing leases, Alternative D would replace some of the restrictions under Alternatives B and C with greater flexibility to assess individual projects, based on site-specific conditions and project-specific design. Under such a scenario, the BLM and Forest Service could approve the action with attached COAs identified during project review as being necessary and appropriate for avoiding, minimizing, or offsetting potential impacts on GRSG and its habitats.

Alternative D would provide more flexibility to fluid mineral leasing and development, which could impact visual resources more within and outside of GRSG habitat.

Under the Proposed LUPA, all of PHMA would be managed as no surface occupancy, with very rare exceptions, and disturbance would be limited to 3 percent. Impacts from the Proposed LUPA would be similar to those under Alternative B.

Impacts from Solid Minerals–Coal and Locatable Minerals Management on Visual Resources

Preservation or Restoration and Enhancement of Landscape Character

Alternative A—Impacts on visual resources would vary, but overall, BLM-administered or National Forest System land would be available for mining, with the exception of SRMAs, ACECs, and WSAs. Alternative A would have the least restrictive measures on coal development and reclamation provisions, resulting in a greater potential for impacts on visual resources.

Alternative B—Alternative B would minimize surface-disturbing activities (operations and maintenance) in ADH for coal mining projects and would prohibit surface coal mines in PHMA. Other measures under Alternative B would prohibit new subsurface coal mine leases in PHMA, unless surface materials would be located outside of PHMA. Also, expansion of existing leases would be limited, unless new surface facilities were either located outside of PHMA; if that is not possible, they would have to be collocated within existing disturbance or kept to a minimum. Exploration and development of coal creates large areas of surface disturbance, creating scars in the landscape that remain visible for years.

Other visual impacts include facilities, access roads, equipment, dust, and improper placement of overburden, tailings, and topsoil. Inadequate drainage and revegetation can result in erosion, which would further scar the landscape.

Measures under Alternative B would reduce or eliminate visual impacts of coal mining within GRSG habitat but would not preclude visual impacts outside of GRSG habitat associated with coal development.

Alternative C—Impacts on visual resources from coal mine leasing and development would be the same as Alternative B because all of the measures that would be applied are the same.

Alternative D—Alternative D provides more opportunities for new or expanded coal mines, subject to restrictions on the amount of surface disturbance in PHMA or ADH areas. Alternative D could increase the amount of surface disturbance from coal development and impacts on visual resources, compared to Alternatives B and C.

Proposed LUPA—Impacts are similar to those under Alternative D, with slightly greater benefits to visual resources. This would be due to increased restrictions on human disturbance under the Proposed LUPA (including a 3 percent disturbance cap in PHMA).

Impacts from Nonenergy Leasable Minerals Management on Visual Resources

Preservation or Restoration and Enhancement of Landscape Character

Alternative A—Under Alternative A, only a small amount of GRSG habitat would be closed to nonenergy leasable mineral leasing with varying degrees of PDFs or RDFs district-wide. Alternative A would allow for the greatest potential to impact visual resources.

Alternative B—Measures under Alternative B would close PHMA to nonenergy leasable mineral leasing and would prohibit new leases for expanding existing mines. Alternative B would also require the application of PFDs and RDFs to prevent unnecessary resource degradation. Exploration and development of nonenergy leasable minerals creates surface disturbances and visual impacts similar to the impacts from coal exploration and development, which could adversely affect visual resources. Measures under Alternative B would reduce or eliminate visual impacts of nonenergy mineral development within GRSG habitat; however, these measures would not preclude visual impacts outside of GRSG associated with nonenergy leasable mineral development.

Alternative C—Impacts on visual resources from nonenergy mineral development would be the same as Alternative B because all of the measures that would be applied are the same.

Alternative D—Alternative D would consider allowing expansion of existing nonenergy mineral leases. However, where practicable, any permitted disturbance would be limited to a 5 percent disturbance cap. In areas where disturbance exceeds this disturbance cap, mitigation would be required to offset habitat loss. Compared to Alternatives B and C, Alternative D could increase the amount of surface disturbance from locatable mineral development and impacts on visual resources.

Proposed LUPA—Impacts are similar to those under Alternative D, with slightly greater benefits to visual resources. This is due to increased restriction on human disturbance for the Proposed LUPA (including a 3 percent disturbance cap in PHMA).

Impacts from Salable Mineral Management on Visual Resources

Preservation or Restoration and Enhancement of Landscape Character

Alternative A—Alternative A would allow for the continued development of salable minerals. Overall, this alternative would provide the fewest restrictive

measures on salable minerals development and subsequent reclamation requirements; therefore, it could result in more adverse changes to the characteristic landscape than Alternatives B, C, and D. As such, this alternative has the most potential to impact visual resources.

Alternative B—Measures under Alternative B would close PHMA to mineral material sales and would require reclamation of salable mineral pits that are no longer in use. Exploration and development of salable minerals creates surface disturbances and visual impacts similar to the impacts from coal exploration and development. This could adversely affect visual resources. Measures under Alternative B, including reclaiming salable mineral pits, would reduce or eliminate visual impacts of salable mineral mines within GRSG habitat; however, this would not preclude visual impacts outside of GRSG associated with nonenergy leasable mineral development.

Alternative C—Impacts on visual resources from salable mineral development would be the same as Alternative B because all of the measures that would be applied are the same.

Alternative D—Alternative D would allow existing mineral material sites to continue operations and existing mineral material sales sites to expand. However, where practicable, any permitted disturbance would be limited to a 5 percent disturbance cap. In areas where disturbance exceeds this cap, mitigation would be required to offset habitat loss. compared to Alternatives B and C, Alternative D could increase the amount of surface disturbance from locatable mineral development and impacts on visual resources.

Proposed LUPA—Impacts are similar to those described under Alternative D, with slightly greater benefits to visual resources. This is due to increased restriction on human disturbance under the Proposed LUPA (including a 3 percent disturbance cap in PHMA).

Impacts from Fuels Management and Fire Operations on Visual Resources

Preservation or Restoration and Enhancement of Landscape Character

Alternative A—Alternative A would have the fewest restrictions for fuels management actions, with the most potential for vegetation disturbance. Additionally, Alternative A would not prioritize fire operations beyond what has already been determined in fire management plans for the area. Therefore, Alternative A could have the greatest indirect impacts on visual resources.

Alternative B—Impacts on visual resources from prevention and mitigation programs aimed at reducing unwanted fire would be similar to those for vegetation treatments. However, actions related to prevention could reduce human-caused ignitions and related visual impacts caused by fire. Impacts would be minor to moderate in the short term, depending on the magnitude, but would become negligible in the long term. Wildland fires and prescribed fires

would result in smoke, causing short-term, minor to moderate impacts on visibility and visual resources.

Alternative B would require the following specific fuel management measures in PHMA: reduction of sagebrush canopy cover to no more than 15 percent, seasonal restrictions, restrictions on treatments in sagebrush in less than 12-inch precipitation zones, invasive weed monitoring and control, resting treated areas from grazing for 2 years, requiring native planting materials, long-term monitoring to ensure vegetation persistence, and the use of livestock to reduce fine fuels.

Alternatives B, C, and D do not include specific design measures to avoid creating or enhancing linear features in the landscape. In fact, the design measure that is included under Alternative B, C, and D would require fuels management treatments be implemented in a more linear versus block design to reduce wildfire threats in the greatest area. Depending on the scale, this would contrast with the existing natural landscape, which would typically be composed of natural patterns or mosaics of landscape features that would vary depending on the soil, topography, microclimate, and disturbance regime.

Alternative C—Impacts on visual resources would be similar to Alternative B, except all of the fuel treatment measures would be applied to ADH under Alternative C, compared to PHMA under Alternative B. Under Alternative C, fuel treatments would be focused on interfaces with human habitation or significant existing disturbances. ADH lands would be managed to be in a good or better ecological condition to help minimize adverse impacts from fire.

Alternative D—Impacts on visual resources would be similar to Alternative B, except most of the fuel treatment measures would be applied to ADH, compared to PHMA under Alternative B. Alternative D would require specific vegetation cover guidelines with a disturbance cap of 30 percent for loss of sagebrush. It would require that fuels treatments be designed to facilitate firefighter safety, which may require arranging new vegetation treatments with past treatments, vegetation with fire-resistant serial stages, natural barriers, and roads in order to constrain fire spread and growth.

Proposed LUPA—Management of fuels and fire operations would be the same as under Alternative D. Impacts from the Proposed LUPA, therefore, are the same as those for Alternative D, above.

Impacts from Emergency Stabilization and Rehabilitation on Visual Resources

Preservation or Restoration and Enhancement of Landscape Character

Alternative A—Impacts on visual resources would be similar to habitat restoration.

Alternative B—Impacts on visual resources would be similar to those disclosed under habitat restoration. All measures under Alternative B would be within ADH. Alternative B would require the use of native plant materials for ESR and burned area emergency response and would require that ESR and burned area emergency response management be designed to ensure long-term persistence of vegetation, which would minimize impacts on visual resources.

Alternative C—Impacts on visual resources would be similar to Alternative B, except post-fire recovery would require the establishment of adequately sized exclosures (free of livestock grazing) that could be used to access during recovery. Where burned GRSG habitat could not be fenced from other unburned GRSG habitat, the allotment/pasture would be closed to grazing until recovered. During fuels reduction projects (roadsides or other areas) the mowing of grass would be employed. Alternative C would provide the most benefits to visual resources over the long term because it would require the use of native plant materials and would allow a burned area to recover without additional disturbance.

Alternative D—Alternative D is similar to Alternative B only in that native plant materials would be required for vegetation treatments in ADH.

Proposed LUPA—Management of emergency stabilization and rehabilitation would be the same as under Alternative D. Impacts from the Proposed LUPA, therefore, are the same as for Alternative D, above.

Impacts from Habitat Restoration on Visual Resources

Preservation or Restoration and Enhancement of Landscape Character

Alternative A—There is variability in the extent and type of restoration and the planting materials required. Alternative A would have the fewest restrictions for habitat restoration actions, with the most potential for vegetation disturbance. Alternative A would not prioritize GRSG habitat restoration and would not require any additional guidelines beyond what has already been determined within the current LUPs for the targeted areas. Alternative A would indirectly benefit visual resources within the targeted areas; however, it would not preclude the indirect benefits to visual resources created by project-specific reclamation projects outside of the target areas (e.g., mineral development and ROW development).

Alternative B—Alternative B would prioritize implementation of restoration projects in sagebrush habitat thought to be limiting GRSG distribution or abundance. Alternative B would also require the use of native plant materials and to design post-restoration management to ensure vegetation persistence. Restoring native (or desirable) plants and post-restoration management to ensure the persistence of these plants in degraded landscapes would create landscape patterns that most benefit GRSG. This would indirectly, but beneficially, contribute to maintaining scenic quality and visual resources in the

long term because the restored areas would blend in with the adjacent natural landscape, repeating the basic elements in form, line, color, and texture.

Alternative C—Impacts under Alternative C would be similar to the impacts under Alternative B, except exotic seedings would be rehabilitated, interseeded, and restored to recover sagebrush in areas to expand occupied habitat. Alternative C would be more beneficial to visual resources than Alternatives A and B because the landscape would more closely resemble its predisturbance condition.

Alternative D—Impacts under Alternative D would be similar to the impacts under Alternatives B and C. The only difference is that it would require specific restoration guidelines with a disturbance cap of 30 percent for loss of sagebrush and consideration for GRSG habitat requirements in conjunction with all other resource values managed by the BLM and Forest Service. Alternative D would be more beneficial to visual resources than Alternative A but less than Alternatives B and C.

Proposed LUPA—Management of habitat restoration would be the same as under Alternative D. Impacts from the Proposed LUPA, therefore, are the same as for Alternative D, above.

Impacts from ACEC/Zoological Area Management on Visual Resources

Preservation or Restoration and Enhancement of Landscape Character

Alternative A—All existing ACEC designations would be recognized. ACEC designations and their management prescriptions offer long-term benefits to visual resources that occur within their boundaries by limiting or preventing surface disturbance. The current ACEC designations would indirectly protect visual resources but would provide less protection than Alternative C, which would make all PHMA an ACEC.

Alternative B—Alternative B would recognize all of the existing ACEC designations. Impacts under Alternative B would be the same as impacts under Alternative A.

Alternative C—Alternative C would designate PHMA as a GRSG habitat ACEC. This would create more acreage, beyond or including the surface area of existing ACEC designations under Alternative A, that would be protected from surface disturbance and impacts on visual resources. Designating an ACEC itself provides no protection; it is the management prescriptions associated with an ACEC that provide the protections. ACECs may be managed for historic, cultural, scenic, fish or wildlife, or natural hazard values. Prescriptions for these values would indirectly benefit visual resources. The measures under Alternative C could have an adverse effect on visual resources because it would limit or prohibit surface occupancy and surface disturbance within the ACEC boundary.

This may push development outside of the ACEC into areas that may be more visually sensitive.

Alternative D and the Proposed LUPA—Alternative D and the Proposed LUPA would recognize all of the existing ACEC designations but do not propose to designate any new ACECs. Impacts under Alternative D would be the same as impacts under Alternatives A and B.

4.20.4 Summary of Impacts on Visual Resources

The magnitude of the indirect visual impacts associated with all alternatives proposed under this LUPA/EIS cannot be adequately assessed without project-specific information on the location, scale, landownership, VRM objective and mitigation, spatial relationship to existing surface disturbance, existing infrastructure (road and utility corridors), and GRSG leks and other seasonally critical habitats where surface disturbance should be avoided. Impacts on visual resources would need to be analyzed in subsequent NEPA documents.

In general, the following applies:

- Alternative A provides the least amount of protection for visual resources. It puts very few restrictions on development, which could result in the most modification of the landscape, and consequently, the most impacts on visual resources.
- Alternative B provides a greater level of protection for visual resources than Alternative A but would provide a lower level of protection than Alternative C.
- Alternative C would provide the most protection for visual resources. The most restrictions would be placed on development under Alternative C, which would afford the most protection for visual resources.
- Alternative D would provide more protection for visual resources than Alternative A but would provide less protection than Alternatives B and C. More flexibility for development is built into Alternative D, which could result in higher levels of development and associated surface disturbance than Alternatives B and C.
- The Proposed LUPA would be similar to Alternative D, with slightly greater protections for visual resources. This is due to increased restrictions on surface disturbance in PHMA (3 percent cap on disturbance).

4.21 LANDS WITH WILDERNESS CHARACTERISTICS

4.21.1 General Description

This section discusses impacts on lands with wilderness characteristics from proposed management actions of other resources and resource uses. Existing

conditions concerning lands with wilderness characteristics are described in **Section 3.20**, Lands with Wilderness Characteristics.

The BLM has numerous authorities under FLPMA to maintain inventories of all public lands and their resources, including wilderness characteristics, and to consider such information during land use planning. During the RMP planning process for each field office, a review was completed of lands within the respective boundaries to determine whether they possess wilderness characteristics. This review included only BLM-administered lands outside of existing WSAs.

Wilderness characteristics considered in this analysis include sufficient size (typically 5,000 acres or greater), naturalness, outstanding opportunities for either solitude or primitive and unconfined type of recreation, and supplemental values. In total, 242,400 acres of BLM-administered lands were found to contain, or potentially contain, wilderness characteristics within PHMA and 125,800 acres within GHMA. An updated inventory would be completed before any surface disturbance and any potential impacts on lands with wilderness characteristics would be analyzed through the site-specific NEPA process.

Analysis for this section discusses the impacts of planning decisions on managing lands with wilderness characteristics. Impacts identified in this section are limited to potential changes in wilderness characteristics for only the areas identified to contain, or potentially contain, wilderness characteristics. Areas identified as potentially containing wilderness characteristics meet the manageable size criteria but have not yet been inventoried to determine their naturalness and outstanding opportunities for solitude or primitive and unconfined types of recreation. As such, until a complete on-the-ground inventory can be conducted, they are assumed to contain wilderness characteristics.

Wilderness characteristics are primarily influenced by actions that impact the undeveloped nature of the area or activities that increase the sights and sounds of other visitors. Generally, actions that create surface disturbance degrade the natural character of lands with wilderness characteristics, as well as the setting for experiences of solitude and primitive recreation.

No actions would be taken on any BLM-administered lands without a current inventory of lands with wilderness characteristics that has been completed and shared with the public. Management actions that could impact an area's natural appearance include the presence or absence of roads and trails, use of motorized vehicles along those roads and trails, fences and other improvements, nature and extent of landscape modifications, or other actions that result in surface-disturbing activities. All of these activities affect the presence or absence of human activity and, therefore, could affect an area's natural appearance. Prohibiting surface-disturbing activities and new developments within lands with wilderness characteristics would protect naturalness.

Two other wilderness characteristics—outstanding opportunities for solitude and primitive and unconfined types of recreation—are related to the human experience in an area. Visitors could have outstanding opportunities for solitude and for primitive and unconfined recreation under the following conditions:

- When the sights, sounds, and evidence of other people are rare or infrequent
- Where visitors can be isolated, alone, or secluded from others
- Where the use of the area is through nonmotorized nonmechanized means
- Where no or minimal developed recreation facilities are encountered

4.21.2 Methodology and Assumptions

General Impacts on Lands with Wilderness Characteristics

Indicators of impacts on lands with wilderness characteristics and the measurements used to describe the impacts (where available or appropriate) are as follows:

- Protection of the inventoried characteristics to a level at which the value of the wilderness characteristic would continue to be present within the specific area
- Degradation of the inventoried characteristics to a level at which the value of the wilderness characteristic would no longer be present within the specific area
- Measures common to both general impacts listed above are as follows:
  - Size of roadless acres—Impacts would result from building roads that would reduce the roadless size
  - Naturalness (apparent naturalness, not ecological naturalness)—Impacts would result from developments or vegetation manipulations that make the area appear less natural
  - Opportunities for solitude or primitive recreation—Impacts would result from increases in visitation or loss of primitive recreation opportunities, depending on if either or both solitude or private and unconfined recreation were an identified wilderness characteristic
  - Supplemental values—Impacts would result from any action that degrades the inventoried values

Impacts could also include actions that maintain, protect, or improve wilderness characteristics.

Assumptions

The following assumptions were used in the analysis:

- Some BLM-administered lands have been identified as potentially containing wilderness characteristics because they meet the minimum size requirements and are free of roads. However, these parcels have yet to be inventoried to verify their apparent naturalness and opportunities for solitude and unconfined and primitive types of recreation. Until a complete on-the-ground inventory is undertaken, these parcels are assumed to contain wilderness characteristics and would be managed as such.
- All parcels identified as containing wilderness characteristics were identified because they meet the inventory criteria in BLM manual 6310, *Conducting Wilderness Characteristics Inventory on BLM Lands* (i.e., size, apparent naturalness, opportunities for solitude and primitive types of recreation, and supplemental values).
- Impacts on lands with wilderness characteristics are analyzed based on the maintenance, enhancement, or degradation (adverse impacts) of naturalness and outstanding opportunities for solitude or primitive recreation.
- All wilderness characteristics inventories will be maintained and will be updated whenever actions are proposed that could impact parcels identified as containing wilderness characteristics.
- Management of lands with wilderness characteristics to protect those characteristics is subject to valid existing rights.
- The RMPs that would be amended by this LUPA are in varying stages of inventory and management prescriptions for lands with wilderness characteristics. Potential impacts on lands with wilderness characteristics will depend on the underlying RMP's determination whether or not to protect those characteristics.

Implementing management actions for the following resources would have negligible or no impact on lands with wilderness characteristics and are therefore not discussed in detail: recreation, wild horse management, fuels management, fire operations, habitat restoration, and ESR.

4.21.3 Direct and Indirect Impacts on Lands with Wilderness Characteristics

Impacts from Travel Management on Lands with Wilderness Characteristics Not in Protected Status

Degradation of the Inventoried Characteristics

By definition, there are no roads in lands with wilderness characteristics, so there would be no impact. Motorized travel on primitive roads and trails, unless specifically prohibited, would still be allowed. Additional public use of these primitive roads and trails may diminish apparent naturalness and opportunities for solitude.

Alternative A would have the most areas open to motorized travel, and therefore would have the greatest impact on lands with wilderness characteristics. However, these impacts would be relatively moderate.

Under action Alternatives B, C, and D and the Proposed LUPA, there would be limits on route construction and realignment in PHMA. This would result in indirect beneficial effects on lands with wilderness characteristics.

Protection of the Inventoried Characteristics

Beneficial impacts on restoring roads and trails include returning an area to a more natural state and providing additional opportunities for solitude.

Alternative A would put the lowest priority on restoration and therefore would have the lowest beneficial impact on lands with wilderness characteristics.

Under Alternatives B, C, and D and the Proposed LUPA, there would be priority on restoration in PHMA. This would result in indirect beneficial effects on lands with wilderness characteristics.

Impacts from Lands and Realty Management on Lands with Wilderness Characteristics

ROWs

<u>Degradation of the Inventoried Characteristics</u>

Surface-disturbing activities would be authorized only if there was no negative impact on the characteristics for which an area has been identified as a land with wilderness characteristics (i.e., size, apparent naturalness, opportunities for solitude and primitive types of recreation, and supplemental values). Structures that are detrimental to the apparent naturalness of an area, or that would introduce elements that would reduce or eliminate opportunities for solitude, would not be authorized. However, if the surface disturbance were to enhance the feeling of apparent naturalness, it could be allowed. The majority of the impacts would occur next to the lands managed for lands with wilderness

characteristics because existing protections would be the same across all alternatives for those areas.

Alternative A would have the most areas available for ROWs and also construction of structures, with no restrictions in place to protect GRSG habitat specifically and therefore would have the greatest impact on lands with wilderness characteristics.

Alternative B would have fewer areas available for ROWs and also construction of structures, through restrictions to protect GRSG habitat. Therefore, impacts on lands with wilderness characteristics would be less than Alternatives A and D but would be greater than Alternative C.

Alternative C would have the fewest areas available for ROWs and also construction of structures, so it would have the fewest impacts on lands with wilderness characteristics.

Alternative D would have fewer impacts than Alternative A, but greater impacts than Alternatives A and C.

Proposed LUPA—Impacts would be similar to those described above for Alternative D. However, additional protections would be greater under the Proposed LUPA for lands with wilderness characteristics because GHMA would also be managed as avoidance for ROWs. Additionally, under the Proposed LUPA, no aboveground structures would be authorized within 1 mile of active leks in occupied habitat, which would provide additional protection for lands with wilderness characteristics.

Land Tenure Adjustment

<u>Protection of the Inventoried Characteristics</u>
The BLM would evaluate on a case by case basis acquiring lands with the following criteria:

- State and private lands of 5,000 acres or greater that contain wilderness characteristics
- Conservation easements on state or private parcels that total 5,000 acres or greater and contain wilderness characteristics
- Lands that total 5,000 acres or greater that contain wilderness characteristics proposed for mineral withdrawal

Under Alternative A, the acquisition of lands through exchanges or the disposal of lands would be guided by the existing LUP. Unless specifically managed for wilderness characteristics with management guidance within an LUP, there could be adverse impacts if lands where disposed of that possessed wilderness characteristics. The acquisition of lands within the decision area would benefit

lands with wilderness characteristics if acquired lands contained wilderness characteristics.

Alternative B would encourage retaining public ownership of public lands while considering certain exemptions. Exemptions include land exchanges where there is mixed landownership and an land exchange would allow for additional or more contiguous federal ownership patterns within PHMA or considering disposal of federally owned lands within PHMA where there is a minority of ownership and where effective mitigation agreements could be pursued or under the consideration of pursing permanent conservation easements. The BLM and Forest Service would also seek to acquire state or private lands where conservation actions cannot be achieved. This would provide greater protections to existing lands with wilderness characteristics especially if acquired lands possessed wilderness characteristics.

Alternative C would have the same benefits as Alternative B but the BLM and Forest Service would strive and prioritize acquisition over conservation easements and there would be no exception of disposals. This would have the greatest benefit to if acquired lands possessed wilderness characteristics or for protections of existing lands with wilderness characteristics.

Alternative D would have similar benefits to Alternatives B and C, however isolated federal parcels could be disposed of if they are not capable of altering grouse populations (e.g., no leks within such parcel). When considering the acquisition of lands the GRSG habitat values would be considered and how such acquisition would benefit the GRSG. Under this alternative there would be fewer benefits than under Alternatives B and C but greater benefits than Alternative A.

Management of the lands program, specifically land tenure adjustments, would be the same under the Proposed LUPA as under Alternative D; impacts are therefore the same as those described under Alternative D.

Impacts from Range Management on Lands with Wilderness Characteristics

Range Improvements

Degradation of the Inventoried Characteristics

The construction of structures associated with range management is generally consistent with wilderness characteristics, as long as it does not create roads, detract from the apparent naturalness of an area, or negatively impact opportunities for solitude and primitive types of recreation. Examples of structures are water troughs, fences, and corrals.

Alternative A would have the most areas available for livestock grazing, and consequently, construction of structures, with no restrictions in place to

protect GRSG habitat specifically; therefore, Alternative A would have the greatest impact on lands with wilderness characteristics.

Alternative B would have fewer areas available for construction of structures, through restrictions to protect GRSG habitat. Therefore, impacts on lands with wilderness characteristics would be less than Alternatives A and D but would be greater than Alternative C.

Alternative C would have no areas available for livestock grazing and construction of structures associated with livestock grazing would be restricted. In order to implement Alternative C, thousands of miles of fence may be needed to be constructed on private allotments to prevent trespass of livestock onto BLM-administered or National Forest System lands. This potential increase in infrastructure would have a greater impact on lands with wilderness characteristics.

Alternative D would have the same restrictions as Alternative B, but those restrictions would be applied to ADH. Alternative D would have greater impacts on lands with wilderness characteristics than Alternative C, but fewer impacts than Alternatives A and B.

The Proposed LUPA's impacts would be similar to Alternative D.

Vegetation Disturbance

Degradation of the Inventoried Characteristics

In areas that are available for livestock grazing, changes in vegetation would have an impact on lands with wilderness characteristics if they would detract from the apparent naturalness of an area or negatively impact opportunities for solitude and primitive types of recreation.

Alternative A would have the most areas available for livestock grazing, with the most potential for vegetation disturbance; therefore, Alternative A would have the greatest impact on lands with wilderness characteristics.

Alternative B would have the same areas available for livestock grazing as Alternative A but would put more restrictions on livestock grazing in place. The potential for vegetation disturbance would be the same under Alternative B as it is under Alternative A;

Alternative C would not allow livestock grazing in ADH; therefore, Alternative C would have the fewest impacts on lands with wilderness characteristics because it would have the least potential for vegetation disturbance.

Alternative D has the same areas available for livestock grazing as Alternatives A and B. Impacts on lands with wilderness characteristics would be the same under Alternative D as they are under Alternatives A and B.

The Proposed LUPA's impacts would be similar to Alternative D.

Impacts from Fluid Minerals Management on Lands with Wilderness Characteristics

Degradation of the Inventoried Characteristics

Construction of Structures

Areas with high potential and availability for development of fluid minerals are likely to have a greater impact on lands with wilderness characteristics than areas with low potential and low or no availability for fluid mineral development. The construction of energy facilities would generally be considered detrimental to the apparent naturalness of an area or would introduce elements that would reduce or eliminate opportunities for solitude.

Alternative A would place the fewest restrictions on fluid mineral development, so it would have the most potential for installation of structures to extract the fluid minerals. Alternative A has the most impacts on lands with wilderness characteristics.

Alternative B would place some restrictions on fluid mineral development, including no new leasing in PHMA and restrictions on locations of well pads and associated facilities. Impacts on lands with wilderness characteristics are less than Alternatives A and D but greater than Alternative C.

Alternative C would place the most restrictions on fluid mineral development, including no new leasing in ADH and restrictions on locations of well pads and associated facilities. Alternative C would have the fewest impacts on lands with wilderness characteristics.

Alternative D would have fewer impacts than Alternative A but greater impacts than Alternatives A and C because it would allow more flexibility in fluid mineral development.

Proposed LUPA—Impacts from management of fluid minerals for all indicators would be similar to Alternative D. There would be additional protections for lands with wilderness characteristics due to increased restrictions on surface disturbance in PHMA (3 percent disturbance cap).

Construction of Roads and Trails

Areas with high potential and availability for development of fluid minerals would have a greater impact on visual resources than areas with low potential and low or no availability for fluid mineral development. Surface-disturbing activities, such as road and trail construction, would be authorized only if there were no negative impact on an area that had been identified to be managed for wilderness characteristics protection in an RMP. This could change if an

underlying RMP determines that these areas would or would not be protected for wilderness characteristics.

Alternative A would place the fewest restrictions on fluid mineral development, so it would have the most potential for roads to access the development to extract the fluid minerals. Alternative A has the most impacts on lands with wilderness characteristics.

Alternative B would place some restrictions on fluid mineral development and therefore some restrictions on creation of access roads. Impacts on lands with wilderness characteristics are less than Alternatives A and D but greater than Alternative C.

Alternative C would place the most restrictions on fluid mineral development, as well as creation of roads, and therefore has the fewest impacts on lands with wilderness characteristics.

Alternative D has fewer impacts than Alternative A but greater impacts than Alternatives A and C because it would allow more flexibility in fluid mineral development, as well as the creation of roads to access the development.

Proposed LUPA—See *Construction of Structures*, above.

Earthwork Construction

Surface-disturbing activities, earthwork construction, and vegetation disturbance would be authorized only if there were no negative impact on the characteristics for which an area has been identified as a land with wilderness characteristics (i.e., size, apparent naturalness, opportunities for solitude and primitive types of recreation, and supplemental values). Earthwork construction would not be authorized if it would be detrimental to the apparent naturalness of an area or introduce elements that would reduce or eliminate opportunities for solitude. However, if the surface disturbance would enhance the feeling of apparent naturalness, it could be allowed.

Alternative A would place the fewest restrictions on fluid mineral development and so would have the most potential for changes in topography, such as clearing and leveling well pads. Alternative A has the most impacts on lands with wilderness characteristics.

Alternative B would place some restrictions on fluid mineral development and therefore some restrictions on changes in topography. Impacts on lands with wilderness characteristics are less than Alternatives A and D but greater than Alternative C.

Alternative C would place the most restrictions on fluid mineral development, as well as the changes in topography associated with well development;

therefore, Alternative C has the fewest impacts on lands with wilderness characteristics.

Alternative D has fewer impacts than Alternative A but greater impacts than Alternatives A and C because it would allow more flexibility in fluid mineral development.

Proposed LUPA—See Construction of Structures, above. *Vegetation Disturbance*. Areas with high potential and availability for development of fluid minerals would have a greater impact on lands with wilderness characteristics than areas with low potential and low or no availability for fluid mineral development. Energy facilities could impact lands with wilderness characteristics by necessitating construction and vegetation clearing, thereby reducing an area's apparent naturalness and opportunities for solitude.

Alternative A would place the fewest restrictions on fluid mineral development and therefore would have the most potential for vegetation disturbance, such as the disturbance associated with clearing and leveling well pads. Alternative A has the most impacts on lands with wilderness characteristics in this regard.

Alternative B would place some restrictions on fluid mineral development and therefore some restrictions on vegetation disturbance. Impacts on lands with wilderness characteristics are less than Alternatives A and D but greater than Alternative C.

Alternative C would place the most restrictions on fluid mineral development, as well as the vegetation disturbance associated with well development, and therefore has the fewest impacts on lands with wilderness characteristics.

Alternative D has fewer impacts than Alternative A but greater impacts than Alternatives A and C because it would allow more flexibility in fluid mineral development.

Proposed LUPA—See *Construction of Structures*, above.

Impacts from Solid Minerals, Locatable Minerals, Nonenergy Leasable Minerals, and Salable Minerals Management on Lands with Wilderness Characteristics

Impacts from the management actions associated with these resources would be the same as the impacts described under *Impacts from Fluid Minerals Management on Lands with Wilderness Characteristics* above.

Impacts from Wildfire Suppression and Fire Rehabilitation on Lands with Wilderness Characteristics

Fire Operations

Degradation of the Inventoried Characteristics

Vegetation Disturbance and Road Construction. Areas prioritized as high for suppression would have fewer impacts on lands with wilderness characteristics than areas prioritized lower or not prioritized at all. Wildland fire can cause great contrast to the natural landscape, removing large swaths of vegetation and leaving behind visible scars. However, these impacts are generally short term as over the long term, fires allow for the regrowth of native or appropriately adapted vegetation, which improves ecological health. Fire is a naturally occurring ecosystem process and, generally speaking, is consistent with wilderness characteristics. However, constructing roads to facilitate fire operations is not consistent with wilderness characteristics.

Alternative A would not prioritize suppression of fire in GRSG habitat and therefore would have the most potential for vegetation disturbance outside of that habitat. Alternative A has the most impacts on lands with wilderness characteristics in this regard.

Alternative B would prioritize suppression in PHMA only. Impacts on lands with wilderness characteristics are less than Alternatives A and D but greater than Alternative C.

Alternative C would also prioritize suppression in PHMA only; therefore, it has the same impacts on lands with wilderness characteristics as Alternative B.

Alternative D has fewer impacts than Alternative A but greater impacts than Alternative C. This is because it would prioritize suppression, but suppression would be prioritized higher than Alternative A and lower than Alternative C.

Proposed LUPA—Management of wildfire suppression and fire rehabilitation would be the same as Alternative D; impacts on Lands with Wilderness Characteristics are the same as for Alternative D.

Impacts from Habitat Restoration on Lands with Wilderness Characteristics

Protection of the Inventoried Characteristics

Restoration of Surface Disturbance

In areas that contain higher densities of surface disturbance, prioritization of restoration would have a greater impact on lands with wilderness characteristics than areas that contain a lower density of roads and trails. Any increase in

restoration would reduce the level and number of existing routes and vegetation loss.

Alternative A would put the lowest priority on restoration of sagebrush habitat. This would not improve the apparent naturalness of the planning area nor create additional opportunities for solitude or primitive types of recreation; therefore, Alternative A has the fewest beneficial impacts on lands with wilderness characteristics in the planning area.

Alternative B would put a lower priority on restoration than Alternative C but would put a higher priority on restoration than Alternative D.

Alternative C would put the highest priority on restoration of sagebrush habitat, which would have the highest beneficial impact on lands with wilderness characteristics in the planning area.

Alternative D would put a higher priority on restoration of sagebrush than Alternative A but would put a lower priority on restoration of sagebrush than Alternatives B and C.

Management of habitat restoration under the Proposed LUPA would be the same as Alternative D; impacts on Lands with Wilderness Characteristics from habitat restoration are the same as for Alternative D.

Impacts from ACEC/Zoological Area Management on Lands with Wilderness Characteristics

Protection of the Inventoried Characteristics

Areas that are designated as ACECs would have more beneficial impacts on lands with wilderness characteristics than areas that are not designated as ACECs. Management of ACECs to protect relevant and important values could have both direct and indirect impacts on lands with wilderness characteristics. Prohibiting surface-disturbing activities and other authorized activities would benefit lands with wilderness characteristics by creating areas with an apparent feeling of naturalness and creating additional opportunities for solitude and primitive types of recreation. ACECs often also help protect supplemental values that are associated with lands with wilderness characteristics.

Alternatives A, B, and D and the Proposed LUPA would recognize all of the existing ACEC designations. These alternatives would have fewer beneficial impacts on lands with wilderness characteristics than Alternative C. Alternative C would make all PHMA an ACEC, in addition to the existing ACECs. However, there are no additional management actions associated with designation of PHMA as an ACEC than what is already in Alternative C.

4.21.4 Summary of Impacts on Lands with Wilderness Characteristics

Potential impacts on lands with wilderness characteristics depends on the underlying RMPs determination whether or not to protect these characteristics.

Alternative A provides the least protection for lands with wilderness characteristics in the planning area. Alternative A puts very few restrictions on development, which could result in the most modification of the landscape and, consequently, the most impacts on lands with wilderness characteristics.

Alternative B provides a greater level of protection for lands with wilderness characteristics than Alternative A but would provide a lower level of protection than Alternative C.

Alternative C would provide the most protection for lands with wilderness characteristics. The most restrictions would be placed on development under Alternative C, which would afford the most protection for lands with wilderness characteristics.

Alternative D would provide more protection for lands with wilderness characteristics than Alternative A but would provide less protection than Alternatives B and C. More flexibility for development is built into Alternative D, which could result in higher levels of development than Alternatives B and C.

The Proposed LUPA has impacts similar to Alternative D, with additional protections for Lands with Wilderness Characteristics. This is due to additional restrictions on surface disturbance in PHMA (3 percent disturbance cap).

4.22 SOUNDSCAPES

4.22.1 General Description

A soundscape is the component sounds of the environment, including natural, human-produced, and mechanical in origin. Noise is generally described as unwanted sound in an environment. Weighted noise intensity (or loudness) is measured as sound pressure in decibels. Almost all human activities, such as construction and road traffic and pedestrian traffic, create noise or sound and thus alter the soundscape.

The expansion of aircraft "flight-seeing," snowmobile use, and motorcycle touring are a few examples of technological advancements that now commonly impact public land soundscapes. To adequately manage these impacts, agencies must view them as part of an evolution toward a noisier society rather than as isolated situation-specific events.

The factors that combine to determine whether the activities would impacts the soundscape character are loudness, frequency or pattern, duration, the time at which it is produced, the proximity to the source of the sound and sensitive receptors.

4.22.2 Methodology and Assumptions

General Impacts on Soundscapes

Indicators of impacts on soundscapes and the measurements used to describe the impacts (where available or appropriate) are as follows:

Activities That Produce Sound

- Changes to ambient or background noise level or noise (decibel) levels
- Adverse or beneficial—Changes to baseline noise levels are considered adverse to GRSG

Assumptions

The following list presents basic assumptions related to soundscapes that apply to the impacts assessment for Alternatives A through D.

- Distance attenuation estimation is an inverse square law: Sound dissipates at 6 decibels as distance doubles from a point source and at 3 decibels from a line source, such as constant flowing traffic.
- All human activities produce some level of sound.
- Topography, climate, and vegetation affect how sound is propagated through the landscape.
- Any change from ambient noise levels would be an adverse impact on soundscapes.
- Any impacts on soundscapes would occur at the project implementation level and would be further analyzed at that time.

4.22.3 Impacts Common to all Management Actions on Soundscapes

Activities That Produce Sound

All human activities would result in some level of impact on the soundscape. In areas with high levels of human activity, noise impacts would increase and would have a greater effect in both context and intensity.

Alternative A would allow the most development and other human activities; therefore, it would result in the most impacts on soundscapes.

Alternative B places restrictions on development and other human activities and would impact soundscapes less than Alternative A but more than Alternative C.

Alternative C places the most restrictions on development and other human activities; therefore, it would result in the fewest impacts on soundscapes.

Alternative D places more restrictions on development and other human activities than Alternative A, but it places fewer restrictions than Alternatives B

and C; therefore, Alternative D would impact soundscapes less than Alternative A but more than Alternatives B and C.

The Proposed LUPA places more restrictions on development and other human activities than Alternatives A and D, but slightly less than Alternatives B and C.

4.22.4 Summary of Impacts on Soundscapes

Alternative A—Impacts on soundscapes are the greatest under this alternative since it would allow the most opportunity for human activities.

Alternative B—Impacts on soundscapes under Alternative B are fewer than under Alternative A since it would allow fewer opportunities for human activities.

Alternative C—Impacts on soundscapes are the fewest under this alternative since it would allow the fewest opportunities for human activities.

Alternative D—Impacts on soundscapes are greater than under Alternatives B and C but fewer than Alternative A.

Proposed LUPA—Impacts on soundscapes are slightly greater than Alternatives B and C but less than Alternatives A and D.

4.23 CULTURAL RESOURCES

4.23.1 General Description

Cultural resources are the material and physical remains of prehistoric and historic human activity, occupation, or endeavor.

> *Culture [is] a system of behaviors, values, ideologies, and social arrangements. These features, in addition to tools and expressive elements such as graphic arts, help humans interpret their universe as well as deal with features of their environments, natural and social. Culture is learned, transmitted in a social context, and modifiable. Synonyms for culture include "lifeways," "customs," "traditions," "social practices," and "folkways"* (Parker and King 1998).

Natural features of importance in human history, such as mountains and rivers, may also be considered cultural resources. Overall, these resources are fragile and nonrenewable and embody characteristics and information specific to the period in which a cultural group lived in the area. Intrinsically, each cultural resource is important and provides valuable information about human occupation of the area.

4.23.2 Methodology and Assumptions

General Impacts on Cultural Resources

Indicators of impacts on cultural resources and the measurements used to describe the impacts (where available or appropriate) are as follows:

- Vandalism and collection
  - Measures of vandalism and collection of cultural resources include access and visibility.
  - Adverse impacts on cultural resources that can lead to vandalism and collection include an increase in access, which could expose significant or sensitive sites to collection or destruction. Increasing or changing ground visibility also could increase vandalism and collection because artifacts and features are more visible and susceptible.
  - Limiting access and decreasing ground visibility can be beneficial to cultural resources and can decrease the potential for vandalism and collection.
- Scientific knowledge
  - Measures of scientific knowledge of cultural resources include site recordation, eligibility determination, and acres inventoried.
  - Adverse impacts on scientific knowledge of cultural resources can occur from loss of data, such as destroyed features or artifacts.
  - Beneficial impacts on scientific knowledge of cultural resources comes from new cultural resource inventories, which lead to new sites being documented and their significance determined.
- Site setting
  - Measures of site setting for cultural resources include landscape fragmentation, visual disturbance, and audible noise.
  - Adverse impacts on site setting can occur from increased disturbances around or near sites, which changes the sites' natural setting. Visual or audible disturbances, such as buildings, roads, traffic, and machinery, also contribute to the potential impact on cultural resources.
  - Decreasing landscape fragmentation and mitigating or deterring visual and audible disturbances would be beneficial to preserving site setting of cultural resources.

- Traditional cultural properties
  - Measures of significance to Traditional Cultural Properties and traditional uses include plant communities, minerals, sacred sites, and access.
  - Adverse impacts on Traditional Cultural Properties and uses can come from disturbances to plant communities used traditionally, disturbances to significant sites, or limiting or closing access to areas used by tribes.
  - Limiting disturbances to plant communities or significant sites can be beneficial to protecting Traditional Cultural Properties and uses by keeping these resources intact. Limiting access is also beneficial to protecting traditional properties by ensuring sensitive areas are generally avoided.
- Ground disturbance
  - Measures of ground disturbance to cultural resources include human-caused erosion and soil removal.
  - Adverse impacts from ground disturbance on cultural resources occur from many activities, including construction, livestock hoof action, and creation of unauthorized routes. Additionally, activities that lead to changes in vegetation or stability of soils can cause adverse impacts through erosion.
  - Limiting ground disturbances that lead to changes in soil stability or vegetation would help reduce adverse impacts on cultural resources.
- Natural processes
  - Measures of natural processes that affect cultural resources include wind erosion, water erosion, wildfire, and vegetation loss or increase.
  - Adverse impacts from natural processes on cultural resources are ongoing. These adverse impacts happen naturally but can be sped up as a cumulative result of human actions.
  - Beneficial impacts from natural processes include burying cultural materials or increasing vegetation, which helps to stabilize cultural resources.

Assumptions

The following list presents basic assumptions related to cultural resources that apply to the impacts assessment for Alternatives A, B, C, and D and the Proposed LUPA.

- All four alternatives require that BLM and Forest Service-administered cultural resources be managed and protected and comply with all relevant laws and regulations.
- Cultural resources are defined as including archaeological, historic, and Native American traditional cultural properties, religious sites, and sensitive areas, unless otherwise specified in the analysis.
- Historic properties are defined as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP. The term includes, for purposes of these regulations, artifacts, records, and remains that are related to and located within such properties. The term 'eligible for inclusion in the NRHP' includes both properties formally determined as such by the Secretary of the Interior and all other properties that meet NRHP listing criteria" (quoted from 36 CFR, Part 800.2[e]; compare National Historic Preservation Act, Section 301, Appendix 5).
- "An adverse effect is found when an action would alter the characteristics of a historic property that qualify it for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, workmanship, feeling, or association. Adverse impacts would include reasonably foreseeable impacts caused by the action that would occur later in time, be farther removed in distance, or be cumulative" (36 CFR, Part 800.5a).
- Direct impacts result from implementing the management goals, objectives, and actions of other resources that conflict with cultural resource management goals, objectives, and actions.
- Indirect impacts are caused by actions that are farther removed in time or distance.
- Beneficial impacts include management actions or policies that result in preserving the characteristics of cultural resources that are important to traditional or religious uses and protecting the integrity of the cultural property's location, design, setting, workmanship, feeling, or association that would qualify them for listing on the NRHP.
- Any ground-disturbing activity should be considered a potential threat to cultural and Native American resources. Adverse impacts are permanent, and beneficial impacts cannot reverse these impacts; therefore, every impact is considered cumulative. Even minor impacts accrue over time, resulting in deteriorating site condition and loss of important scientific data and cultural values.

- All alternatives require consultation with Native American tribes and recognition of tribal interests during the planning phase of proposed federal undertakings.
- Traditional cultural property locations, importance, and extent of use are limited by the communities associated with them. Maintaining access to and reducing impacts on them are responsibilities of the BLM and Forest Service and is an important objective of cultural resource management.
- Nondiscretionary mining notices are not federal undertakings, but 43 CFR, Part 3809, specifically provides for the protection of cultural properties by prohibiting mining operators on claims of any size from knowingly disturbing or damaging these properties.
- Unauthorized or unplanned activities, wildland fire, dispersed recreation, natural processes and unauthorized collection, excavation, and vandalism would lead to impacts that would be difficult to monitor and mitigate. Impacts on traditional cultural properties, sacred sites, historic trails, and some other cultural resources that are significant for reasons other than data potential would be difficult or impossible to mitigate unless the resources and associated settings were avoided.

4.23.3 Direct and Indirect Impacts on Cultural Resources

Impacts from Travel Management on Cultural Resources

Restrictions on travel management designed to protect GRSG habitat would also protect cultural resources. Limiting activity and use in areas where there is potential for cultural resources is beneficial to preserving and protecting cultural resources. Moving travel-related impacts outside of GRSG habitat would in turn move these impacts on other areas within the planning area. This could concentrate use in areas where there are potentially significant cultural resources.

Vandalism and Collection

Management actions for travel that limit or control access could reduce vandalism and collection of cultural resources. As access and visibility increase, the probability for unauthorized collection or vandalism rises. This is caused by less control over where people go and what sensitive cultural resources are in those areas.

Alternative A—Travel under this alternative would be the least restrictive. On BLM-administered lands, open OHV travel would be allowed in some areas, making it difficult to avoid and protect cultural resources. This alternative would have the greatest impact on cultural resources from vandalism and collection by continuing to provide access to areas, which increases the opportunity for these activities. Lands within GRSG habitat managed by the Forest Service are limited

to designated routes; therefore, this alternative would not increase or decrease impacts on National Forest System lands.

Alternative B—Under this alternative, motorized travel would be limited to existing routes, which would not be upgraded. Routes that are closed are required to be restored and reseeded with native species. These actions are beneficial to cultural resources by reducing travel and access, which in, turn could reduce vandalism and collection.

Alternative C—This alternative would limit travel the most and follows the management decisions in Alternative B, but in addition, limits new road construction within 4 miles of active GRSG leks. These actions are beneficial to cultural resources by reducing travel and access, which in, turn could reduce vandalism and collection.

Alternative D—This alternative has travel restrictions similar to Alternatives B and C but offers disturbance exception criteria for construction of new routes and allows upgrades to existing routes. This alternative limits travel to existing routes, which would benefit cultural resources and limit vandalism and collection. Offering exception criteria and allowing routes to be upgraded could impact cultural resources by increasing travel and access, which could increase opportunities for vandalism and collection; however, it would be more limiting than Alternative A because it would also have to be shown that the routes would not adversely impact GRSG populations.

Proposed LUPA—Impacts on cultural resources would be similar to those above for Alternative D for all indicators. However, under the Proposed LUPA, the Wolford Mountain OHV area would continue to be managed as open to OHVs, which includes one acre of PHMA. Under the Proposed Plan/Final EIS for the KFO, there would be an additional 13 acres of PHMA, which would be managed as open. The Proposed LUPA would have a slightly greater impact on cultural resources than Alternatives B and C, but smaller impacts than Alternatives A and D.

Scientific Knowledge

Management actions for travel would have beneficial impacts on cultural resources by helping to protect scientific knowledge. Scientific knowledge is gained through site discovery and recordation, as well as intensive research. Limiting travel to designated routes helps ensure that people are not traveling cross-country through areas that have not had the cultural resources inventoried. By not restricting people to designated routes, adverse impacts can occur on cultural resources and the scientific knowledge gained from them.

Alternative A—Travel under this alternative would be the least restrictive. On BLM-administered lands, it would allow open OHV travel in some areas, making it difficult to avoid and protect cultural resources. This alternative would have the greatest impact on scientific knowledge of cultural resources by continuing

to provide access to areas that have not been inventoried and where significant cultural resources may not be avoided. Lands within GRSG habitat managed by the Forest Service are limited to designated routes; therefore, this alternative would not increase or decrease impacts on National Forest System lands.

Alternative B—This alternative would limit motorized travel to existing routes, which would not be upgraded. Routes that are closed are required to be restored and reseeded with native species. These actions are beneficial to cultural resources by reducing travel and access in areas that have not been inventoried for cultural resources. This reduces adverse impacts on undocumented and unprotected cultural resources that could provide scientific knowledge.

Alternative C—This alternative would limit travel the most and follows the management decisions in Alternative B, but in addition it limits new road construction within 4 miles of active GRSG leks. These actions are beneficial to cultural resources by reducing travel and access in areas that have not been inventoried for cultural resources. This reduces adverse impacts on undocumented and unprotected cultural resources that could provide scientific knowledge.

Alternative D—This alternative has travel restrictions similar to Alternatives B and C, but it offers disturbance exception criteria for construction of new routes and allows upgrades to existing routes. This alternative limits travel to existing routes, which would reduce travel and access in areas that have not been inventoried for cultural resources. Offering exception criteria and allowing upgrading of routes has little potential to impact scientific knowledge of cultural resources because routes would have to go through the Section 106 process, and adverse impacts would be mitigated.

Proposed LUPA—See Vandalism and Collection, above. Site Setting

Management actions for travel have beneficial impacts on site setting of cultural resources. Site setting includes not only the actual area the site encompasses but the surrounding landscape. Limiting travel to designated routes would help preserve site setting by decreasing new disturbance and controlling where travel occurs.

Alternative A—Travel under this alternative would be the least restrictive. On BLM-administered lands, it would allow open OHV travel in some areas, making it difficult to avoid and protect cultural resources. This alternative would have the greatest impact on site setting of cultural resources because it could create disturbances within the area surrounding a site that contributes to its significance. Lands within GRSG habitat managed by the Forest Service are limited to designated routes; therefore, this alternative would not increase or decrease impacts on National Forest System lands.

Alternative B—This alternative would limit motorized travel to existing routes, which would not be upgraded. Routes that are closed are required to be restored and reseeded with native species. These actions are beneficial to cultural resource setting because it would limit travel to designated routes. This would decrease impacts on site setting by preserving areas around sites and keeping disturbance to a minimum.

Alternative C—This alternative would limit travel the most and follows the management decisions in Alternative B, but in addition it limits new road construction within 4 miles of active GRSG leks. These actions are beneficial to cultural resource setting because it would limit travel to designated routes. This would decrease impacts on site setting by preserving areas around sites and keeping disturbance to a minimum.

Alternative D—This alternative has travel restrictions similar to Alternatives B and C, but it offers disturbance exception criteria for construction of new routes and allows upgrades to existing routes. This alternative limits travel to existing routes, which would reduce travel and access in areas that have not been inventoried for cultural resources. Offering exception criteria and allowing upgrading of routes could impact site setting. By creating new routes and upgrading existing routes, site setting may be impacted by new disturbance within the areas surrounding significant sites.

Proposed LUPA—See *Vandalism and Collection*, above.

Opportunities for Native American Traditional Uses

Management actions for travel have both beneficial and negative impacts on opportunities for Native American traditional uses. Limiting travel to existing routes is beneficial because it helps reduce impacts on areas possibly used by Native Americans for traditional uses, such as plant collection, or traditional cultural properties. On the other hand, access is important to tribes for getting to areas for traditional uses. Closing routes and limiting open OHV travel may make it difficult for tribal members to access areas of interest.

Alternative A—Travel under this alternative would be the least restrictive. On BLM-administered lands, it would allow open OHV travel in some areas, making it difficult to avoid and protect traditional areas. On the other hand, this would make areas more accessible to tribes for traditional uses. Lands within GRSG habitat managed by the Forest Service are limited to designated routes; therefore, this alternative would not increase or decrease impacts on National Forest System lands.

Alternative B—This alternative would limit motorized travel to existing routes, which would not be upgraded. Routes that are closed are required to be restored and reseeded with native species. These actions are beneficial to areas used by tribes for traditional practices because it would limit travel to designated routes. This would decrease impacts on traditional use sites by

preserving areas and keeping disturbance to a minimum. At the same time, this might make it more difficult for tribes to access areas they use traditionally. Closing routes might require additional tribal consultation to identify routes used by tribes and might place those routes in administrative access only use instead of closing the route completely.

Alternative C—This alternative would limit travel the most and follows the management decisions in Alternative B, but in addition it limits new road construction within 4 miles of active GRSG leks. These actions are beneficial to areas used by tribes for traditional practices because it would limit travel to designated routes. This would decrease impacts on traditional use sites by preserving areas and keeping disturbance to a minimum. At the same time, this might make it more difficult for tribes to access areas they use traditionally. Closing routes might require additional tribal consultation to identify routes used by tribes and place those routes in administrative access only use instead of closing the route completely.

Alternative D—This alternative has travel restrictions similar to Alternatives B and C, but it offers disturbance exception criteria for construction of new routes and allows upgrades to existing routes. This alternative limits travel to existing routes, which would reduce travel and access in areas that have not been inventoried for cultural resources. Offering exception criteria and allowing upgrading of routes could impact areas used traditionally by Native Americans. At the same time, it provides access to areas that tribal members can use to practice traditional uses. Closing routes might require additional tribal consultation to identify routes used by tribes and to place those routes in administrative access only use, instead of closing the route completely.

Proposed LUPA—See *Vandalism and Collection*, above.

Ground Disturbance

Management actions for travel have mainly beneficial impacts, resulting from restrictions on ground disturbances to cultural resources. By limiting access to designated routes, unplanned ground disturbance would be reduced. Ground disturbance to cultural resources is caused by soil removal from human actions, such as off-highway travel, unauthorized excavation, and construction.

Alternative A—Travel under this alternative would be the least restrictive. On BLM-administered lands, it would allow open OHV travel in some areas, making it difficult to avoid and protect cultural resources. Ground disturbance could adversely impact cultural resources the most with this alternative because OHVs are not limited to designated routes. Vehicles traveling off designated roads can cause ground disturbance, which can increase site disturbances. Lands within GRSG habitat managed by the Forest Service are limited to designated routes; therefore, this alternative would not increase or decrease impacts on National Forest System lands.

Alternative B—This alternative would limit motorized travel to existing routes, which would not be upgraded. Routes that are closed are required to be restored and reseeded with native species. These actions are beneficial to limiting unplanned ground disturbance and could help protect cultural resources.

Alternative C—This alternative would limit travel the most and follows the management decisions in Alternative B, but in addition, it limits new road construction within 4 miles of active GRSG leks. These actions are beneficial to limiting ground disturbance and could protect cultural resources. On the other hand, limiting new roads to areas outside of GRSG lek areas could push disturbances into areas with a higher probability for cultural resources.

Alternative D—This alternative has travel restrictions similar to Alternatives B and C, but it offers disturbance exception criteria for construction of new routes and allows upgrades to existing routes. This alternative limits travel to existing routes, which would reduce travel and access in areas that have not been inventoried for cultural resources. Offering exception criteria and allowing upgrading of routes has minimal potential to impact cultural resources through ground disturbance because new routes would require cultural resource inventory and compliance.

Proposed LUPA—See *Vandalism and Collection*, above.

Natural Processes

Management actions for travel have mainly beneficial impacts on natural processes and cultural resources. Natural processes, such as water and wind erosion, can cause adverse impacts on cultural resources by disturbing artifacts or features.

Alternative A—Travel under this alternative would be the least restrictive. On BLM-administered lands, it would allow open OHV travel in some areas, making it difficult to avoid and protect cultural resources. Natural processes acting on cultural resources could cause the most adverse impacts under this alternative because OHVs are not limited to designated routes. Vehicles traveling off designated roads can increase natural processes, such as erosion or surface disturbances. Lands within GRSG habitat managed by the Forest Service are limited to designated routes; therefore, this alternative would not increase or decrease impacts on National Forest System lands.

Alternative B—Travel under this alternative would limit motorized travel to existing routes, which would not be upgraded. Routes that are closed are required to be restored and reseeded with native species. These actions are beneficial to decreasing adverse impacts from natural processes, such as erosion from off-highway travel, which could help protect cultural resources.

Alternative C—This alternative would limit travel the most and follows the management decisions in Alternative B, but in addition, it limits new road construction within 4 miles of active GRSG leks. This alternative has the least potential to increase or speed up natural processes, such as erosion, and would help limit adverse impacts on cultural resources.

Alternative D—This alternative has travel restrictions similar to Alternatives B and C, but it offers disturbance exception criteria for construction of new routes and allows upgrades to existing routes. This alternative limits travel to existing routes, which would reduce travel and access in areas that have not been inventoried for cultural resources. Offering exception criteria and allowing upgrading of routes has some potential to contribute to natural processes affecting cultural resources by increasing possible erosion and decreasing vegetation in some areas.

Proposed LUPA—See *Vandalism and Collection*, above.

Impacts from Recreation Management on Cultural Resources

Restrictions on recreation to protect GRSG habitat would generally protect cultural resources, but these actions generally would be negligible for cultural resources.

Vandalism and Collection

Management actions for recreation allow for SRPs to be issued in PHMA if they have beneficial or neutral impacts. Issuing SRPs has little potential to affect vandalism or collecting of cultural resources because areas used intensively, such as camping locations, are inventoried before the permit. Limiting camping and other nonmotorized recreation seasonally outside of lek areas has some potential to adversely affect cultural resources because it pushes these activities to other areas, which may concentrate use in areas with potential for cultural resources.

Alternative A—Recreation under this alternative restricts SRPs to an as-needed basis for the WRFO and LSFO; all other offices have no restrictions on issuing SRPs. This alternative would have little impact on vandalism or collection of cultural resources. SRPs are usually issued for activities that are dispersed, or they are concentrated activities, such as outfitter camps or trail events. Areas that have concentrated use are inventoried for cultural resources.

Alternative B—This alternative allows SRPs to be issued in PHMA if the permits would be neutral or beneficial to habitat areas. This alternative would have little effect on cultural resources. Alternative B might be somewhat beneficial to decreasing vandalism or collection of cultural resources because it limits recreation in these areas through limiting SRPs.

Alternative C—This alternative would be the same as Alternative B and allows SRPs to be issued in PHMA if the permits would be neutral or beneficial to

habitat areas. This alternative would have little effect on cultural resources. Alternative C might be somewhat beneficial to decreasing vandalism or collection of cultural resources because it limits activity in these areas.

Alternative D—This alternative is similar to Alternatives B and C in that it would allow SRPs as long as the activities are not disruptive or cause habitat loss but would not limit camping or nonmotorized recreation. This alternative would have little effect on vandalism or collection of cultural resources.

Proposed LUPA—Management of recreation would be the same as under Alternative D; impacts for all indicators are the same as those described for Alternative D.

Scientific Knowledge

Management actions for recreation allow for SRPs to be issued in PHMA if they have beneficial or neutral impacts. Issuing SRPs has little potential to affect cultural resource scientific knowledge because areas used intensively for recreation, such as camping locations, are inventoried before the permit. Limiting camping and other nonmotorized recreation seasonally outside of lek areas could adversely affect cultural resources because it pushes these activities to other areas, which may concentrate use in areas with potential for cultural resources.

Alternative A—Recreation under this alternative restricts SRPs to an as-needed basis for the WRFO and LSFO; all other offices have no restrictions on issuing SRPs. This alternative would have little impact on scientific knowledge of cultural resources. SRPs are usually issued for activities that are dispersed, or they are concentrated activities, such as outfitter camps or trail events. Areas that have concentrated use are inventoried for cultural resources.

Alternative B—This alternative allows SRPs to be issued in PHMA if the permits would be neutral or beneficial to habitats. This alternative would have little effect on cultural resources and on scientific knowledge of cultural resources.

Alternative C—This alternative would be the same as Alternative B and allows SRPs to be issued in PHMA if the permits would be neutral or beneficial to habitats. This alternative would have little effect on cultural resources and scientific knowledge of cultural resources.

Alternative D—This alternative is similar to Alternatives B and C in that it would allow SRPs as long as the activities were not disruptive or cause habitat loss, but it would not limit camping or nonmotorized recreation. This alternative would have little effect on scientific knowledge of cultural resources.

Proposed LUPA—See *Vandalism and Collection*, above.

Site Setting

Management actions for recreation have neutral to beneficial impacts on site setting for cultural resources. Site setting includes not only the actual area the site encompasses but extends to the surrounding landscape. Limiting SRPs in PHMA helps preserve site setting by decreasing heavy use of areas, which over time can increase impacts on cultural resources. For the most part, this impact would be minimal on cultural resources.

Alternative A—Recreation under this alternative restricts SRPs to an as-needed basis for the WRFO and LSFO; all other offices have no restrictions on issuing SRPs. This alternative would have little impact on site setting of cultural resources. SRPs are usually issued for activities that are dispersed, or they are concentrated activities, such as outfitter camps or trail events. Areas that have concentrated use are inventoried for cultural resources.

Alternative B—This alternative allows SRPs to be issued in PHMA if the permits would be neutral or beneficial to habitats. This would be beneficial to helping preserve site setting of cultural resources because it would limit recreation in these areas.

Alternative C—This alternative would seasonally prohibit camping within a buffered area around GRSG leks. This is potentially beneficial to site setting of cultural resources by limiting activities.

Alternative D—This alternative is similar to Alternatives B and C in that it would allow SRPs as long as the activities were not disruptive or cause habitat loss, but it would not limit camping or nonmotorized recreation. This is potentially beneficial to preserving site setting because it would limit recreation in these areas.

Proposed LUPA—See *Vandalism and Collection*, above.

Opportunities for Native American Traditional Uses

Management actions for recreation have beneficial to neutral impacts on opportunities for Native American traditional uses. Limiting SRPs to within GRSG habitat may help reduce activity in areas of traditional use for Native Americans. When issuing SRPs, these actions require a cultural resource inventory, so impacts on cultural resources or areas of Native American concern should be mitigated before the permit is issued. Overall, this action would have little impact on opportunities for Native American traditional uses.

Alternative A—Recreation under this alternative restricts SRPs to an as-needed basis for the WRFO and LSFO; all other offices have no restrictions on issuing SRPs. This alternative would have little impact on Native American traditional uses. SRPs are usually issued for activities that are dispersed, or they are concentrated activities, such as outfitter camps or trail events. Areas that are concentrated use are inventoried for cultural resources.

Alternative B—This alternative allows SRPs to be issued in PHMA if the permits would be neutral or beneficial to habitat areas. This is potentially beneficial to opportunities for Native American traditional uses because it limits activity in PHMA that may also coincide with areas of interest to tribes.

Alternative C—This alternative would seasonally prohibit camping within a buffered area around GRSG leks. This is potentially beneficial to reducing impacts on opportunities for Native American traditional because it would limit recreation in these areas.

Alternative D—This alternative has restrictions similar to Alternative B but is less limiting to the issuance of SRPs. It is potentially beneficial to reducing impacts on opportunities for Native American traditions because it would limit recreation in these areas.

Proposed LUPA—See *Vandalism and Collection*, above.

Ground Disturbance

Management actions for recreation have mainly beneficial or neutral impacts on ground disturbances of cultural resources. Potential long-term impacts may come from pushing activities to other areas where cultural resources are present. By limiting SPRs within PHMA, this can decrease possible ground disturbance from recreation. Ground disturbance to cultural resources is caused by soil removal from human actions, such as off-highway travel.

Alternative A—Recreation under this alternative restricts SRPs to an as-needed basis for the WRFO and LSFO; all other offices have no restrictions on issuing SRPs. This alternative would have little impact on ground disturbance of cultural resources. SRPs are usually issued for activities that are dispersed, or they are concentrated activities, such as outfitter camps or trail events. Areas that have concentrated use are inventoried for cultural resources.

Alternative B—This alternative allows SRPs to be issued in PHMA if the permits would be neutral or beneficial to habitat areas. This is potentially beneficial to cultural resources by limiting ground-disturbing impacts in PHMA from SRP activities. It may also increase these types of recreation in areas outside of GRSG habitat, which can increase ground disturbances.

Alternative C—This alternative would seasonally prohibit camping and other nonmotorized recreation within a buffered area around GRSG leks. This is potentially beneficial to reducing impacts on cultural resources through ground disturbance by limiting recreation in these areas. Similar to Alternative B, it may also increase these types of recreation in areas outside of GRSG habitat, which can increase ground disturbances.

Alternative D—This alternative has restrictions similar to Alternative B but is less limiting to the issuance of SRPs. This is potentially beneficial to cultural

resources by limiting ground-disturbing impacts in PHMA from SRP activities. It may also increase these types of recreation in other areas outside of GRSG habitat, which can increase ground disturbances.

Proposed LUPA—See *Vandalism and Collection*, above.

Natural Processes

Management actions for recreation have mainly beneficial or neutral impacts on natural process for cultural resources. Natural processes, such as water and wind erosion, can cause adverse impacts on cultural resources by disturbing artifacts or features. Limiting SRPs within GRSG habitat could reduce natural processes in this area but may increase these processes in other areas.

Alternative A—Recreation under this alternative restricts SRPs to an as-needed basis for the WRFO and LSFO; all other offices have no restrictions on issuing SRPs. This alternative would have little impact on natural processes that affect cultural resources. SRPs are usually issued for activities that are dispersed, or they are concentrated activities, such as outfitter camps or trail events. Areas that have concentrated use are inventoried for cultural resources.

Alternative B—This alternative allows SRPs to be issued in PHMA if the permits would be neutral or beneficial to habitats. It may increase these types of recreation in areas outside of GRSG habitat, which can increase natural processes, such as erosion.

Alternative C—This alternative would seasonally prohibit camping and other nonmotorized recreation within a buffered area around GRSG leks. This is potentially beneficial to reducing impacts on cultural resources through natural processes by limiting recreation in these areas. Similar to Alternative B, it may also increase these types of recreation in areas outside of GRSG habitat, which can increase natural processes such as erosion.

Alternative D—This alternative has restrictions similar to Alternative B but is less limiting to the issuance of SRPs. It may increase these types of recreation in areas outside of GRSG habitat, which can increase natural processes, such as erosion.

Proposed LUPA—See *Vandalism and Collection*, above.

Impacts from Lands and Realty Management on Cultural Resources

Management actions for lands and realty would generally limit actions from occurring in GRSG habitat. This is beneficial to protecting and preserving cultural resources by not allowing or restricting land and realty actions within GRSG habitat. Additionally, this restriction may push these activities and uses to areas outside of GRSG habitat, which may adversely impact cultural resources.

Vandalism and Collection

Management actions for lands and realty include actions to exclude or avoid ROWs, use existing roads for development, make new roads with minimal disturbance, reclaim disturbed areas, retain public ownership of lands, and withdraw minerals from habitats. Generally, actions such as ROWs or mineral development have significant impacts on cultural resources; however, they are inventoried for cultural resources before a permit is issued. These impacts can include surface disturbances to unidentified sites, visual impacts, and loss of protection through land exchange and increased access. As access and visibility increase, the probability for unauthorized collection or vandalism rises. These actions may also push these activities and uses to other areas outside of GRSG habitat, which may adversely impact cultural resources.

Alternative A—Lands and realty actions under this alternative would be the least restrictive, although some protections are provided for threatened or endangered species. In general, these actions are beneficial to protecting cultural resources by limiting ground disturbance, considering resources during land exchanges, or collocating utilities. Although accommodating for cultural resources, this alternative still allows such actions as ROWs and land exchanges and has no restrictions on construction of new roads for new actions. Therefore, possible disturbances from activities and access may increase vandalism and unauthorized collection.

Alternative B—Lands and realty under this alternative would limit or close PHMA areas to certain actions. Actions under this alternative are as follows:

- PHMA is ROW avoidance areas
- Issue SUAs for exclusion areas
- Remove, bury, or modify power lines
- Reclaim disturbed areas
- Retain public ownership of lands
- Allow land exchanges where there is mixed ownership and land exchange would allow for more contiguous federal ownership patterns within PHMA
- Apply mineral withdrawals

In general, all management actions under this alternative are beneficial to cultural resources and protect them from vandalism and collection. Such actions as limiting ROW corridors, withdraw areas from mineral entry, and retaining BLM-administered and National Forest System lands are all beneficial to minimizing activity in areas of cultural resources and keeping cultural resources under federal protection. A potentially adverse impact on vandalism and collection of cultural resources from these actions is allowing land exchanges to create more contiguous habitat.

Alternative C—This alternative is similar to Alternative B, with a few more restrictions for lands and realty actions. Actions for Alternative C are the following:

- ADH ROW exclusion areas
- New ROWs collocated and only within current ROW footprint

In general, all management actions under this alternative are beneficial to cultural resources and protect them from vandalism and collection. Such actions as ROW exclusions, withdrawal from mineral entry, and retention of BLM-administered and National Forest System lands are beneficial to minimizing activity in areas of cultural resources and keeping cultural resources under federal protection. One potentially adverse impact from these actions is allowing land exchanges to create more contiguous habitat.

Alternative D—This alternative is similar to Alternative B, with some modified restrictions for lands and realty actions. Actions for Alternative D are the following:

- New ROWs issued if they would not affect GRSG populations
- If power lines could not be removed, buried, or modified, perch deterrents would be installed

In general, all management actions under this alternative are beneficial to cultural resources and protect them from vandalism and collection. Such actions as ROW exclusions, withdrawal from mineral entry, and retention of BLM-administered and National Forest System lands are beneficial to minimizing activity in areas of cultural resources and keeping cultural resources under federal protection. A potentially adverse impact on vandalism and collection of cultural resources from these actions is allowing land exchanges to create more contiguous habitat. If BLM-administered and National Forest System lands are exchanged to gain land in GRSG habitat, those lands are no longer protected by cultural resource laws, so the potential for vandalism and unauthorized collection increases.

Proposed LUPA—Impacts would be similar to those for Alternative D. However, additional protections would be greater under the Proposed LUPA because GHMA would also be managed as avoidance for ROWs. Additionally, under the Proposed LUPA, no aboveground structures would be authorized within 1 mile of active leks in occupied habitat. This would provide additional protection for cultural resources.

Site Setting

Management actions for lands and realty are actions to exclude or avoid ROWs, use existing roads for development, make new roads with minimal disturbance, reclaim disturbed areas, retain public ownership of lands, and withdraw minerals

from habitat areas. Generally, such actions as ROWs and mineral development have significant impacts on cultural resources, including surface disturbances, visual impacts, and loss of protection through land exchange and increased access. These actions may also push these activities and uses to other areas outside of GRSG habitat, which may adversely impact cultural resources. Management actions for lands and realty have potentially beneficial impacts on site setting of cultural resources. Site setting includes not only the actual area that the site encompasses but extends to the surrounding landscape.

Alternative A—Lands and realty actions under this alternative would be the least restrictive, although some protections are provided for threatened or endangered species. In general, these actions are beneficial to protecting cultural resources by limiting ground disturbance, considering resources during land exchanges, and collocating utilities. Although accommodating for cultural resources, this alternative still allows such actions as ROWs and land exchanges and has no restrictions on construction of new roads for new actions. Possible impacts on site setting of cultural resources are increased visibility, landscape fragmentation, and construction from utilities or mineral development.

Alternative B—Lands and realty under this alternative would limit or close PHMA to certain actions. Actions under this alternative are as follows:

- PHMA is ROW avoidance areas
- Issue SUAs for exclusion areas
- Remove, bury, or modify power lines
- Reclaim disturbed areas
- Retain public ownership of lands
- Allow land exchanges where there is mixed ownership and land exchange would allow for more contiguous federal ownership patterns within PHMA
- Apply mineral withdrawal

In general, all management actions under this alternative are beneficial to protecting site setting of cultural resources. Such actions as limiting ROW corridors, withdrawing areas from mineral entry, and retaining public lands are beneficial to minimizing activity in areas of cultural resources and keeping cultural resources under federal protection. There are negligible impacts on site setting of cultural resources under this alternative. Potential beneficial impacts on site setting from limiting development of utilities and minerals, providing contiguous land protection by acquiring land, and removing existing power lines help to keep the landscape undisturbed.

Alternative C—This alternative is similar to Alternative B, with a few more restrictions for lands and realty actions. Actions for Alternative C are as follows:

- Manage ADH as ROW exclusion areas
- Collocate new ROWs only within current ROW footprints

In general, all management actions under this alternative are beneficial to protecting site setting of cultural resources. Such actions as ROW exclusions, withdrawal from mineral entry, and retention of public lands are all beneficial to minimizing activity in areas of cultural resources and keeping cultural resources under federal protection. One potentially adverse impact from these actions is allowing land exchanges to create more contiguous habitat. If BLM-administered and National Forest System lands are exchanged to gain land in GRSG habitat, those lands are no longer protected by cultural resource laws; therefore, development can occur, which can impact site setting of nearby cultural resources by fragmenting landscapes.

Alternative D—This alternative is similar to Alternative B, with some modified restrictions for lands and realty actions. Actions for Alternative D are as follows:

- New ROWs issued if they would not affect GRSG populations
- If power lines cannot be removed, buried, or modified, install perch deterrents

In general, all management actions under this alternative are beneficial to protecting site setting of cultural resources. Such actions as ROW exclusions, withdrawal from mineral entry, and retention of public lands are all beneficial to minimizing activity in areas of cultural resources and keeping cultural resources under federal protection. One potentially adverse impact from these actions is allowing land exchanges to create more contiguous habitat. If BLM and Forest Service lands are exchanged to gain land in GRSG habitat, those lands are no longer protected by cultural resource laws; therefore, development can occur, which can impact site setting of nearby cultural resources by fragmenting landscapes.

Proposed LUPA—See *Vandalism and Collection*, above.

Opportunities for Native American Traditional Uses

Management actions for lands and realty are those to exclude or avoid ROWs, use existing roads for development, make new roads with minimal disturbance, reclaim disturbed areas, retain public ownership of lands, and withdraw minerals from habitat areas. Generally, actions such as ROWs or mineral development have significant impacts on cultural resources. These impacts include surface disturbances, visual impacts, loss of protection through land exchange, and increased access. These actions may also push these activities and uses to other areas outside of GRSG habitat, which may adversely impact cultural resources.

Alternative A—Lands and realty actions under this alternative would be the least restrictive, although some protections are provided for threatened or endangered species. In general, these actions are beneficial to protecting cultural resources by limiting ground disturbance, considering resources during land exchanges, or collocating utilities. Although accommodating for cultural resources, this alternative still allows actions such as ROWs and land exchanges and has no restrictions on construction of new roads for new actions. Possible impacts on Native American traditional uses may come from land exchanges, issuing ROWs, or mineral development. These impacts could disturb traditional plants or interfere with traditional religious sites by disturbing the landscape through fragmentation or visual impacts.

Alternative B—Lands and realty under this alternative would limit or close PHMA to certain actions. Actions under this alternative are as follows:

- PHMA is ROW avoidance areas
- Issue SUAs for exclusion areas
- Remove, bury, or modify power lines
- Reclaim disturbed areas
- Retain public ownership of lands
- Allow land exchanges where there is mixed ownership and land exchange would allow for more contiguous federal ownership patterns within PHMA
- Apply mineral withdrawal

In general, all management actions under this alternative are beneficial to protecting Native American traditional uses. Such actions as limiting ROW corridors, withdrawing areas from mineral entry, and retaining public lands are all beneficial to minimizing activity in sensitive areas and keeping lands under federal protection. Possible impacts on Native American traditional uses under this alternative include burying or modifying power lines because it could disturb plants or sensitive sites through ground disturbance. In some cases, allowing land exchanges in GRSG habitat would affect exchanged land that is no longer protected by cultural resource laws and is no longer available to Native Americans for traditional uses.

Alternative C—This alternative is similar to Alternative B, with a few more restrictions for lands and realty actions. Actions for Alternative C are as follows:

- Manage ADH as ROW exclusion areas
- Collocate new ROWs only within current ROW footprints

In general, all management actions under this alternative are beneficial to preserving Native American traditional uses. Such actions as ROW exclusions,

withdrawal from mineral entry, and retention of public lands are all beneficial to minimizing activity in sensitive areas and keeping lands under federal protection. Possible impacts on Native American traditional uses under this alternative are burying or modifying power lines because it could disturb plants or sensitive sites through ground disturbance. In some cases, allowing land exchanges to gain land in GRSG habitat affects exchanged land, which is no longer protected by cultural resource laws and is no longer available to Native Americans for traditional uses.

Alternative D—This alternative is similar to Alternative B, with some modified restrictions for lands and realty actions. Actions for Alternative D are as follows:

- New ROWs issued if they would not affect GRSG populations
- If power lines cannot be removed, buried, or modified, install perch deterrents

In general, all management actions under this alternative are beneficial to preserving Native American traditional uses. Such actions as ROW exclusions, withdrawal from mineral entry, and retention of public lands are all beneficial to minimizing activity in areas of cultural resources and keeping cultural resources under federal protection. Possible impacts on Native American traditional uses under this alternative are burying or modifying existing power lines because it could disturb plants or sensitive sites through ground disturbance. In some cases, allowing land exchanges to gain land in GRSG habitat can affect exchanged land, which is no longer protected by cultural resource laws and is no longer available to Native Americans for traditional uses.

Proposed LUPA—See *Vandalism and Collection*, above.

Ground Disturbance

Management actions for lands and realty include those to exclude or avoid ROWs, use existing roads for development, make new roads with minimal disturbance, reclaim disturbed areas, retain public ownership of lands, and withdraw minerals from habitat areas. Generally, actions such as ROWs or mineral development have significant impacts on cultural resources. These impacts include surface disturbances, visual impacts, loss of protection through land exchange, and increased access. These actions can cause ground disturbance through utility installation, mineral development, and land exchange. These actions may also push these activities and uses to other areas outside of GRSG habitat, which may adversely impact cultural resources.

Alternative A—Lands and realty actions under this alternative would be the least restrictive, although some protections are provided for threatened or endangered species. In general, these actions are beneficial to protecting cultural resources by limiting ground disturbance, considering resources during land

exchanges, and collocating utilities. Although accommodating for cultural resources, this alternative still allows actions such as ROWs and land exchanges and has no restrictions on construction of new roads for new actions. All of these actions may impact cultural resources through ground disturbance. Ground disturbance can impact cultural resources by disturbing irreplaceable cultural artifacts, features, and information about the past.

Alternative B—Lands and realty under this alternative would limit or close PHMA areas to certain actions. Actions under this alternative are as follows:

- PHMA is ROW avoidance areas
- Issue SUAs for exclusion areas
- Remove, bury, or modify power lines
- Reclaim disturbed areas
- Retain public ownership of lands
- Allow land exchanges where there is mixed ownership and land exchange would allow for more contiguous federal ownership patterns within PHMA
- Apply mineral withdrawal

In general, all management actions under this alternative are beneficial to reducing ground disturbance and impacting cultural resources. Such actions as limiting ROW corridors, withdrawing areas from mineral entry, and retaining public lands are all beneficial to minimizing activity and limiting ground disturbances. Possible impacts on cultural resources through ground disturbances under this alternative are burying or modifying existing power lines. In some cases, allowing land exchanges in GRSG habitat affects the exchanged land, which is no longer protected by cultural resource laws.

Alternative C—This alternative is similar to Alternative B, with a few more restrictions for lands and realty actions. Actions for Alternative C are as follows:

- Manage ADH as ROW exclusion areas
- Collocate new ROWs only within current ROW footprints

In general, all management actions under this alternative are beneficial to reducing ground disturbance and impacting cultural resources. Such actions as limiting ROW corridors, withdrawing areas from mineral entry, and retaining public lands are all beneficial to minimizing activity and limiting ground disturbances. Possible impacts on cultural resources through ground disturbances under this alternative are burying or modifying existing power lines. In some cases, allowing land exchanges in GRSG habitat affects the exchanged land, which is no longer protected by cultural resource laws.

Alternative D—This alternative is similar to Alternative B, with some modified restrictions for lands and realty actions. Actions for Alternative D are as follows:

- New ROWs issued if would not affect GRSG populations
- If power lines cannot be removed, buried, or modified, perch deterrents would be installed

In general, all management actions under this alternative are beneficial to reducing ground disturbance and impacting cultural resources. Such actions as limiting ROW corridors, withdrawing areas from mineral entry, and retaining public lands are all beneficial to minimizing activity and limiting ground disturbances. Possible impacts on cultural resources through ground disturbances under this alternative are burying or modifying existing power lines. In some cases, allowing land exchanges in GRSG habitat affects the exchanged land, which is no longer protected by cultural resource laws. This alternative is less restrictive to issuing new ROWs, which could impact cultural resources through ground disturbance more that Alternatives B or C.

Proposed LUPA—See *Vandalism and Collection*, above.

Natural Processes

Management actions for lands and realty include those to exclude or avoid ROWs, use existing roads for development, make new roads with minimal disturbance, reclaim disturbed areas, retain public ownership of lands, and withdraw minerals from habitat areas. Generally, actions such as ROWs or mineral development have significant impacts on cultural resources. These impacts include surface disturbances, visual impacts, loss of protection through land exchange, and increased access. These actions can increase natural processes such as erosion through modifying ground surfaces or vegetation. It may also push these activities and uses to other areas outside of GRSG habitat, which may adversely impact cultural resources.

Alternative A—Lands and realty actions under this alternative would be the least restrictive, although some protections are provided for threatened or endangered species. In general, these actions are beneficial to protecting cultural resources by limiting ground disturbance, considering resources during land exchanges, or collocating utilities. Although accommodating for cultural resources, this alternative still allows actions such as ROWs and land exchanges and has no restrictions on construction of new roads for new actions. All of these actions may impact cultural resources through increasing natural processes, such as erosion. This and vegetation changes can occur from such actions as utility installation, new construction, mineral development, and land exchange. Natural processes can increase the deterioration of cultural resources by disturbing artifacts or features and manipulating ground surface or vegetation.

Alternative B—Lands and realty under this alternative would limit or close PHMA areas to certain actions. Actions under this alternative are as follows:

- Manage PHMA as ROW avoidance areas
- Identify SUA exclusion areas
- Remove, bury, or modify existing power lines
- Reclaim disturbed areas
- Retain public ownership of lands
- Allow land exchanges where there is mixed ownership and land exchange would allow for more contiguous federal ownership patterns within PHMA
- Apply mineral withdrawal

In general, all management actions under this alternative are beneficial to reducing natural processes that impact cultural resources. Such actions as limiting ROW corridors, withdrawing areas from mineral entry, and retaining public lands are all beneficial to minimizing activity and limiting natural processes. Possible impacts on cultural resources through natural processes under this alternative are new ground disturbances or vegetation changes from modifying power lines or allowing land exchanges. For the most part, this alternative would be beneficial to reducing natural processes that impact cultural resources because these management actions are more restrictive than Alternative A.

Alternative C—This alternative is similar to Alternative B, with a few more restrictions for lands and realty actions. Actions for Alternative C are as follows:

- ADH ROW exclusion areas
- New ROWs can be collocated and only within current ROW footprint

In general, all management actions under this alternative are beneficial to reducing natural processes that impact cultural resources. Such actions as limiting ROW corridors, withdrawing areas from mineral entry, and retaining public lands are all beneficial to minimizing activity and limiting natural processes. Possible impacts on cultural resources through natural processes under this alternative include new ground disturbances or vegetation changes from modifying power lines or allowing land exchanges. For the most part this alternative is similar to Alternative B and would be beneficial to reducing natural processes that impact cultural resources.

Alternative D—This alternative is similar to Alternative B, with some modified restrictions for lands and realty actions. Actions for Alternative D are as follows:

- New ROWs issued if they would not affect GRSG populations
- If power lines cannot be removed, buried, or modified, perch deterrents would be installed

In general, all management actions under this alternative are beneficial to reducing natural processes that impact cultural resources. Such actions as limiting ROW corridors, withdrawing areas from mineral entry, and retaining public lands are all beneficial to minimizing activity and limiting natural processes. Possible impacts on cultural resources through natural processes under this alternative include new ground disturbances or vegetation changes from modifying power lines or allowing land exchanges. For the most part this alternative is similar to Alternative B and would be beneficial to reducing natural processes that impact cultural resources.

Proposed LUPA—See *Vandalism and Collection*, above.

Impacts from Wind and Solar Energy Development on Cultural Resources

Wind and solar developments are authorized through ROWs. Impacts on cultural resources from restrictions on wind and solar power projects would be the same as those described under *Impacts from Lands and Realty Management on Cultural Resources*.

Impacts from Range Management on Cultural Resources

Restrictions on grazing designed to protect GRSG habitat would also protect cultural resources. Cultural resources can be adversely impacted by grazing through direct trampling of artifacts and features and from such activities as livestock trailing concentrating around water, under shade, or along natural constraining features, such as rock cliffs. Increased erosion and other natural impacts on cultural resources can occur through the loss of vegetation, such as grass, forbs, and shrubs consumed by livestock. Range management that reduces grazing in GRSG areas could protect cultural resources.

Vandalism and Collection

Restrictions on grazing designed to protect GRSG habitat would also protect cultural resources because the reductions in cattle use may result in less access (via cattle trails) to remote public land areas. Less access typically is linked with less vandalism and reduced unauthorized collection of cultural resources.

Alternative A—In locations where no surface disturbance restrictions for GRSG habitat occur, cultural resources could be adversely impacted by grazing practices. In the CRVFO, the RMP allows for adjustments to grazing management to occur based on monitoring. If these adjustments are made to protect GRSG habitat, the results would likely be beneficial to cultural resources in reducing direct damage by trampling and other surface disturbances of livestock impacts.

The GJFO RMP mostly manages for impacts on soils and riparian and water resources, which may or may not protect GRSG and thus cultural resources.

The LSFO RMP directs the office to identify and begin restoring and rehabilitating sagebrush habitat, which may increase the area in which GRSG can live. Active vegetation treatments such as hydro-axing, prescribed fire, or removing encroaching trees into sage flats may adversely impact wooden, architectural cultural resources, such as brush fences and wickiups and other sites (although these impacts would typically be mitigated through the Section 106 process). Depending on the method used in the LSFO, to move toward the sustainability of biological diversity across the landscape, cultural resources could be adversely impacted (for example, through vegetation treatments and prescribed fire) or beneficially impacted (for example, through fencing or reducing AUMs in a grazing allotment).

Livestock exclusions and rangeland projects mentioned in the Roan Plateau RMP and WRFO RMP to achieve resource objectives for GRSG could be adverse or beneficial to cultural resources, depending on the method used. In general, reductions in grazing can reduce vandalism impacts on cultural resources by reducing access to remote areas where cultural resources may be found.

Alternative B—Action items that direct for vegetation management or changes to livestock grazing in GRSG habitat could result in less surface disturbance (for example, the reduction of livestock and access within an area) or more surface disturbance (for example, increased access to facilitate active vegetation removal to increase sage), depending on the methods used.

Alternative C—Under Alternative C, all GRSG habitat would be excluded from grazing. This would increase protection of cultural resources by removing livestock from the landscape, which would decrease artifact and feature trampling and impacts from livestock concentration.

Alternative D—This would be the same as Alternative B.

Proposed LUPA—This would be the same as Alternative D.

Scientific Knowledge

Restrictions on range management designed to protect GRSG habitat could limit new scientific knowledge, due to fewer cultural surveys and mitigation excavations, both of which can result in subsequent identification of new cultural resource sites. However, existing sites within PHMA would have greater protections, preserving known cultural resource sites for potential future scientific study.

Alternative A—If surface disturbance restrictions for GRSG habitat were to occur based on monitoring, then portions excluded would decrease the number

of new sites discovered. However, this may lead to the protection of known cultural resource sites and could preserve them for future scientific study.

Alternative B—Restrictions on surface disturbance for GRSG habitat could decrease the number of new sites discovered but may lead to the protection of known cultural resource sites. Adding additional structural range improvements or water development locations in areas that would improve GRSG habitat would result in additional cultural resource inventory, which would reveal more about cultural resources on the landscape.

Alternative C—Grazing restrictions required under this alternative would allow for the greatest preservation of known cultural resources for potential future scientific study. Not allowing new structural range improvements or water developments for diversion from springs or seeps in GRSG habitat could result in no additional cultural resource information and could encourage wildlife concentration in these sensitive areas, which could impact cultural resources. Dismantling water developments to return riparian areas to predevelopment conditions or removing historic ranching fences or modifications could require cultural surveys. This would increase our understanding of historic water modifications and area ranching methods, but the removal of some of these features may result in the loss of some structures considered to be cultural resources.

Alternative D—Impacts on cultural resources would be similar to those listed under Alternatives B and C.

Proposed LUPA—This would have the same impacts as Alternative D.

Site Setting

The setting in which a cultural resource is located is an important part of a site's integrity as it provides the backdrop for the feelings and context of a site. Integrity of setting is one of seven categories evaluated for each site when considering it for inclusion on the NRHP.

Alternative A—Under Alternative A, several field offices mention the management of vegetation to meet BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado (Grand Junction RMP and Roan Plateau RMP). In some cases, field offices are tasked with restoring and rehabilitating sagebrush habitat (Little Snake RMP). In general, adjustments can be made to meet resource objectives (White River RMP and Colorado River Valley RMP). Any projects that impact large acreages of vegetation could impact the site setting of certain types of sites from the original setting.

Alternative B—Under Alternative B, the action items that alter vegetation type or percentages could alter site setting if the changes in vegetation were to result

in differences from the original setting (unless project designs aim for restoring historic settings). Larger projects could result in site setting changes.

Alternative C—This has the same impacts on cultural resources as those listed under Alternative B.

Alternative D—This has the same impacts on cultural resources as those listed under Alternative B.

Proposed LUPA—This would have the same impacts as Alternative D.

Opportunities for Native American Uses

Native Americans have a generalized concept of spiritual significance that is not easily transferred to Western models or definitions. During tribal consultation, tribes have described concerns about fragmentation of landscape, loss of site setting, and decreased access to traditional plants, animals, and minerals that are collected from public land. Tribes have also expressed a concern for the loss of sagebrush resources. Vegetation management to increase sage could benefit Native American uses but may also alter the landscape, depending on the methods used to increase sage.

Alternative A—Under this alternative, several field offices mention the management of vegetation to meet BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado (Grand Junction RMP and Roan Plateau RMP). In some cases the field offices are tasked with restoring and rehabilitating sagebrush habitat (Little Snake RMP), and in general adjustments can be made to meet resource objectives (White River RMP, Colorado River Valley RMP, and Routt National Forest Plan). Any projects that impact large acreages of vegetation could impact the setting of certain types of sites from the original setting, especially in highly visible locations on the landscape. This could adversely impact the setting of and landscape surrounding cultural resource sites considered significant to Native Americans, including traditional trails, rock art, vision quest sites, and other ceremonial sites still used today. Certain collection items may be impacted by changes to vegetation communities.

Alternative B—The impacts on Native American traditional uses and ceremonial sites would be the same as those described under Alternative A.

Alternative C—The impacts on Native American traditional uses and ceremonial sites would be the same as those described under Alternative A.

Alternative D—The impacts on Native American traditional uses and ceremonial sites would be the same as those described under Alternative A.

Proposed LUPA—The impacts on Native American traditional uses and ceremonial sites would be the same as those described under Alternative A.

Ground Disturbance

Restrictions on range management designed to protect GRSG habitat could reduce or eliminate surface disturbance. Ground disturbance within PHMA can result in erosion, increased sedimentation, decreased vegetation, and degraded slope stability, all of which could adversely affect cultural resources. However, cultural resource surveys and construction monitors required for ground-disturbing projects could lead to new cultural resource discoveries. Additionally, many projects that manipulate vegetation to increase sage habitat could impact cultural resources, depending on the amount of ground disturbance caused by the methods used.

Alternative A—In locations where no surface disturbance restrictions for GRSG habitat occur, cultural resources could be adversely impacted by grazing practices. In CRVFO, the RMP allows for adjustments to grazing management to occur based on monitoring. If these adjustments are made to the benefit of protecting GRSG habitat, the results would likely be beneficial to cultural resources in reducing direct damage to cultural resources through trampling and other surface disturbance types of livestock impacts.

The GJFO RMP mostly manages for impacts on soils, riparian and water resources, which may or may not provide protection for GRSG and thus cultural resources.

The LSFO RMP directs the office to identify and initiate restoration and rehabilitation of sagebrush habitat, which may increase the area in which GRSG can live. Depending on the method used in the LSFO, to move toward the sustainability of biological diversity across the landscape, cultural resources could be potentially adversely impacted (for example, through vegetation treatments, prescribed fire, etc.) or beneficially impacted (for example, through fencing or the reduction of AUMs in a grazing allotment).

Livestock exclusions and rangeland projects as mentioned in the Roan Plateau RMP and WRFO RMP to achieve resource objectives for GRSG could be adverse or beneficial to cultural resources depending on the method used.

Alternative B—Range surface disturbance restrictions for GRSG habitat could limit the number of new sites discovered but may protect cultural resource sites. Adding structural range improvements or water development locations in areas that would improve GRSG habitat would result in additional cultural resource inventory. This would reveal more about cultural resources on the landscape. Action items that modify vegetation management or changes to livestock grazing in GRSG habitat could result in less surface disturbance (for example, the reduction of livestock within an area) or more surface disturbance (for example, vegetation removal to increase sage), depending on the methods used.

Alternative C—Removing grazing from GRSG habitat would result in the greatest protection to cultural resources by removing the need for facilities and eliminating impacts from livestock.

Alternative D—The impacts on cultural resources would be similar to those under Alternative B.

Proposed LUPA—This would have the same impacts as Alternative D.

Natural Causes

Natural causes that increase cultural resource site deterioration include erosion, increased sedimentation, decreased vegetation, and degraded slope stability. Restrictions on grazing use designed to protect GRSG habitat could reduce or eliminate increased natural causes (such as increased water erosion after rains). This might be the indirect result of disruptive activities that occur during grazing or facility development. Conversely, vegetation treatments, depending on the type used, may also increase natural causes deterioration. In general, natural caused impacts would be similar to those described under the ground disturbance section above.

Impacts from Wild Horse Management on Cultural Resources

Restrictions on wild horse management designed to protect GRSG habitat would also protect cultural resources. Cultural resources can be adversely impacted by wild horses through direct trampling of artifacts and features and from activities like trailing and concentrating in areas around water, under shade, or along natural constraining features, such as rock cliffs. Increased erosion and other degradation impacts on cultural resources can occur through the loss of vegetation, such as grass, forbs and shrubs consumed by horses. In general, the impacts on cultural resources from wild horses would be similar to those from grazing livestock.

The following field offices and forest do not have wild horses or burros within the decision area: CRVFO, KFO, Roan Plateau, GJFO, and Routt National Forest. The LSFO and WRFO do have wild horses within the decision area.

Vandalism and Collection

Restrictions on wild horse management designed to protect GRSG habitat would also protect cultural resources from increased vandalism or collection.

Alternative A—Restrictions on wild horses for GRSG habitat would result in protection of cultural resources.

Alternative B—This has the same impacts as Alternative A.

Alternative C—This has the same impacts as Alternative A.

Alternative D—This has the same impacts as Alternative A.

Proposed LUPA—This has the same impacts as Alternative A.

Scientific Knowledge

Restrictions on wild horse management designed to protect GRSG habitat would have some effect on scientific knowledge that might be acquired from project specific survey work.

Alternative A—No additional scientific knowledge of cultural resources would be gained from this alternative because no facilities are potentially proposed; therefore, no additional cultural survey work or incidental excavations would be completed, both of which could increase identification of new cultural resource sites.

Alternative B—Additional cultural resource surveys may be conducted if wild horse facilities, such as water developments or other rangeland improvements, are proposed. This would lead to increased scientific knowledge of cultural resources in the area.

Alternative C—Impacts would be the same as Alternative B.

Alternative D—Impacts would be the same as Alternative B.

Proposed LUPA—Impacts would be the same as Alternatives B, C, and D.

Opportunities for Native American Traditional Uses

Native Americans have a generalized concept of spiritual significance that is not easily transferred to Western models or definitions. Through tribal consultation, tribes have described concerns about fragmentation of landscape, loss of site setting, and decreased access to traditional plants, animals, and minerals that are collected from public land. The management of wild horses to protect GRSG habitat would generally benefit the production of vegetation that may be collected by Native American users.

Alternative A—Managing for GRSG would generally be beneficial to Native Americans, who may use those areas for traditional plants, animals, and minerals.

Alternative B—Impacts would be the same as Alternative A.

Alternative C—Impacts would be the same as Alternative A.

Alternative D—Impacts would be the same as Alternative A.

Proposed LUPA—Impacts would be the same as Alternative A.

Ground Disturbance

Restrictions on wild horses designed to protect GRSG habitat could reduce or eliminate surface disturbance from horses. Ground disturbance within PHMA

can result in erosion, increased sedimentation, decreased vegetation, and degraded slope stability, all of which could adversely affect cultural resources.

Alternative A—Impacts on cultural resources would not be increased or decreased based on the management of wild horses for GRSG under this alternative.

Alternative B—Promoting gathers, which would result in the reduction of wild horses, would lessen their impacts on cultural resources.

Alternative C—Impacts would be the same as Alternative B.

Alternative D—Impacts would be the same as Alternative B.

Proposed LUPA—Impacts would be the same as Alternative B.

Natural Causes
Disruptive activities associated with wild horse management would affect natural causes in the same manner described above for ground disturbance.

Impacts from Fluid Minerals Management
Oil and gas exploration and development includes the construction of well pads, pipelines, utility lines, roads, and facilities, all of which could impact cultural resources. Restrictions on fluid mineral development for GRSG would protect cultural resources in the habitat; however, these restrictions would move potential impacts on cultural resources outside of habitat, as development is forced to go outside of these areas. Many fragile site types in northwest Colorado, like wickiups, are in pinyon and juniper woodlands; if more development were to occur in these areas due to having to avoid GRSG habitat, this could cause a negative impact on cultural resources.

Vandalism and Collection
In areas of oil and gas development, associated route construction would result in increased public access to areas where cultural resources are present. This increased public access, as well as the additional numbers of industry workers in an area, increases the risk of vandalism or unauthorized collection of cultural resources. Restrictions for GRSG would not cause these negative impacts on the resources within a habitat, though it could cause them outside of the habitat.

Alternative A—With this alternative, fluid mineral development would continue as it currently is, causing the indirect impacts of collection and vandalism to cultural resources.

Alternative B—Increased restrictions on fluid mineral leasing, including allowing no new leases, would increase protections against vandalism and collection of

cultural resources in habitats. However, this may cause these impacts to be pushed outside of GRSG habitat.

Alternative C—As the most restrictive, Alternative C would offer the greatest protection of cultural resources in GRSG habitat; however, this may cause impacts to be pushed outside of PHMA.

Alternative D—Moderate restrictions on fluid mineral development would have moderate beneficial impacts on the protection of cultural resources in GRSG habitat.

Proposed LUPA—Impacts would be similar to those for Alternative D, with additional protections for cultural resources. This is due to increased restrictions on surface disturbance in PHMA (3 percent disturbance cap).

Scientific Knowledge

The results of the oil and gas industry surveys required under Section 106 of the NHPA cause a beneficial impact on cultural resources. This is because the surveys generate data that promotes further understanding of cultural resources in the planning area. Restrictions on fluid mineral development designed to protect GRSG habitat would lessen this beneficial impact.

Alternative A—With this alternative, fluid mineral development would continue as it currently is, causing a beneficial increase in scientific knowledge.

Alternative B—Increased restrictions on fluid mineral leasing, including allowing no new leases, would lessen potential increases in scientific knowledge. However, the restrictions may cause this to be pushed outside of GRSG habitat.

Alternative C—As the most restrictive, Alternative C would restrict gains in scientific knowledge within GRSG habitat; however, this would most likely shift development and the associated potential increase in scientific knowledge outside of PHMA.

Alternative D—Moderate restrictions on fluid mineral development would have moderate impacts on the change in scientific knowledge.

Proposed LUPA—See *Vandalism and Collection*, above.

Site Setting

Direct impacts on cultural resources can result from actions that result in the following:

- Alter characteristics of the surrounding environment that contribute to resource significance
- Introduce visual or audible elements out of character with the property

- Alter its setting
- Fragment the landscape of which sites are a part

Restrictions for GRSG would have a beneficial impact on cultural resources in GRSG habitat, but they would move impacts on cultural resources outside of habitat if development were concentrated there.

Alternative A—With this alternative, fluid mineral development would continue as it currently is, causing continual and at times cumulative impacts on site settings.

Alternative B—Increased restrictions on fluid mineral leasing, including allowing no new leases, would increase protections against altering site settings in habitat. However, this may cause these impacts to be pushed outside of GRSG habitat.

Alternative C—As the most restrictive, Alternative C would offer the greatest protection against altering settings to sites in GRSG habitat; however, this would most likely move the impacts to site settings outside of PHMA.

Alternative D—Moderate restrictions on fluid mineral development would have moderate beneficial impacts on the protection of site settings in GRSG habitat.

Proposed LUPA—See *Vandalism and Collection*, above.

Opportunities for Native American Traditional Uses

In areas of fluid mineral development, increased public access can make more areas available for Native American traditional uses, such as gathering plants and minerals. Restrictions on fluid mineral development designed to protect GRSG habitat would lessen this beneficial impact.

Alternative A—With this alternative, fluid mineral development would continue as it currently is, causing increases in public access and enabling new opportunities for Native American uses.

Alternative B—Increased restrictions on fluid mineral leasing, including allowing no new leases, would lessen potential increases in public access. However, this may cause access to be pushed outside of GRSG habitat, increasing opportunities for Native American uses.

Alternative C—As the most restrictive, Alternative C would restrict an increase in access within GRSG habitat; however, this would most likely shift development and the associated increase in public access outside of PHMA.

Alternative D—Moderate restrictions on fluid mineral development would have impacts on the opportunities for Native American traditional uses.

Proposed LUPA—See *Vandalism and Collection*, above.

Ground Disturbance

Direct impacts occur to cultural resources resulting from any development actions that disturb the soil or alter, damage, or destroy all or part of a resource. Restrictions for GRSG would protect cultural resources in the habitat but could move impacts on cultural resources outside of habitat.

Alternative A—With this alternative, fluid mineral development would continue as it currently is, causing continual and at times cumulative impacts on cultural resources.

Alternative B—Increased restrictions on fluid mineral leasing, including allowing no new leases, would increase protections against ground disturbance to cultural resources in habitat. However, this may cause these direct impacts to be pushed outside of GRSG habitat.

Alternative C—As the most restrictive, Alternative C would offer the greatest protection to cultural resources in GRSG habitat from the ground disturbance that is caused by fluid mineral development. However, this would most likely cause these impacts to happen to sites outside of PHMA when development is pushed there.

Alternative D—Moderate restrictions on fluid mineral development would have moderate beneficial impacts on the protection of cultural resources in GRSG habitat.

Proposed LUPA—See *Vandalism and Collection*, above.

Natural Processes

Indirect impacts from fluid mineral development on cultural resources are the vegetation loss and increased erosion that is caused by directly impacting ground disturbances. Restrictions for GRSG would protect cultural resources in the habitat but could move impacts on cultural resources outside of habitat.

Alternative A—With this alternative, fluid mineral development would continue as it currently is, causing continual and at times cumulative impacts on cultural resources.

Alternative B—Increased restrictions on fluid mineral leasing, including allowing no new leases, would increase protections of cultural resources from increased natural processes within habitat. However, this may cause these indirect impacts to be pushed outside of GRSG habitat.

Alternative C—As the most restrictive, Alternative C would offer the greatest protection to cultural resources in GRSG habitat from indirect impacts, such as erosion caused by fluid mineral development. However, this would most likely

cause these impacts to happen to sites outside of PHMA when development is pushed there.

Alternative D—Moderate restrictions on fluid mineral development would have moderate beneficial impacts on the protection of cultural resources in GRSG habitat.

Proposed LUPA—See *Vandalism and Collection*, above.

Impacts from Solid Minerals, Locatable Minerals, Nonenergy Leasable Minerals, and Salable Minerals Management on Cultural Resources

Impacts from management of solid minerals, locatable minerals, nonenergy leasable minerals, and salable minerals on cultural resources would be the same as the impacts described above from fluid minerals management on cultural resources.

Impacts from Fuels Management, Wildland Fire Management, and Emergency Stabilization and Response on Cultural Resources

Vandalism and Collection

Restrictions on wildland fire and prescribed fire to protect GRSG habitat would protect historic sites and at the same time may result in higher site and artifact visibility because of larger and higher intensity fires. The increased visibility of historic properties would result in vandalism through artifact extraction and collection. The result would be the loss of scientifically important information.

Alternative A—This would have the fewest restrictions on wildland fire and prescribed fire on PHMA, which would result in more ground disturbance and would have greater potential to impact cultural resources.

Alternative B—Increased restrictions would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PHMA.

Alternative C—This is the most restrictive and would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PHMA.

Alternative D and the Proposed LUPA—The moderate restrictions under Alternative D and the Proposed LUPA would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources.

Scientific Knowledge

Wildland fire could adversely affect both known and unknown cultural resource sites, with impacts on features and artifacts resulting in the loss of scientific knowledge. Prescribed fire would help to provide additional scientific

information through site location and recording. Limited use of wildland fire use and prescribed fire would limit scientific study because of fewer undertakings to identify cultural resources.

Alternative A—Alternative A's fewest restrictions on wildland fire and prescribed fire on PHMA would have greater potential to impact cultural resources.

Alternative B—Alternative B's increased restrictions would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PHMA.

Alternative C—The most restrictive, Alternative C would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PHMA.

Alternative D—With its moderate restrictions, Alternative D would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PHMA.

Proposed LUPA—See *Vandalism and Collection*, above.

Site Setting

Wildland and prescribed fire in themselves would have a temporary effect on site setting, while suppression activities would have a longer-lasting alteration of the site setting for historic properties.

Alternative A—This would have the fewest restrictions on wildland fire and prescribed fire on PHMA and would have greater potential to impact cultural resources.

Alternative B—With increased restrictions, Alternative B would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PHMA.

Alternative C—The most restrictive, Alternative C would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PHMA.

Alternative D—Alternative D's moderate restrictions would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PHMA.

Proposed LUPA—See *Vandalism and Collection*, above.

Opportunities for Native American Traditional Uses

Wildland fire suppression could affect resources that are important to traditional Native Americans. The impacts from fire and associated activities

may impact traditional plant resources for both the short term and the long term collection and use. Prescribed fire can be designed to potentially avoid or lessen intensity and severity on natural resources important to traditional use.

Alternative A—This would have the fewest restrictions on wildland fire and prescribed fire on PHMA and would have greater potential to impact cultural resources.

Alternative B—Increased restrictions would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PHMA.

Alternative C—The most restrictive, Alternative C would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PHMA.

Alternative D—Moderate restrictions would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PHMA.

Proposed LUPA—See *Vandalism and Collection*, above.

Ground Disturbance

Wildland fire suppression and the use of retardant would impact both known and unknown cultural resources, affecting artifacts and datable material by altering radiocarbon dates and affecting paleo-botanical data. The use of mechanized equipment would directly impact unknown historic properties, with the loss of scientific information, the direct loss of artifacts, and indirect impacts from water and wind erosion, which would compromise site integrity.

Alternative A—This would have the fewest restrictions on wildland fire and prescribed fire on PHMA and would have greater potential to impact cultural resources.

Alternative B—Increased restrictions would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PHMA.

Alternative C—The most restrictive, Alternative C would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PHMA.

Alternative D—Moderate restrictions would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PHMA.

Proposed LUPA—See *Vandalism and Collection*, above.

Natural Processes
Wildland fire would remove protective vegetation cover, exposing historic properties to artifact collection and destruction of site integrity from soil and wind erosion.

Alternative A—This has the fewest restrictions on wildland fire and prescribed fire on PHMA and would have greater potential to impact cultural resources.

Alternative B—Increased restrictions would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PHMA.

Alternative C—The most restrictive, Alternative C would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PHMA.

Alternative D—Moderate restrictions would have no impact on activities associated with wildland fire, with the same potential to affect cultural resources. Prescribed fire would not be allowed within PHMA.

Proposed LUPA—See *Vandalism and Collection*, above.

Impacts from Habitat Restoration on Cultural Resources

Soil
Limiting soil erosion on steep slopes and managing ground-disturbing activities would result in beneficial impacts and would help protect cultural resources. However, because many cultural resource sites are on, or just below, the ground surface, they are susceptible to damage and destruction from ground disturbance and erosion.

The techniques or practices used in order to stabilize soils and control soil erosion may include the risk of direct disturbance of cultural resources as the result of ground-disturbing activities. Damage would likely include modification of site spatial relationships and displacement or damage of artifacts, features, and midden deposits. This would result in the loss of information relevant to the site function, dates of use, plants and animals used, past environments, and other important research data. Reclamation measures could help preserve or restore the setting of cultural resources.

Pinyon Juniper
Management activities would continue to be implemented using a variety of treatment methods, including clear-cuts, shelter wood, partial cuts, thinning, managed fire, planting, and mechanical treatments. The degree of impacts on cultural resources would vary by treatment method. Treatments could impact cultural resources through direct surface disturbance, erosion, alteration of setting, cross-country driving, and the adverse impacts of wildland fire.

Rangelands

Vegetation would continue to be treated to maintain and improve rangeland forage. Direct cultural resource impacts include destruction of surface and buried structures and features. Vegetation treatments would cause indirect impacts on cultural resources from increased erosion and displacement and destruction of surface artifacts. Vegetation treatments could result in adverse impacts from ground-disturbing equipment and the alteration of setting. Improvement projects that would impact historic properties would require further cultural resources review.

Measures designed to restrict surface occupancy and livestock grazing, to fence sensitive areas, and to disperse impacts resulting from use within riparian areas could protect cultural sites from ground disturbance. The restoration of desired native species would include plants used or valued by tribal users and would help retain historic settings.

Revegetation from a seed bank would introduce seeds and pollens, which would impact the accuracy of paleo-botanical data on archaeological sites. Reseeding using the in situ native seed bank would not impact historic properties, whereas the use of drill seeding could have direct impacts on artifacts or features.

Riparian

Invasive and exotic species could be removed from some riparian areas. This may directly impact archaeological and historical resources. Vegetation treatments would result in short-term indirect impacts on cultural resources due to the increased erosion from the invasive species removal. This could, in turn, displace and destroy surface artifacts and, in some cases, surface and buried structures and features. Generally vegetation treatments would be excluded from riparian areas providing protection to cultural resources through avoidance.

Weeds

Impacts on cultural resources from weeds management would depend on the method used to treat weed infestations. Manual treatments would result in minimal impacts on cultural resources because treatment is done by hand, and specific plants, features, or artifacts can be avoided. Mechanical treatments may require the use of light or heavy equipment. Equipment can directly impact cultural resources as the result of surface disturbance and the direct destruction of artifacts and features.

Biological treatments would result in no direct impacts on cultural resources. Herbicide applications could create short- and long-term impacts due to the impacts of chemicals, which may affect the accuracy of paleo-botanical data on archaeological sites or increase deterioration.

These impacts on cultural resources would also apply to plant resources of importance to Native Americans. Herbicide applications, in particular, could

affect Native American health from plant gathering and use. Restoration of the native plant community could increase some native vegetation important to Native Americans and could provide additional locations for Native Americans to collect such vegetation. There could be short-term impacts due to the loss of access during treatment or closures for cultural uses.

Vandalism and Collection

Restrictions on habitat restoration would allow for greater site protection, while reducing potential impacts that could lead to artifact collection and the loss of scientific information. Increased vegetation habitat would help to protect sites from artifact collectors because of reduced visibility of sites.

Alternative A—This would have the fewest restrictions on habitat restoration on PHMA and would have greater potential to impact cultural resources.

Alternative B—Increased restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative C—The most restrictive, Alternative C would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative D and the Proposed LUPA—Moderate restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Scientific Knowledge

The identification of historic properties through vegetation manipulation would result in the location of historic properties that could lend additional information about prehistoric land use.

Alternative A—This would have the fewest restrictions on habitat restoration on PHMA and would have greater potential to impact cultural resources.

Alternative B—Increased restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative C—The most restrictive, Alternative C would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative D—Moderate restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Proposed LUPA—See *Vandalism and Collection*, above.

Site Setting

Vegetation treatments would result in adverse impacts from ground-disturbing equipment and the alteration of setting. The restoration of desired native species would include plants used or valued by tribal users, which would help retain historic settings.

Alternative A—This would have the fewest restrictions on habitat restoration on PHMA and would have greater potential to impact cultural resources.

Alternative B—Increased restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative C—The most restrictive, Alternative C would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative D—Moderate restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Proposed LUPA—See *Vandalism and Collection*, above.

Opportunities for Native American Traditional Uses

Vegetation habitat treatments could enhance and protect plant resources that are important to Native American traditional use through manipulation of plant resources and protection in areas important to GRSG habitat. Herbicide applications, in particular, could affect Native American health from plant gathering and use. Restoration of the native plant community could increase some native vegetation important to Native Americans and provide additional locations for Native Americans to collect such vegetation. There could be short-term impacts due to the loss of access during treatment or closures for cultural uses.

Alternative A—This would have the fewest restrictions on habitat restoration on PHMA and would have greater potential to impact cultural resources.

Alternative B—Increased restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative C—The most restrictive, Alternative C would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative D—Moderate restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Proposed LUPA—See *Vandalism and Collection*, above.

Ground Disturbance

Vegetation treatments would result in adverse impacts ground-disturbing equipment, such as drill seeding and disking, which would affect cultural artifacts, features, and structures. There could be increased soil and wind erosion in the short term from mechanical treatments that could adversely affect historic properties. Vegetation treatments would also allow for increased ground cover that would reduce visibility and increase site protection.

Alternative A—This would have the fewest restrictions on habitat restoration on PHMA and would have greater potential to impact cultural resources.

Alternative B—Increased restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative C—The most restrictive, Alternative C would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative D—Moderate restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Proposed LUPA—See *Vandalism and Collection*, above.

Natural Processes

The lack of vegetation would result in increased soil erosion from wind and water that would affect both known and unknown cultural resources, leading to the loss of scientific information.

Alternative A—This would have the fewest restrictions on habitat restoration on PHMA and would have greater potential to impact cultural resources.

Alternative B—Increased restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative C—The most restrictive, Alternative C would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Alternative D—Moderate restrictions would have no impact on activities associated with habitat restoration, with the same potential to affect cultural resources.

Proposed LUPA—See *Vandalism and Collection*, above.

Impacts from ACEC/Zoological Area Management on Cultural Resources

ACEC designations generally have a beneficial impact on cultural resources. This designation would limit actions within the ACEC area, which in turn would limit actions that could impact cultural resources. This designation may push activities and uses to other areas outside of GRSG habitat, which may concentrate use in other areas where there are potentially significant cultural resources.

Vandalism and Collection

The management action for ACEC designation is to designate PHMA as a GRSG habitat ACEC under Alternative C. This action would be generally beneficial to protecting cultural resources by limiting activities within this area.

Alternative A—ACEC designation under this alternative would not occur for GRSG habitat. This would have negligible impacts on vandalism and unauthorized collection of cultural resources. There is always potential for people to vandalize or collect cultural resources, and this alternative would neither increase nor decrease this potential impact.

Alternative B—Impacts would be the same as Alternative A.

Alternative C—This alternative would designate an ACEC of all PHMA. This designation would be beneficial to protecting cultural resources from vandalism and unauthorized collection by limiting activities and actions within this ACEC. Potential impacts from this designation may push potential impacts from vandalism and unauthorized collection to other areas, which could impact cultural resources.

Alternatives D and the Proposed LUPA—Impacts would be the same as Alternative A.

Site Setting

The management action for ACEC designation is to designate PHMA as a GRSG habitat ACEC under Alternative C. This action would be generally beneficial to protecting cultural resources by limiting activities within this area.

Alternative A—ACEC designation under this alternative would not occur for GRSG habitat. This would have negligible impacts on vandalism and unauthorized collection of cultural resources. There is always potential for people to impact cultural resource site setting, and this alternative would neither increase nor decrease this potential impact.

Alternative B—Impacts would be the same as Alternative A.

Alternative C—This alternative would designate an ACEC of all PHMA. This designation would be beneficial to protecting cultural resource site setting by limiting activities and actions within this ACEC. However, there are no additional management actions associated with the ACEC beyond what is already in Alternative C. Potential impacts from this designation may push potential site setting impacts on other areas, which impact cultural resources.

Alternative D—Impacts would be the same as Alternative A.

Proposed LUPA—See *Vandalism and Collection*, above.

Ground Disturbance

The management action for ACEC designation is to designate PHMA as a GRSG habitat ACEC under Alternative C. This action would be generally beneficial to protecting cultural resources by limiting activities within this area.

Alternative A—ACEC designation under this alternative would not occur for GRSG habitat. This would have negligible impacts on vandalism and unauthorized collection of cultural resources. There is always potential for people to impact cultural resource site setting, and this alternative would neither increase nor decrease this potential impact.

Alternative B—Impacts would be the same as Alternative A.

Alternative C—This alternative would designate an ACEC of PHMA. This designation would be beneficial to protecting cultural resource site setting by limiting activities and actions within this ACEC. Potential impacts from this designation may push potential site setting impacts on other areas, which impact cultural resources.

Alternative D—Impacts would be the same as Alternative A.

Proposed LUPA—See *Vandalism and Collection*, above.

Natural Processes

The management action for ACEC designation is to designate PHMA as a GRSG habitat ACEC under Alternative C. This action would be generally beneficial to protecting cultural resources by limiting activities within this area.

Alternative A—ACEC designation under this alternative would not occur for GRSG habitat. This would have negligible impacts on vandalism and unauthorized collection of cultural resources. There is always potential for people to impact cultural resource site setting, and this alternative would neither increase nor decrease this potential impact.

Alternative B—Impacts would be the same as Alternative A.

Alternative C—This alternative would designate an ACEC of PHMA. This designation would be beneficial to protecting cultural resource site setting by limiting activities and actions within this ACEC. Potential impacts from this designation may push potential site setting impacts on other areas, which impact cultural resources.

Alternative D—Impacts would be the same as Alternative A.

Proposed LUPA—See *Vandalism and Collection*, above.

4.23.4 Summary of Impacts on Cultural Resources

Alternative A

Alternative A (current management) is generally the least protective for cultural resources of the alternatives. Current management of cultural resources follows federal laws, regulations, and guidelines to manage and protect significant resources from adverse impacts. These laws and regulations operate outside of management actions, so cultural resources would still be protected and managed to prevent adverse impacts to avoid, minimize, or mitigate any adverse effects on historic properties the extent possible.

This alternative provides some limited restrictions of activities or uses within GRSG habitat, which in turn provides some additional protection for cultural resources. Adverse impacts may continue to the degree they occur today through changes in all six cultural resource indicators: vandalism and collection, scientific knowledge, site setting, Native American traditional uses, ground disturbance, and natural causes. Areas open to OHV travel, land exchanges, ROWs, resource development, livestock grazing, or new construction could adversely impact cultural resources because it allows greater land use activity in areas where there are potentially significant sites. Some benefits to allowing more land use activities are an increase in land inventoried for cultural resources and increased knowledge of cultural resources in the area.

Alternative B

Under Alternative B, decisions to retain public land and restrictions to permitted activities generally benefit cultural resources. Examples are livestock grazing, recreation SRPs, ROWs, SUAs, power lines, mineral withdrawal, fluid mineral leasing, solid mineral development, and other activities that would limit or reduce disturbance in GRSG habitat. Limiting motorized travel to existing roads under this alternative is beneficial to some cultural resources in that limitations could reduce vandalism by reducing access to distant sites.

In general, restrictions on various uses to increase or protect GRSG habitat typically reduces vandalism, ground disturbance, and natural disturbances on sites. This happens by reducing access while preserving site settings and traditional uses by tribes. Restricting uses for GRSG habitat may also reduce

new scientific knowledge that results from the inventories required before project development.

Potentially adverse impacts on cultural resources under Alternative B include allowing land exchanges to create more contiguous habitat. This is because lands and resources removed from federal ownership would no longer be protected by cultural resource laws. However, that impact would be mitigated by the fact that lands removed from federal ownership would be inventoried and impacts on significant cultural resources minimized.

Additionally, this alternative places no restrictions on solar facility development for GRSG habitat or active leks. If solar and wind facilities were developed under this alternative, vandalism and ground disturbance to cultural resources could occur. However, additional scientific knowledge would also be gained during the inventory of those projects.

Some cultural resources in areas crossed by roads may see additional vandalism through unauthorized collection and increased ground disturbance through road use. The decision to not upgrade roads may increase natural disturbance from road erosion. If some routes are closed to public access, some access routes used by tribes for traditional practices could be impacted if they are not identified in consultation. Limiting activities on public lands for GRSG habitat might move those actions to other areas, which could increase overall use in areas that are not sage parks and may possess higher potential for cultural sites.

Alternative C

Alternative C is the most restrictive. Various aspects include making PHMA a GRSG habitat ACEC, making all habitat a grazing exclusion area, making occupied habitat exclusion areas for new ROWs, and withdrawing habitat from mineral entry. The overall impact would be to protect cultural resources within GRSG habitat. However, this alternative would cause the most impacts outside of GRSG habitat, as development would be pushed into these areas.

Additionally, certain actions, such as forcing new roads to be constructed around a 4-mile buffer from leks and avoiding construction in occupied habitat, may cause roads to be longer in distance; in such a case, more areas would be exposed to ground disturbance, erosion, and public impacts.

Such actions as ROW exclusions, withdrawal from mineral entry, and retention of BLM-administered and National Forest System lands are all actions that are beneficial to minimizing activity in areas of cultural resources and keeping cultural resources under federal protection. Potential negative impacts are from such actions as seasonally prohibiting camping and nonmotorized recreation within 4 miles of active leks. This could cause these activities, which are normally dispersed, to be concentrated in other areas and potentially cause vandalism and illegal collection there.

Alternative C would restrict gains in scientific knowledge within GRSG habitat by decreasing the industry development in the habitat. However, this would most likely shift development and the associated potential increase in scientific knowledge outside of PHMA. Alternative C would beneficially protect site settings within GRSG habitat, but impacts would again likely shift outside of habitat as development is pushed there.

Also, restoration of such areas as former mineral material sale areas and routes no longer in use could improve previously impacted site settings by restoring the landscape to its original look and feeling. Alternative C would limit development and travel the most, which would decrease impacts on Native American traditional use sites by preserving areas and keeping disturbance to a minimum; however, this might make it more difficult for tribes to access areas they use traditionally. Restrictions to various uses to increase or protect GRSG habitat would reduce ground disturbance and subsequent acceleration of natural processes to cultural resources but would likely push these impacts onto other areas.

Alternative D

Alternatives A and B have roughly comparable levels of potential adverse impacts. Implementation of Alternative D would result in comparable adverse impacts on cultural resources and values of importance to Native Americans, when compared to Alternatives B and C.

Proposed LUPA

Impacts from the Proposed LUPA are similar to those under Alternative D, with greater protections overall for cultural resources. This is due to additional restrictions on surface disturbance in PHMA (3 percent disturbance cap).

4.24 PALEONTOLOGICAL RESOURCES

4.24.1 General Description

Paleontological resources are any fossilized remains, traces, or imprints of organisms preserved in or on the earth's crust that are of scientific or paleontological interest and that provide information about the history of life on earth. BLM policy is to manage paleontological resources for scientific, educational, and appropriate recreational values and to protect or mitigate these resources from adverse impacts.

To accomplish this goal, paleontological resources must be professionally identified and evaluated, and paleontological resources should be considered as early as possible in the decision-making process.

Requirements under all alternatives to identify paleontological resources in areas of high potential before the ground is disturbed would allow evaluation, avoidance, recovery, or other mitigation to preserve the scientific, educational, and appropriate recreational uses.

4.24.2 Methodology and Assumptions

General Impacts on Paleontological Resources

Indicators of impacts on paleontological resources and the measurements used to describe the impacts (where available or appropriate) are as follows:

- Vandalism and collection
  - Measures of vandalism and collection of paleontological resources include access and visibility.
  - Adverse impacts on paleontological resources that can lead to vandalism and collection include an increase in access, which could expose vertebrate fossil or significant or sensitive localities to collection or destruction. Increasing or changing ground visibility also could increase vandalism and collection because fossils and their host deposits are more visible and susceptible.
  - Beneficial impacts on paleontological resources, which can in some cases avoid vandalism and collection, are rare instances where more fossils are being seen and responsibly reported for further scientific follow-up.
  - Limiting access and decreasing ground visibility can be mostly beneficial to paleontological resources and can decrease the potential for vandalism and collection.
- Scientific knowledge
  - Measures of scientific knowledge of paleontological resources include locality recordation, collection of fossils and their associated data, and acres inventoried.
  - Adverse impacts on scientific knowledge of paleontological resources can occur from loss of data, such as destroyed outcrops and fossils.
  - Beneficial impacts on scientific knowledge of paleontological resources come from new paleontological resource inventories, which lead to new localities being documented, new specimens and their associated data being collected and analyzed, and their significance being determined.
- Ground disturbance
  - Measures of ground disturbance to paleontological resources include human-caused erosion and vegetation and soil removal and, conversely, human-caused deposition and vegetation and soil obscuring bedrock.

  - Adverse impacts from ground disturbance on paleontological resources occur from many activities, including construction, livestock trampling and defecation, and creation of unauthorized routes. Additionally, activities that lead to changes in vegetation or stability of soils can cause adverse impacts through erosion, deposition, or other obscuring of outcrop visibility.
  - Limiting ground disturbances that lead to changes in soil stability or vegetation would help reduce adverse impacts on paleontological resources.
  - In rare cases, limiting ground disturbance changes may also have beneficial impacts on paleontological resources in that more rock outcrop seen may reveal more fossils for scientific collection/recordation.
- Natural processes
  - Measures of natural processes that affect paleontological resources include wind erosion, water erosion, wildfire, and vegetation loss or increase.
  - Adverse impacts from natural processes on paleontological resources are ongoing. These adverse impacts happen naturally but can be sped up as a cumulative result of human actions.
  - Beneficial impacts from natural processes include burying paleontological materials or increased vegetation, which helps to stabilize paleontological resources.
  - Conversely, beneficial impacts from natural processes in rare cases include increasing erosional surfaces or decreased vegetation, which helps to better see, locate, collect, and record new paleontological resources.

Assumptions

The following list presents basic assumptions related to paleontological resources that apply to the impacts assessment for Alternatives A, B, C, and D and the Proposed LUPA.

- All four alternatives require that BLM and Forest Service-held paleontological resources be managed and protected and that the BLM and Forest Service comply with all relevant laws and regulations.
- Paleontological resources are defined as physical evidence of vertebrate, invertebrate, track, trace, or plant fossils generally older than 10,000 years.

- Scientifically significant fossils would continue to be discovered throughout the planning area. Most discoveries would occur in Potential Fossil Yield Class 4 and 5 geologic units.
- Inventories conducted before surface disturbance in high-probability areas (Potential Fossil Yield Class 4 and 5) and some sampling of unknown potential areas (Potential Fossil Yield Class 3) would result in the identification and evaluation of previously undiscovered resources, which the BLM or Forest Service would manage accordingly.
- Unmitigated surface-disturbing activities could dislodge or damage paleontological resources that were not visible before surface disturbance.
- Conversely, mitigated surface-disturbing activities could help locate, record, and collect paleontological resources that were not visible before surface disturbance.
- Increased access associated with new development and increased recreation would lead to increased access to paleontological localities.
- Vandalism and unauthorized collecting could destroy a fossil or remove it from its context and thereby reduce its value for scientific study.
- Public education would increase public appreciation and awareness of the need for protection, but publication of any specific locations would lead to increased visitation and would require prior inventory, collecting, and interpretation needs to properly protect the localities.
- Direct impacts result from implementing the management goals, objectives, and actions of other resources that conflict with paleontological resource management goals, objectives, and actions.
- Indirect impacts are caused by actions that are farther removed in time or distance.
- Beneficial impacts include management actions or policies that preserve the characteristics of paleontological resources, either on the ground or through proper collection, recordation, and analysis of fossils and their associated data.
- Any ground-disturbing activity should be considered a potential threat to paleontological resources. Adverse impacts are permanent, and beneficial impacts cannot necessarily reverse these impacts; therefore, every impact is considered cumulative. Even minor impacts accrue over time, resulting in deteriorating locality conditions and potential loss of important scientific data and paleontological values.

- Appropriate recreational collection of common invertebrate and plant fossils in reasonable quantities is important. Maintaining access to and reducing impacts on these are required under the Paleontological Resources Preservation Act of 2009 and are responsibilities of the BLM or Forest Service and an important objective of paleontological and recreational resource management.
- Nondiscretionary mining notices are not federal undertakings, but 43 CFR, Part 3809, specifically provides for the protection of cultural and paleontological properties by prohibiting mining operators, on claims of any size, from knowingly disturbing or damaging these properties.
- Unauthorized or unplanned activities, wildland fire, dispersed recreation, natural processes and unauthorized collection, excavation, and vandalism could lead to impacts that would be difficult to monitor and mitigate. Unmitigated impacts on paleontological resources that are significant would be avoided.

4.24.3 Direct and Indirect Impacts on Paleontological Resources

Impacts from Travel Management on Paleontological Resources

The different proposals for how travel and transportation would be managed to protect GRSG; management includes limiting travel to existing roads, limiting new route construction, and managing travel in general to benefit paleontological resources. There could be negative impacts on paleontological resources if, in having to avoid habitat, roads are caused to be longer, routing around habitat, and exposing more areas to the public.

Vandalism and Collection

Routes provide access to areas that can lead to vandalism and illegal collection of fossils. Restricting vehicle use to existing or designated routes reduces the risk of disturbing resources located off trails. Closing routes to multiple methods of travel provides the greatest protection, reducing opportunities for vandalism and unauthorized collection of fossils. There could be negative impacts on paleontological resources if in having to avoid GRSG habitat, roads are caused to be longer, routing around habitat and exposing more areas to the public.

Alternative A—The fewest restrictions on PHMA could result in the least beneficial protection of paleontological resources.

Alternative B—Increased restrictions on PHMA would protect paleontological resources from vandalism and illegal collection.

Alternative C—The most restrictions on PHMA should protect paleontological resources from vandalism and illegal collection. If in forcing new roads to be constructed around a 4-mile buffer from leks and avoiding construction in

occupied habitat causes roads to be longer, more areas would be exposed to the public, potentially causing negative impacts.

Alternative D—Moderate restrictions on travel would offer a moderate level of protection for paleontological resources.

Proposed LUPA—Impacts on paleontological resources from travel management would be similar to those above for Alternative D for all indicators.

Scientific Knowledge

Construction of new roads can increase scientific knowledge if surveys or paleontological monitors are required. Restrictions on travel development to protect GRSG habitat could not increase routes and therefore would not increase scientific knowledge, due to fewer paleontological surveys, monitoring activity, and incidental excavations.

Alternative A—With this alternative, management of travel would continue as it currently is, causing a potential beneficial increase in scientific knowledge, but typically only if it is tied to an industry-related development occurring in Potential Fossil Yield Class 4 or 5 formations.

Alternative B—Increased restrictions on PHMA would lessen the potential beneficial increase in scientific knowledge that is tied to route development.

Alternative C—As the most restrictive alternative, this should be the least beneficial to a potential increase in scientific knowledge of paleontological resources. However, prohibiting new road construction within 4 miles of active leks and avoiding construction in occupied habitat may push this development into other areas and could increase scientific knowledge there.

Alternative D—Moderate restrictions on travel would cause a moderate level of impacts.

Proposed LUPA—See *Vandalism and Collection*, above.

Ground Disturbance

Construction of new routes can directly impact paleontological resources. Restrictions on route development in GRSG habitat would protect paleontological resources in habitat. Restrictions could cause more impacts on paleontological resources if, in having to avoid GRSG habitat, roads are caused to be longer, routing around habitat and causing more disturbance.

Alternative A—The fewest restrictions on PHMA could result in the least beneficial protection of paleontological resources from direct impacts, such as ground disturbance.

Alternative B—Increased restrictions on PHMA would benefit the protection of paleontological resources from vandalism and illegal collection.

Alternative C—The most restrictions on PHMA should give protection of paleontological resources from ground disturbance. If in forcing new roads to be constructed around a 4-mile buffer from leks and avoiding construction in occupied habitat, causes roads to be longer, more areas would be directly impacted by ground disturbance.

Alternative D—Moderate restrictions on travel would offer a moderate level of protection from direct impacts on paleontological resources.

Proposed LUPA—See *Vandalism and Collection*, above.

Natural Processes

Deliberate route development causes ground disturbance, which can then hasten natural processes, such as erosion. Restrictions on recreation designed to protect GRSG habitat would beneficially protect paleontological resources in the habitat.

Alternative A—The fewest restrictions on PHMA could result in the least beneficial protection of paleontological resources from indirect impacts, such as erosion.

Alternative B—Limiting travel to existing roads and restoring roads not designated in travel management plans would help lessen erosion.

Alternative C—As the most restrictive alternative, this would be the most beneficial to paleontological resources in GRSG habitat. Natural erosion caused by roads would lessen the most under this alternative. However, prohibiting new road construction within 4 miles of active leks and avoiding construction in occupied habitat may push this development into other areas and potentially cause impacts there.

Alternative D—Moderate restrictions on travel would offer a moderate level of protection from indirect impacts on paleontological resources.

Proposed LUPA—See *Vandalism and Collection*, above.

Impacts from Recreation Management on Paleontological Resources

Recreation can affect paleontological resources. Restrictions on recreation designed to protect GRSG habitat would also protect paleontological resources within the habitat. Recreation could be shifted outside of GRSG habitat, where impacts on paleontological resources would then occur; however, this would depend on the availability of recreation opportunities. Areas with high potential for recreation would be most affected.

Vandalism and Collection

Recreation can physically expose shallowly buried paleontological resources, facilitating illegal collection and vandalism. Increased public access increases the risk of vandalism or illegal collection of paleontological resources. Restrictions on recreation designed to protect GRSG habitat would beneficially protect paleontological resources in GRSG habitat, albeit on a small scale.

Alternative A—The fewest restrictions on recreation in GRSG habitat would result in the least protection of paleontological resources.

Alternative B—Increased restrictions on recreation in GRSG habitat would provide a small beneficial protection of paleontological resources from vandalism and illegal collection.

Alternative C—As the most restrictive alternative, this should be the most beneficial to paleontological resources in GRSG habitat. However, seasonally prohibiting camping and nonmotorized recreation within 4 miles of active leks may cause these activities, which are normally dispersed to concentrate in other areas and potentially cause vandalism and illegal collection there.

Alternative D—Moderate restrictions on recreation in GRSG habitat would offer a moderate level of protection for paleontological resources.

Proposed LUPA—Impacts on paleontological resources from recreation management would be similar to those under Alternative D for all indicators.

Ground Disturbance

Recreation can cause decreases in vegetation, potentially adversely affecting paleontological resources, physically altering exposed or previous shallowly buried paleontological resources. Restrictions on recreation designed to protect GRSG habitat would beneficially protect paleontological resources in habitat.

Alternative A—The fewest restrictions on recreation in GRSG habitat would result in the least protection of paleontological resources from direct impacts.

Alternative B—Increased restrictions on recreation in GRSG habitat would provide a small beneficial protection of paleontological resources from direct ground disturbance.

Alternative C—As the most restrictive alternative, this would be the most beneficial to paleontological resources in GRSG habitat.

Alternative D—Moderate restrictions on travel would offer a moderate level of protection for paleontological resources.

Proposed LUPA—See *Vandalism and Collection*, above.

Natural Processes

Recreation can decrease vegetation, degrade slope stability, and can expose shallowly buried paleontological resources, leading to damage from erosion. Restrictions on recreation designed to protect GRSG habitat would beneficially protect paleontological resources in GRSG habitat.

Alternative A—The fewest restrictions on recreation in GRSG habitat would result in the least protection of paleontological resources from indirect impacts.

Alternative B—Increased restrictions on recreation in GRSG habitat would provide a small beneficial protection of paleontological resources from increased erosion.

Alternative C—As the most restrictive alternative, this would be the most beneficial to paleontological resources in GRSG habitat.

Alternative D—Moderate restrictions on travel would offer a moderate level of protection for paleontological resources.

Proposed LUPA—See *Vandalism and Collection*, above.

Impacts from Lands and Realty Management on Paleontological Resources

The different alternatives for how lands and realty actions would be managed to protect GRSG, such as collocating new ROWs in the footprint of existing ROWS, limiting new ROWs, and reclaiming ROWs no longer in use, would in general benefit paleontological resources. There could be negative impacts on paleontological resources if ROWs have to avoid habitat and are therefore routed around habitat, exposing more areas to the public.

Vandalism and Collection

New roads and pipeline scars provide access for the public to areas, which can lead to vandalism and illegal collection of fossils. Restricting vehicle use to existing or designated routes reduces the risk of disturbing resources located off trails. There could be negative impacts on paleontological resources if ROWs have to avoid habitat and are therefore routed around habitat, exposing more areas to the public.

Alternative A—The fewest restrictions on PHMA would result in the least protection of paleontological resources.

Alternative B—Increased restrictions on PHMA, such as requiring reclamation of roads and wells no longer in use and having ROWs be collocated to reduce new disturbances, would protect paleontological resources from vandalism and over-collection.

Alternative C—By being the most restrictive, this alternative would allow for the greatest protection of paleontological resources.

Alternative D—Moderate restrictions on lands and realty would offer a moderate level of protection for paleontological resources.

Proposed LUPA—Impacts would be similar to those described above for Alternative D. However, additional protections would be greater under the Proposed LUPA because GHMA would also be managed as avoidance for ROWs. Additionally, under the Proposed LUPA, no aboveground structures would be authorized within 1 mile of active leks in occupied habitat. This would provide additional protection for paleontological resources.

Scientific Knowledge

Restrictions on land and realty actions designed to protect GRSG would cause less new disturbance in habitat and lessen any potential increase in scientific knowledge. If ROWs have to avoid habitat and route around habitat, there can be more ground disturbance and potential increase in scientific knowledge outside of habitat.

Alternative A—The fewest restrictions on GRSG habitat would be the most beneficial in terms of gains in scientific knowledge.

Alternative B—Increased restrictions on PHMA would reduce incidental excavation, as well as paleontological surveys and monitors. Alternatively, both identified and unidentified fossil resources would be preserved for scientific study.

Alternative C—By being the most restrictive, this alternative would allow for the greatest preservation of paleontological resources but would yield the fewest immediate gains in scientific knowledge, at least in GRSG habitat. If new disturbances were pushed outside of habitat, scientific knowledge could be gained.

Alternative D—Moderate restrictions on lands and realty would offer a balance of preservation versus survey and monitoring discoveries and incidental excavation.

Proposed LUPA—See *Vandalism and Collection*, above.

Ground Disturbance

Restrictions on lands and realty designed to protect GRSG habitat would beneficially protect paleontological resources in GRSG habitat. There could be negative impacts on paleontological resources if ROWs have to avoid habitat and are therefore routed around habitat, causing more ground disturbance.

Alternative A—The fewest restrictions on PHMA would result in the least protection of paleontological resources from direct impacts of ground disturbance.

Alternative B—Increased restrictions on PHMA, such as requiring reclamation of roads and wells no longer in use and having ROWs be collocated to reduce new disturbances, would protect paleontological resources from exposure.

Alternative C—By being the most restrictive, this alternative would allow for the greatest protection and preservation of paleontological resources.

Alternative D—Moderate restrictions on lands and realty would offer a moderate level of protection for paleontological resources.

Proposed LUPA—See *Vandalism and Collection*, above.

Natural Processes

Restrictions on lands and realty designed to protect GRSG habitat would beneficially protect paleontological resources in GRSG habitat. There could be negative impacts on paleontological resources if ROWs have to avoid habitat and are therefore routed around habitat, causing more disturbance and hastening natural processes, such as erosion.

Alternative A—The fewest restrictions on PHMA would result in the least protection of paleontological resources from natural processes, such as erosion.

Alternative B—Increased restrictions on PHMA, such as requiring reclamation of roads and wells no longer in use and having ROWs be collocated to reduce new disturbances, would protect paleontological resources from continual exposure.

Alternative C—By being the most restrictive, this alternative would allow for the greatest protection and preservation of paleontological resources.

Alternative D—Moderate restrictions on lands and realty would offer a moderate level of protection for paleontological resources.

Proposed LUPA—See *Vandalism and Collection*, above.

Impacts from Wind Energy Development on Paleontological Resources

Restrictions on wind power projects designed to protect GRSG habitat would also protect paleontological resources. Areas with high potential for wind resource development would be affected adversely.

Vandalism and Collection

Restrictions on wind power projects designed to protect GRSG habitat would also protect paleontological resources, because the reductions in surface

disturbance that can unearth or expose subsurface paleontological resources would be reduced.

Alternative A—No restrictions for GRSG habitat would result in the least protection for paleontological resources.

Alternative B—No restrictions for GRSG habitat would result in the least protection for paleontological resources.

Alternative C—By being the most restrictive, this alternative would provide the greatest protection of paleontological resources.

Alternative D—No restrictions for GRSG habitat would result in the least protection for paleontological resources.

Proposed LUPA—Wind energy development would be excluded from PHMA; therefore, impacts on paleontological resources would be similar to those under Alternative C for all indicators. Nevertheless, impacts from wind energy development are not expected to vary between alternatives because the potential for wind energy in northwest Colorado is very limited.

Scientific Knowledge

Restrictions on wind power projects designed to protect GRSG habitat could decrease scientific knowledge, due to fewer paleontological surveys and incidental excavations, both of which can result in subsequent identification of new paleontological sites. However, existing sites within PHMA would have greater protections, preserving known paleontological sites for future scientific study.

Alternative A—No restrictions for GRSG habitat could increase the number of new sites discovered but may lead to degradation of known paleontological sites.

Alternative B—No restrictions for GRSG habitat could increase the number of new sites discovered but may lead to degradation of known paleontological sites.

Alternative C—By being the most restrictive, this alternative would allow for the greatest preservation of known paleontological resources for scientific study but would decrease the number of newly discovered paleontological sites.

Alternative D—No restrictions for GRSG habitat could increase the number of new sites discovered but may lead to degradation of known paleontological sites.

Proposed LUPA—See *Vandalism and Collection*, above.

Ground Disturbance

Restrictions on wind power projects designed to protect GRSG habitat could reduce or eliminate surface disturbance. Ground disturbance within PHMA can result in erosion, increased sedimentation, decreased vegetation, and degraded slope stability, all of which could adversely affect paleontological resources. However, paleontological surveys and construction monitors required for ground-disturbing projects could lead to new paleontological resource discoveries.

Alternative A—No restrictions for GRSG habitat could increase the number of new sites discovered but could lead to degradation of known paleontological sites.

Alternative B—No restrictions for GRSG habitat could increase the number of new sites discovered but could lead to degradation of known paleontological sites.

Alternative C—By being the most restrictive, this alternative would allow for the greatest protection of known paleontological resources but could lead to fewer new discoveries.

Alternative D—No restrictions for GRSG habitat could increase the number of new sites discovered but could lead to degradation of known paleontological sites.

Proposed LUPA—See *Vandalism and Collection*, above.

Natural Processes

Disruptive activities associated with wind power project development would affect natural processes in the same manner described for ground disturbance.

Impacts from Industrial Solar Development on Paleontological Resources

Restrictions on solar power projects designed to protect GRSG habitat would also protect paleontological resources. Areas with high potential for solar resource development would be affected adversely.

Vandalism and Collection

Restrictions on solar power projects designed to protect GRSG habitat would also protect paleontological resources because the reductions in surface disturbance that can unearth or expose subsurface paleontological resources would be reduced.

Alternative A—No restrictions for GRSG habitat would result in the least protection for paleontological resources.

Alternative B—No restrictions for GRSG habitat would result in the least protection for paleontological resources.

Alternative C—By being the most restrictive, this alternative would provide the greatest protection of paleontological resources.

Alternative D—No restrictions for GRSG habitat would result in the least protection for paleontological resources.

Proposed LUPA—Solar energy development would be excluded from PHMA; therefore, impacts on paleontological resources would be similar to those under Alternative C. Nevertheless, impacts from wind energy development are not expected to vary between alternatives because the potential for wind energy in northwest Colorado is very limited.

Scientific Knowledge

Restrictions on solar power projects designed to protect GRSG habitat could decrease scientific knowledge, due to fewer paleontological surveys and incidental excavations, both of which can result in subsequent identification of new paleontological sites. However, existing sites within PHMA would have greater protections, preserving paleontological sites for future scientific study.

Alternative A—No restrictions for GRSG habitat could increase the number of new sites discovered but may lead to degradation of known paleontological sites.

Alternative B—No restrictions for GRSG habitat could increase the number of new sites discovered but may lead to degradation of known paleontological sites.

Alternative C—By being the most restrictive, this alternative would allow for the greatest preservation of known paleontological resources for scientific study, but it would decrease the number of newly discovered paleontological sites.

Alternative D—No restrictions for GRSG habitat could increase the number of new sites discovered, but it may lead to degradation of known paleontological sites.

Proposed LUPA—See *Vandalism and Collection*, above.

Ground Disturbance

Restrictions on solar power projects designed to protect GRSG habitat could reduce or eliminate surface disturbance. Ground disturbance within PHMA can result in erosion, increased sedimentation, decreased vegetation, and degraded slope stability, all of which could adversely affect paleontological resources. However, paleontological surveys and construction monitors required for ground-disturbing projects could lead to new paleontological resource discoveries.

Alternative A—No restrictions for GRSG habitat could increase the number of new sites discovered, but it could lead to degradation of known paleontological sites.

Alternative B—No restrictions for GRSG habitat could increase the number of new sites discovered, but it could lead to degradation of known paleontological sites.

Alternative C—By being the most restrictive, this alternative would allow for the greatest protection of known paleontological resources, but it could lead to fewer new discoveries.

Alternative D—No restrictions for GRSG habitat could increase the number of new sites discovered, but it could lead to degradation of known paleontological sites.

Proposed LUPA—See *Vandalism and Collection*, above.

Natural Processes
Disruptive activities associated with solar power project development would affect natural processes in the same manner described for ground disturbance.

Impacts from Range Management on Paleontological Resources
Restrictions on range management designed to protect GRSG habitat would also protect paleontological resources. Areas used for range management would be affected adversely.

Vandalism and Collection
Restrictions on range management designed to protect GRSG habitat would also protect paleontological resources because the reductions in surface disturbance. which can unearth or expose subsurface paleontological resources, would be reduced.

Alternative A—No surface disturbance restrictions for GRSG habitat would result in the least protection for paleontological resources.

Alternative B—No surface disturbance restrictions for GRSG habitat would result in the least protection for paleontological resources.

Alternative C—Surface disturbance restrictions required in this alternative would provide the greatest protection of paleontological resources.

Alternative D—No surface disturbance restrictions for GRSG habitat would result in the least protection for paleontological resources.

The Proposed LUPA's impacts would be the same as Alternative D.

Scientific Knowledge

Restrictions on range management designed to protect GRSG habitat could decrease scientific knowledge due to fewer paleontological surveys and incidental excavations, both of which can result in subsequent identification of new paleontological sites. However, existing sites within PHMA would have greater protections, preserving known paleontological sites for future scientific study.

Alternative A—No surface disturbance restrictions for GRSG habitat could increase the number of new sites discovered, but it may lead to degradation of known paleontological sites.

Alternative B—No surface disturbance restrictions for GRSG habitat could increase the number of new sites discovered, but it may lead to degradation of known paleontological sites.

Alternative C—Surface disturbance restrictions required in this alternative would allow for the greatest preservation of known paleontological resources for scientific study, but it would decrease the number of newly discovered paleontological sites.

Alternative D—No surface disturbance restrictions for GRSG habitat could decrease the number of new sites discovered, but it may lead to better preservation of known paleontological sites.

The Proposed LUPA's impacts are the same as Alternative D.

Ground Disturbance

Restrictions on range management designed to protect GRSG habitat could reduce or eliminate surface disturbance. Ground disturbance within PHMA can result in erosion, increased sedimentation, decreased vegetation, and degraded slope stability, all of which could adversely affect paleontological resources. However, paleontological surveys and construction monitors required for ground-disturbing projects could lead to new paleontological resource discoveries.

Alternative A—No surface disturbance restrictions for GRSG habitat could decrease the number of new sites discovered, but it could lead to better preservation of known paleontological sites.

Alternative B—No surface disturbance restrictions for GRSG habitat could decrease the number of new sites discovered, but it could lead to better preservation of known paleontological sites.

Alternative C—Surface disturbance restrictions required in this alternative would allow for the greatest protection of known paleontological resources, but it could lead to fewer new discoveries.

Alternative D—No surface disturbance restrictions for GRSG habitat could decrease the number of new sites discovered, but it could lead to better preservation of known paleontological sites.

The Proposed LUPA's impacts are the same as Alternative D.

Natural Processes
Disruptive activities associated with solar power project development would affect natural processes in the same manner described for ground disturbance.

Impacts from Wild Horse Management on Paleontological Resources
Restrictions on wild horse management designed to protect GRSG habitat would also protect paleontological resources. Areas used for wild horse management would be affected adversely.

Vandalism and Collection
Restrictions on wild horse management designed to protect GRSG habitat would also protect paleontological resources.

Alternative A—Restrictions for GRSG habitat would result in protection of paleontological resources.

Alternative B—Restrictions for GRSG habitat would result in protection of paleontological resources.

Alternative C—Restrictions for GRSG habitat would result in protection of paleontological resources.

Alternative D—Restrictions for GRSG habitat would result in protection of paleontological resources.

Proposed LUPA—Wild horse management would be the same as Alternative D, so impacts are the same as those under Alternative D for all indicators.

Ground Disturbance
Disruptive activities associated with wild horse management would affect natural processes in the same manner described for ground disturbance.

Natural Processes
Disruptive activities associated with wild horse management would affect natural processes in the same manner described for ground disturbance.

Impacts from Fluid Minerals Management on Paleontological Resources
Restrictions on fluid minerals designed to protect GRSG habitat would also protect paleontological resources, while reducing some management options designed to benefit paleontological resources. Areas with high potential for fluid mineral development would be most affected, both adversely and beneficially.

Vandalism and Collection

Restrictions on fluid minerals designed to protect GRSG habitat would also protect paleontological resources because the reductions in anthropogenic disturbance, which unearths or exposes resources, would be reduced. Additionally, areas of increased potential fossil yield and identified discovery sites would be less accessible.

Alternative A—The fewest restrictions on PHMA would result in the least protection of paleontological resources. Fluid mineral operations are not currently affecting most high potential fossil yield formations underlying identified GRSG habitat. However, the potential exists for energy development to become a larger factor in the future, especially in areas of dense bedrock exposures.

Alternative B—Increased restrictions on PHMA would protect paleontological resources from vandalism and over-collection.

Alternative C—By being the most restrictive, this alternative would allow for the greatest protection of paleontological resources.

Alternative D—Moderate restrictions on fluid mineral development would offer a moderate level of protection for paleontological resources.

Proposed LUPA—Impacts would be similar to those for Alternative D, with additional protections for paleontological resources. This is due to increased restrictions on surface disturbance in PHMA (3 percent disturbance cap).

Scientific Knowledge

Restrictions on fluid minerals designed to protect GRSG habitat could increase scientific knowledge due to fewer paleontological surveys and incidental excavations, both of which can result is subsequent identification of discovery sites. However, existing sites within PHMA would have greater protections, preserving discovery sites for future scientific study.

Alternative A—The fewest restrictions on PHMA could increase scientific knowledge, with the caveat that incidental excavations can result in damage of paleontological resources. Surveys, however, can lead to resource discovery and mitigation of resource degradation.

Alternative B—Increased restrictions on PHMA would reduce incidental excavation as well as paleontological surveys. Alternatively, both identified and unidentified fossil resources would be preserved for scientific study.

Alternative C—By being the most restrictive, this alternative would allow for the greatest preservation of paleontological resources for scientific study.

Alternative D—Moderate restrictions on fluid mineral development would offer a balance of preservation versus survey discovery and incidental excavation.

Proposed LUPA—See *Vandalism and Collection*, above.

Ground Disturbance

Restrictions on fluid minerals designed to protect GRSG habitat could benefit paleontological resources. Ground disturbance within PHMA can result in erosion, increased sedimentation, decreased vegetation, and degraded slope stability, all of which could adversely affect paleontological resources.

Alternative A—The fewest restrictions on PHMA has the highest potential to adversely impact paleontological resources.

Alternative B—Increased restrictions on PHMA would reduce the potential to adversely impact paleontological resources.

Alternative C—By being the most restrictive, this alternative would allow for the greatest protection of paleontological resources.

Alternative D—Moderate restrictions on fluid mineral development would offer a reasonable balance of protection versus adverse impacts on resources.

Proposed LUPA—See *Vandalism and Collection*, above.

Natural Processes

Disruptive activities associated with fluid minerals development would affect natural processes in the same manner described for ground disturbance.

Impacts from Solid Minerals–Coal Management on Paleontological Resources

Restrictions on coal designed to protect GRSG habitat would also protect paleontological resources, while reducing some management options designed to benefit paleontological resources. Areas with high potential for coal development would be most affected, both adversely and beneficially.

Vandalism and Collection

Restrictions on coal designed to protect GRSG habitat would also protect paleontological resources because the reductions in anthropogenic disturbance, which unearths or exposes resources, would be reduced. Additionally, areas of increased potential fossil yield and identified discovery sites would be less accessible.

Alternative A—The fewest restrictions on PHMA would result in the least protection of paleontological resources. Coal operations have an increased potential to affect paleontological resources due to the stratigraphic nature of coal seams and their propensity to appear in bedrock outcrops. Intact and

preserved fossils tend to be located in outcrop as well and could be in proximity to coal seams.

Alternative B—Increased restrictions on PHMA would protect paleontological resources from vandalism and over collection.

Alternative C—By being the most restrictive, this alternative would allow for the greatest protection of paleontological resources.

Alternative D—Moderate restrictions on coal development would offer a moderate level of protection for paleontological resources.

Proposed LUPA—Impacts would be similar to those under Alternative D with additional protections for paleontological resources. This is due to increased restrictions on surface disturbance in PHMA (3 percent disturbance cap).

Scientific Knowledge

Restrictions on coal designed to protect GRSG habitat could increase paleontological scientific knowledge due to fewer paleontological surveys and incidental excavations, both of which can result is subsequent identification of discovery sites. However, existing sites within PHMA would have greater protections, preserving discovery sites for future scientific study.

Alternative A—The fewest restrictions on PHMA could increase scientific knowledge, with the caveat that incidental excavations can result in damage of paleontological resources. Surveys, however, can lead to resource discovery and mitigation of resource degradation.

Alternative B—Increased restrictions on PHMA would reduce incidental excavation, as well as paleontological surveys. Alternatively, both identified and unidentified fossil resources would be preserved for scientific study.

Alternative C—By being the most restrictive, this alternative would allow for the greatest preservation of paleontological resources for scientific study.

Alternative D—Moderate restrictions on coal development would offer a balance of preservation versus survey discovery and incidental excavation.

Proposed LUPA—See *Vandalism and Collection*, above.

Ground Disturbance

Restrictions on coal development designed to protect GRSG habitat could benefit paleontological resources. Ground disturbance within PHMA can result in erosion, increased sedimentation, decreased vegetation, and degraded slope stability, all of which could adversely affect paleontological Resources.

Alternative A—The fewest restrictions on PHMA has the highest potential to adversely impact paleontological resources.

Alternative B—Increased restrictions on PHMA would reduce the potential to adversely impact Paleontological resources.

Alternative C—By being the most restrictive, this alternative would allow for the greatest protection of paleontological resources.

Alternative D—Moderate restrictions on fluid mineral development would offer a reasonable balance of protection versus adverse impacts on resources.

Proposed LUPA—See *Vandalism and Collection*, above.

Natural Processes
Disruptive activities associated with coal development would affect natural processes in the same manner described for ground disturbance.

Impacts from Locatable Minerals Management on Paleontological Resources
Restrictions on locatable minerals to protect GRSG habitat would offer little to no protection to paleontological resources. Areas with high potential for locatable minerals would be least affected both adversely and beneficially. Igneous and metamorphic source rocks tend to have low quality or nonexistent fossil specimens due to the extreme environments in which they were created.

Vandalism and Collection
Restrictions on locatable minerals designed to protect GRSG habitat would also have little to no beneficial or adverse impacts on paleontological resources due to the scarcity of fossils at these localities.

Alternative A—The fewest restrictions on PHMA would have little to no impacts on protection of paleontological resources.

Alternative B—Increased restrictions on PHMA would have little to no impacts on protection of paleontological resources.

Alternative C—By being the most restrictive, this alternative would have little to no impacts on protection of paleontological resources.

Alternative D—Moderate restrictions on locatable mineral development would have little to no impacts on protection of paleontological resources.

Proposed LUPA—Management of locatable minerals would be the same as under Alternative D; impacts are the same as under Alternative D, above.

Scientific Knowledge
Restrictions on locatable minerals designed to protect GRSG habitat could decrease paleontological scientific knowledge due to fewer opportunities to discover metamorphic changes to sedimentary strata. However, preservation of

geologic processes in mineral localities has the benefit to increase scientific knowledge for future generations.

Alternative A—The fewest restrictions on PHMA could increase scientific knowledge from associated discoveries. But fewer restrictions result in less preservation of geologic and paleontological records.

Alternative B—Increased restrictions on PHMA would reduce incidental discoveries but offer more preservation for geologic and paleontological scientific records.

Alternative C—By being the most restrictive, this alternative would allow for the greatest preservation of geologic and paleontological scientific records.

Alternative D—Moderate restrictions on coal development would offer a balance of preservation versus incidental discovery.

Proposed LUPA—Management of locatable minerals would be the same under as Alternative D; impacts are the same as under Alternative D, above.

Ground Disturbance

Restrictions on locatable minerals designed to protect GRSG habitat would have little to no impacts on to paleontological resources. Generally, locatable mineral localities do not outcrop congruently with sedimentary strata, the place where fossils are most likely to be found. However, development of roads and processing facilities could have associated impacts.

Natural Processes

Disruptive activities associated with locatable minerals development would affect natural processes in the same manner described for ground disturbance.

Impacts from Nonenergy Leasable Minerals Management on Paleontological Resources

Restrictions on nonenergy leasable minerals designed to protect GRSG habitat would also protect paleontological resources, while reducing some management options designed to benefit paleontological resources. Areas with high potential for nonenergy leasable minerals development would be most affected, both adversely and beneficially.

Vandalism and Collection

Restrictions on nonenergy leasable minerals designed to protect GRSG habitat would also protect paleontological resources because the reductions in anthropogenic disturbance, which unearths or exposes resources, would be reduced. Additionally, areas of increased potential fossil yield and identified discovery sites would be less accessible.

Alternative A—The fewest restrictions on PHMA would result in the least protection of paleontological resources. nonenergy leasable mineral operations have an increased potential to affect paleontological resources. This is because of the stratigraphic and depositional nature of evaporitic minerals and their propensity to appear in bedrock outcrops. Intact and preserved fossils tend to be located in outcrop as well and could be in proximity to nonenergy leasable minerals.

Alternative B—Increased restrictions on PHMA would protect Paleontological Resources from vandalism and over-collection.

Alternative C—By being the most restrictive, this alternative would allow for the greatest protection of paleontological resources.

Alternative D—Moderate restrictions on nonenergy leasable mineral development would offer a moderate level of protection for paleontological resources.

Proposed LUPA—Impacts would be similar to those for Alternative D, with additional protections for paleontological resources. This is due to increased restrictions on surface disturbance in PHMA (3 percent disturbance cap).

Scientific Knowledge

Restrictions on nonenergy leasable mineral development designed to protect GRSG habitat could decrease paleontological scientific knowledge. This is due to fewer paleontological surveys and incidental excavations, both of which can result is subsequent identification of discovery sites. However, existing sites within PHMA would have greater protections, preserving discovery sites for future scientific study.

Alternative A—The fewest restrictions on PHMA could increase scientific knowledge, with the caveat that incidental excavations can damage paleontological resources. Surveys, however, can lead to resource discovery and mitigation of resource degradation.

Alternative B—Increased restrictions on PHMA would reduce incidental excavation, as well as paleontological surveys. Alternatively, both identified and unidentified fossil resources would be preserved for scientific study.

Alternative C—By being the most restrictive, this alternative would allow for the greatest preservation of paleontological resources for scientific study.

Alternative D—Moderate restrictions on nonenergy leasable mineral development would offer a balance of preservation versus survey discovery and incidental excavation.

Proposed LUPA—See *Vandalism and Collection*, above.

Ground Disturbance

Restrictions on nonenergy leasable mineral development designed to protect GRSG habitat could benefit paleontological resources. Ground disturbance within PHMA can result in erosion, increased sedimentation, decreased vegetation, and degraded slope stability, all of which could adversely affect paleontological resources. Furthermore, water can dissolve evaporitic minerals, which can interact with fossils and increase carbonaceous breakdown.

Alternative A—The fewest restrictions on PHMA has the highest potential to adversely impact paleontological resources.

Alternative B—Increased restrictions on PHMA would reduce the potential to adversely impact paleontological resources.

Alternative C—By being the most restrictive, this alternative would allow for the greatest protection of paleontological resources.

Alternative D—Moderate restrictions on nonenergy leasable mineral development would offer a reasonable balance of protection versus adverse impacts on resources.

Proposed LUPA—See *Vandalism and Collection*, above.

Natural Processes

Disruptive activities associated with nonenergy leasable mineral development would affect natural processes in the same manner described for ground disturbance.

Impacts from Salable Minerals Management on Paleontological Resources

Restrictions on salable minerals to protect GRSG habitat would offer beneficial or noncommittal protection to paleontological resources. Areas with high potential for locatable minerals would be moderately affected, both adversely and beneficially. Boulders, gravels, and sands generally have low quality or nonexistent fossil specimens due to mechanical and chemical weathering processes. However, boulders and cobbles can contain intact specimens, and in some cases fossil specimens themselves are part of colluvial and alluvial matrices.

Vandalism and Collection

Restrictions on salable minerals designed to protect GRSG habitat would have little to no beneficial or adverse impacts on paleontological resources, due to the poor quality or transient nature of fossils at these localities.

Scientific Knowledge

Restrictions on salable minerals designed to protect GRSG habitat have a low potential to affect paleontological scientific knowledge. However, some benefit

can be gleaned from the lithic portions of fossils, helping researchers to predict where source rocks are located.

Alternative A—The fewest restrictions on PHMA could increase scientific knowledge from associated discoveries. But fewer restrictions result in less preservation of geologic and paleontological records.

Alternative B—Increased restrictions on PHMA would reduce incidental discoveries but offer more preservation for geologic and paleontological scientific records.

Alternative C—By being the most restrictive, this alternative would allow for the greatest preservation of geologic and paleontological scientific records.

Alternative D—Moderate restrictions on salable mineral development would offer a balance of preservation versus incidental discovery.

Proposed LUPA—Management of salable minerals would be the same as Alternative B. Impacts on paleontological resources are the same as those for Alternative B for all indicators.

Ground Disturbance
Restrictions on salable minerals designed to protect GRSG habitat has little to no impacts on paleontological resources. Generally, salable mineral localities have undergone mass wasting events, erosion, and weathering. Operations involved with salable mineral development have little to no impact on paleontological resources in theses localities.

Natural Processes
Disruptive activities associated with locatable minerals development would affect natural processes in the same manner described for ground disturbance.

Impacts from Fuels Management, Wildland Fire Management, and Emergency Stabilization and Response on Paleontological Resources
The range of alternatives allows for limited treatment of vegetation, including mechanical, wildland or prescribed fire use, and chemical methods. Wildland fire use and prescribed fire could result in direct and indirect impacts on paleontological resources. Fire could cause the direct destruction of organic fossil remains. The removal of vegetation cover by fire would accelerate erosion in the short term, thereby creating indirect impacts, although these impacts are negligible compared to similar impacts that occur by natural processes.

Fire suppression that involves the use of heavy equipment and the building of fire lines could damage or destroy surface fossils. In these areas, avoidance of paleontological resources would reduce potential adverse impacts. Potential long-term adverse impacts would result from the construction of fire lines. Wildland fires could increase access to BLM-administered and National Forest

System lands that were previously less accessible to the public, thereby increasing the potential for unauthorized fossil collecting and vandalism.

The recovery and preservation of fossils as the result of paleontological mitigation would result in beneficial impacts because these actions would permanently preserve paleontological resources available for scientific research, education, and display that may otherwise never have been discovered. Wildfire could be used for resource benefit, depending on if more fossils are found in such areas of removed vegetation and increased erosion. *Vandalism and Collection*

The restrictions on fuels management, wildland fire management, and ESR would limit the adverse impacts of exposed ground surface and actions taken for fire suppression in GRSG habitat that could expose fossils, limiting the potential for collecting scientifically important paleontological resources. Indirect impacts, such as soil or wind erosion, could expose more fossils.

Alternative A—The fewest restrictions on PHMA would have greater impacts on protection of paleontological resources with greater fire suppression actions.

Alternative B—Increased restrictions on PHMA would have fewer impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Alternative C—By being the most restrictive, this alternative would have the fewest impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Alternative D—Moderate restrictions from fuels management, wildland fire management, and ESR would have little to no impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Proposed LUPA—Management of wildfire suppression and fuels and fire rehabilitation would be the same as those for Alternative D; therefore, impacts from the Proposed LUPA are the same as for Alternative D. Increased Scientific Knowledge

Restrictions on fuels management, wildland fire management, and ESR designed to protect GRSG habitat would decrease paleontological scientific knowledge due to fewer paleontological surveys and incidental excavations. Fire could cause the direct destruction of organic fossil remains. Existing sites within PHMA would have greater protections, preserving known discovery sites for future scientific study.

Alternative A—The fewest restrictions on PHMA would have greater impacts on protection of paleontological resources.

Alternative B—Increased restrictions on PHMA would have fewer impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Alternative C—By being the most restrictive, this alternative would have the fewest impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Alternative D—Moderate restrictions from fuels management, wildland fire management, and ESR would have little to no impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Proposed LUPA—Management of wildfire suppression and fuels and fire rehabilitation under the Proposed LUPA would the same as that for Alternative D; therefore, impacts from the Proposed LUPA would be the same as for Alternative D.

Ground Disturbance

Restrictions on fuels management, wildland fire management, and ESR designed to protect GRSG habitat would have direct and indirect impacts. This would be measured by the amount of exposed ground surface from wildland fire and from suppression actions, such as hand line and dozer line construction, which would could expose and damage scientifically important fossil material, resulting in increased access from fire suppression.

Alternative A—The fewest restrictions on PHMA would have greater impacts on protection of paleontological resources.

Alternative B—Increased restrictions on PHMA would have fewer impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Alternative C—By being the most restrictive, this alternative would have the fewest impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Alternative D—Moderate restrictions from fuels management, wildland fire management, and ESR would have little to no impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Proposed LUPA—Management of wildfire suppression and fuels and fire rehabilitation under the Proposed LUPA would be the same as that for Alternative D; therefore, impacts from the Proposed LUPA would be the same as for Alternative D.

Natural Processes

The restrictions on fuels management, wildland fire management, and ESR would have no effect on the natural erosional processes that would take place naturally; however, they would increase those natural erosional processes, exposing potentially scientifically important paleontological fossil resources. The removal of vegetation cover by fire would accelerate erosion in the short term, thereby creating indirect impacts, although these impacts are negligible compared to similar impacts that occur by natural processes.

Alternative A—The fewest restrictions on PHMA would have greater impacts on protection of paleontological resources.

Alternative B—Increased restrictions on PHMA would have fewer impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Alternative C—By being the most restrictive, this alternative would have the fewest impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Alternative D—Moderate restrictions from fuels management, wildland fire management, and ESR would have little to no impacts on paleontological resources. Prescribed fire would not be allowed in GRSG habitat.

Proposed LUPA—Management of wildfire suppression and fuels and fire rehabilitation under the Proposed LUPA would be the same as that for Alternative D; therefore, impacts from the Proposed LUPA would be the same as for Alternative D.

Impacts from Habitat Restoration on Paleontological Resources

Surface-disturbing activities could expose, dislodge, or damage paleontological resources and features that were not visible before surface disturbance. Surface-disturbing activities include mitigation measures designed to reduce impacts on paleontological resources, when appropriate. The number of localities that could be impacted by various actions would directly correlate to the degree, nature, and quantity of surface-disturbing activities. Paleontological resources identified during assessments and inventories would be protected through data and specimen collection and mitigation.

Vandalism and Collection

Surface-disturbing activities that would affect soils directly or indirectly from exposure and erosion would increase visibility and the potential for loss of information from illegal collection.

Alternative A—The fewest restrictions on PHMA would have greater impacts on protection of paleontological resources.

Alternative B—Increased restrictions on PHMA would have fewer impacts on paleontological resources.

Alternative C—By being the most restrictive, this alternative would have the fewest impacts on paleontological resources.

Alternative D—Moderate restrictions on PHMA would have little to no impacts on paleontological resources.

Proposed LUPA—Management of habitat restoration under the Proposed LUPA would be the same as Alternative D; impacts on paleontological resources from habitat restoration are the same as for Alternative D for all indicators.

Scientific Knowledge

Fossil resource exposure from direct surface-disturbing activities would help increased scientific knowledge as a beneficial impact on paleontological resources.

Alternative A—Fewest restrictions on PHMA would have greater impacts on protection of paleontological resources.

Alternative B—Increased restrictions on PHMA would have fewer impacts on paleontological resources.

Alternative C—By being the most restrictive, this alternative would have the fewest impacts on paleontological resources.

Alternative D—Moderate restrictions on PHMA would have little to no impacts on paleontological resources.

Proposed LUPA—See *Vandalism and Collection*, above.

Ground Disturbance

Revegetation activities would be an adverse impact on paleontological resources by exposing and even damaging fossils from drill seeding or disking. The beneficial effect would come through scientific recordation, collection, and study.

Alternative A—Fewest restrictions on PHMA would have greater impacts on protection of paleontological resources.

Alternative B—Increased restrictions on PHMA would have fewer impacts on paleontological resources.

Alternative C—By being the most restrictive, this alternative would have the fewest impacts on paleontological resources.

Alternative D—Moderate restrictions on PHMA would have little to no impacts on paleontological resources.

Proposed LUPA—See *Vandalism and Collection*, above.

Natural Processes

Erosion and vegetation loss are adverse impacts on paleontological resources. Increase in vegetation and soils may develop a protective layer, which could be a beneficial impact on paleontological Resources. However, increase in vegetation and soils may also cause mechanical and chemical destruction to paleontological resources (e.g., fossil-killing tree or sagebrush roots or leaching soils).

Alternative A—The fewest restrictions on PHMA would have greater impacts on protection of paleontological resources.

Alternative B—Increased restrictions on PHMA would have fewer impacts on paleontological resources.

Alternative C—By being the most restrictive, this alternative would have the fewest impacts on paleontological resources.

Alternative D—Moderate restrictions on PHMA would have little to no impacts on paleontological resources.

Proposed LUPA—See *Vandalism and Collection*, above.

Impacts from ACEC/Zoological Area Management on Paleontological Resources

The only management action for ACEC designation is to designate all PHMA as a GRSG habitat ACEC under Alternative C. ACEC impacts on paleontological resources are difficult to analyze without the details of specific ACECs. For example ACECs can range from avoidance to exclusion areas and can have exceptions and waivers, all which dictate the level of activity that can occur in that ACEC. In general, ACECs offer protection for paleontological resources.

Vandalism and Collection

In general, ACECs should help protect paleontological resources from vandalism and illegal collection.

Alternative A—With this alternative, management would continue as it currently is, not making all GRSG habitat an ACEC; impacts on paleontological resources could continue at their current rate.

Alternative B—Impacts would be the same as Alternative A.

Alternative C—This Alternative would designate all PHMA as an ACEC. The level of impact cannot be analyzed without knowing more details. All potential

impacts should have been covered above in individual sections regarding impacts on different resources under this alternative.

Alternative D and the Proposed LUPA—Impacts would be the same as Alternative A.

Scientific Knowledge
In general, ACECs should limit development, thereby lessening potentially beneficial increases in scientific knowledge.

Alternative A—With this alternative, management would continue as it currently is, not making all GRSG habitat an ACEC, and impacts on paleontological resources could continue at their current rate.

Alternative B—Impacts would be the same as Alternative A.

Alternative C—This alternative would make all PHMA designated as an ACEC. The level of impact cannot be analyzed without knowing more details. All potential impacts should have been covered above in individual sections regarding impacts on different resources under this alternative.

Alternative D and the Proposed LUPA—Impacts would be the same as Alternative A.

Ground Disturbance
In general, ACECs should limit development and lessen potential ground disturbance to paleontological resources.

Alternative A—With this alternative, management would continue as it currently is, not making all GRSG habitat an ACEC, and impacts on paleontological resources could continue at their current rate.

Alternative B—Impacts would be the same as Alternative A.

Alternative C—This alternative would designate all PHMA as an ACEC. The level of impact cannot be analyzed without knowing more details. All potential impacts should have been covered above in individual sections regarding impacts on different resources under this alternative.

Alternative D and the Proposed LUPA—Impacts would be the same as Alternative A.

Natural Processes
In general, ACECs should limit development and the associated hastening of natural processes, such as erosion to paleontological resources.

Alternative A—With this alternative, management would continue as it currently is, not making all GRSG habitat an ACEC, and impacts on paleontological resources could continue at their current rate.

Alternative B—Impacts would be the same as Alternative A.

Alternative C—This alternative would designate all PHMA as an ACEC. The level of impact cannot be analyzed without knowing more details. All potential impacts should have been covered above in individual sections regarding impacts on different resources under this alternative.

Alternative D and the Proposed LUPA—Impacts would be the same as Alternative A.

4.24.4 Summary of Impacts on Paleontological Resources

Alternative A

With this being the no action, or status quo, alternative, all resource management actions would continue as they are. Ultimately, Alternative A has the fewest restrictions imposed on resource management related to protection of GRSG. In respect to the general impacts described above, this alternative offers the least protection from vandalism/collection, could increase scientific knowledge, and offers the least protection from ground disturbance and natural processes. However, there are some resources that would have little to no impact change on paleontological resources, including salable and locatable minerals.

Alternative B

This alternative would provide more surface protections than Alternatives A and D but less than C. Impacts from natural processes, ground disturbance, vandalism, and theft would be less than the impacts of Alternatives A and D but more than impacts from Alternative C. New scientifically significant discoveries could be less frequent than under Alternatives A and D but more frequent than with Alternative C. This is due to less required paleontological surveys and less surface disturbance associated with various types of surface-disturbing projects.

Alternative C

Alternative C is the most restrictive. Various aspects include making all PHMA a GRSG habitat ACEC, making all habitat a grazing exclusion area, making occupied habitat exclusion areas for new ROWs and withdrawals of habitat from mineral entry. The overall impact would be protection of paleontological resources within GRSG habitat. However, this alternative would cause the most impacts outside of GRSG habitat, as development would be pushed into these areas. Additionally, certain actions, such as forcing new roads to be constructed around a 4-mile buffer from leks and avoiding construction in occupied habitat, may cause roads to be longer, where more areas would be exposed to ground disturbance, erosion, and public impacts.

Such actions as ROW exclusions, withdrawal from mineral entry, and retention of BLM-administered and National Forest System lands are all beneficial to minimizing activity in areas of paleontological resources and keeping paleontological resources under federal protection. Potential negative impacts come from such actions as seasonally prohibiting camping and nonmotorized recreation within 4 miles of active leks, which may cause these activities, which are normally dispersed, to concentrate in other areas and potentially cause vandalism and illegal collection there.

Alternative C would restrict gains in scientific knowledge within GRSG habitat by decreasing the amount of industry development in habitat. However, this would most likely shift development and the associated potential increase in scientific knowledge outside of PHMA. Restrictions to various uses to increase or protect GRSG habitat reduce ground disturbance and the subsequent acceleration of natural processes to paleontological resources, but they may likely push these impacts on other areas.

Alternative D

Alternatives A and B have roughly comparable levels of potential adverse impacts. Implementation of Alternative D would result in comparable adverse impacts on paleontological resources, when compared to Alternatives B and C.

Proposed LUPA

Impacts from the Proposed LUPA are similar to those under Alternative D, with slightly greater protections overall for paleontological resources. This is due to additional restrictions on surface disturbance in PHMA (3 percent disturbance cap).

4.25 Social and Economic Impacts (Including Environmental Justice)

4.25.1 General Description

This section discusses social and economic impacts from proposed GRSG management actions related to other resources and resource uses. Existing social and economic conditions are described in **Section 3.24**, Social and Economic Conditions (Including Environmental Justice). This section also addresses environmental justice impacts and the differences between alternatives for the social and economic impacts identified.

4.25.2 Methodology and Assumptions

For the analysis of economic impacts, quantitative estimates are provided where sufficient data or estimates are available on the potential changes in authorized uses of federal lands under each alternative. When quantitative estimates of economic impacts were not possible, a qualitative discussion of the potential economic impacts of management actions associated with specific authorized uses is presented. Therefore, the overall economic impacts are a combination of quantitative estimates and qualitative discussion.

For quantitative estimates, IMPLAN was used to estimate impacts on outcomes, employment, and earnings in the primary study area, including those derived from the multiplier effect. The multiplier effect captures the impact of initial expenditures on subsequent rounds of expenditures derived from the initial income generated as well as the impact of initial expenditures in one sector of the economy on other inter-related sectors. This allows for a more complete picture of the economic impacts of the management alternatives in the planning area. However, the IMPLAN model is a static model, and it does not capture changes in the industrial composition of a region over time, nor does it capture dynamic effects that may be associated with processes of growth or decline, such as changes in technology or labor productivity or the feasibility of economic operations that require scale. There is, therefore, a degree of uncertainty in the estimates of impacts obtained through the IMPLAN model.

For the analysis of social impacts, two other types of impacts were considered. The first is that derived from migration induced by management actions. These impacts are induced by economic opportunities that drive population into or out of specific areas and affect population growth as well as the demand for housing and public services. The second is that associated with specific interest groups, community livelihoods, or minority and low income populations (Environmental Justice).

The following are summaries of the types of social and economic impacts and associated indicators of those impacts, from management actions related to the protection of GRSG within the study area:

- Direct economic activity dependent on BLM-administered and National Forest System land and resource management
  - Qualitative assessment of the volume of economic activity dependent on BLM-administered and National Forest System_lands and resources
  - Indirect impacts could be changes in economic activity.
- Overall employment, earnings, output, and earnings per job associated with economic activities impacted by management alternatives
  - Dollar value of output, earnings, and earnings per job; number of jobs
  - Indirect impacts would include changes in number of jobs.
- Tax revenues and payments to states and counties
  - Dollar value of tax revenues
  - Indirect impacts would include changes in tax revenues. Other (nonmarket) values

- Dollar value of consumer surplus associated with recreation activities; qualitative assessment of the "non-use" values attributable to GRSG populations and ranching activity
  - Indirect impacts would include changes in nonmarket values.
- Qualitative assessment of potential increase or decrease in population
  - Indirect impacts would include changes in population, housing, and public services
- Qualitative assessment of local availability of housing and public services
  - Indirect Impacts would include changes in availability of housing and public services.
- Consistency with county LUPs
  - Qualitative assessment of consistency with county LUPs
- Interest groups and communities of place
  - Qualitative assessment of alignment with interest group objectives and community livelihoods
- Environmental Justice
  - Disproportionately high and adverse human health and environmental impacts

Assumptions

The following list presents the basic assumptions related to social and economic impact assessment for all alternatives.

- The analysis of economic impacts of management alternatives on grazing assumes active AUMs represent an upper bound to impacts, while billed AUMs represent an estimate based on the latest available data, although the possibility of impacts outside this range is also discussed. Active AUMs measure the amount of forage from land available for grazing. Forest Service terms this measure "permitted" AUMs. Billed AUMs measure the amount of forage the BLM and Forest Service bill for annually. Forest Service uses the term "authorized" AUMs for the same concept.
- Recreational expenditures incurred by local visitors to federal lands for recreational purposes would still be spent locally if recreational resources on federal lands are no longer available. Expenditures by nonlocal visitors to federal lands are assumed to no longer be spent in the primary study area if federal lands are no longer available for recreation. Economic impacts were assumed to derive from recreation from nonlocal visitors.

- The analysis of quantitative impacts of management alternatives affecting oil and gas development on federal lands assumes that operators who are unable to drill on federal lands would not access the same oil and gas from nearby private or state lands. To the degree that a shift to private or state lands would occur, the impact estimates would be lower for restrictions on drilling and production on federal lands.
- As in other sections of this document, renewable energy development is assumed to continue to be a possibility for the primary study area in the future, and applications would be considered on a case-by-case basis.
- Alternative B and the Proposed LUPA include a 3 percent disturbance cap on PHMA, Alternative C includes a 3 percent disturbance cap on GHMA, and Alternative D includes a 5 percent disturbance cap in ecological sites that support sagebrush within PHMA. These disturbance caps are applied independent of surface ownership. If a cap is reached, economic activity on BLM-administered and National Forest System lands could be curtailed further than what is described in this section for these management alternatives.
- The Proposed LUPA would also include an adaptive management plan where additional measures could be taken to protect GRSG habitat based on triggers linked to indicators monitored by BLM. If triggered, these measures could impose additional restrictions on economic activity on BLM-administered and National Forest System lands. However, these restrictions would not generate additional socioeconomic impacts if economic activities are already limited in the areas they are applied to. For example, the disturbance cap under the Proposed LUPA would have little or no impact on activities in PHMA under the Proposed LUPA, if those activities are already limited in PHMA by other stipulations.
- Implementation of conservation measures in all resource or program areas would contribute to conservation of GRSG habitat and GRSG benefits, as qualitatively discussed in this section, and as detailed in other sections of Chapter 4.

Implementing management actions for the following resources would have negligible social or economic impacts and are therefore not discussed in detail: ACECs, wild horses, fuels management, fire operations, ESR, and habitat restoration. Effects regarding effectiveness and efficiency of implementing agency actions to achieve these objectives and resource outcomes are presented in respective resource sections within Chapter 4 and are not restated in this section to avoid redundancy.

As a landscape level planning effort, none of the alternatives prescribe project-level or site-specific activities on BLM-administered or National Forest System lands. Furthermore, the agencies' selection of an alternative does not authorize funding to any specific project or activity and does not directly tie into the agencies' budgets as appropriated annually through the federal budget process. As a consequence, agencies' costs and differences in program costs across alternatives have not been quantified. Information has been presented in several resource impact sections on the types of costs that might be associated with various GRSG conservation measures.

4.25.3 Economic Impacts

Impacts from Management Actions Affecting Grazing Allotments

Economic impacts for grazing are quantified for Alternative C and the Proposed LUPA where grazing would not be allowed in all or portions of GRSG habitat. Impacts of all alternatives are qualitatively discussed for other types of restrictions or design feature requirements that are contingent upon range conditions, disturbance caps, or other protocol for specifying when and where conservation measures are adopted.

Overall Employment, Earnings, and Output per Job Impacted by Management Alternatives

The potential impacts of grazing closures on overall employment, earnings, and output were estimated quantitatively only for Alternative C, compared to Alternative A. Alternatives A, B, and D and the Proposed LUPA would maintain GRSG habitat open for grazing, but Alternatives B and D and the Proposed LUPA would allow less flexibility for management to target increasing forage availability for livestock in GRSG habitat. Alternatives B and D and the Proposed LUPA (along with Alternative C) could carry increased restrictions on lessees' ability to construct or maintain range improvements and could restrict the lessees' ability to conduct treatments (e.g., vegetation treatments). These restrictions, as well as compliance with adaptive management, habitat objectives under the Proposed LUPA, and disturbance caps, could have implications on operator costs, as discussed below. The extent to which this would actually reduce the amount of active or billed AUMs is unclear.

For comparison of alternatives, the mid-point between Alternatives A and C is presented as an estimate of the economic impact of Alternative B and the mid-point between Alternatives A and B is presented as an estimate of the economic impact of Alternative D and the Proposed LUPA. This estimate is presented to allow addition to the impacts of other resource areas on output, employment, and earnings for comparison of alternatives, but should be understood as representing the range of potential impacts.

Estimates for one year were obtained using the IMPLAN model. Billed AUMs better reflect the economic impact than active AUMs in any given year.

However, billed AUMs fluctuate from one year to another. For this reason, estimates are presented based on the range between average billed AUMs in the 2000-2011 period and active AUMs in 2011. Further details are provided in **Appendix N**, Socioeconomics Data and Methodology. **Table 4.19** presents these estimates. Employment estimates do not include family labor and may, therefore, underestimate labor use differences among alternatives.

Table 4.19
One Year Impact of Management Actions Affecting Grazing on Output, Employment, and Earnings, Alternative C Relative to Alternative A

	Billed AUMs	Active AUMs
Primary Study Area		
Output (2011 $)	-$26,697,625	-$37,369,234
Employment	-312	-439
Earnings (2011 $)	-$9,280,265	-$12,975,900
Primary and Secondary Study Area		
Output (2011 $)	-$26,764,888	-$37,463,658
Employment	-312	-439
Earnings (2011 $)	-$9,293,863	-$12,994,971

Source: Calculated using the IMPLAN model as explained in the text and in **Appendix N**, Socioeconomics Data and Methodology

Table 4.20 presents one year impacts of management actions affecting grazing on output, employment and earnings for Alternatives B, C, D, and the Proposed Alternative, relative to Alternative A, using the mid-point of the impact estimates based on billed and active AUMs.

Table 4.20
One Year Impact of Management Actions Affecting Grazing on Output, Employment, and Earnings by Alternative Relative to Alternative A, Midpoint Between Billed and Active AUMs

	Alternative B	Alternative C	Alternative D and the Proposed LUPA
Primary Study Area			
Output (2011 $)	-$16,016,714	-$32,033,430	-$8,008,357
Employment	-188	-376	-94
Earnings (2011 $)	-$5,564,041	-$11,128,083	-$2,782,021
Primary and Secondary Study Area			
Output (2011 $)	-$16,057,136	-$32,114,273	-$8,028,568
Employment	-188	-376	-94
Earnings (2011 $)	-$5,572,208	-$11,144,417	-$2,786,104

Source: Calculated using the IMPLAN model as explained in the text and in **Appendix N**, Socioeconomics Data and Methodology
Note: A lower bound impact for Alternatives B and D and the Proposed LUPA would be zero if range condition standards happen to be met for all allotments.

As mentioned, beyond economic impacts linked to closing federal lands to livestock grazing, the estimates are intended to illustrate other costs on livestock operators, mainly under Alternatives B and D and the Proposed LUPA. These include, among others:

- Various measures could affect the efficiency of livestock operations such as restrictions in GRSG habitat on vegetation treatments, structural improvements, movement of cattle, or on supplemental winter feeding.
- To the extent determined necessary in land health assessments, some allotments may be required to change livestock rotation or season of grazing, which could also affect the efficiency of farm operations.
- For Alternatives B, C, and D, and the Proposed LUPA, in areas where disturbance caps are exceeded, there is potential for restrictions on new disturbance (e.g., roads) that could increase operation costs for livestock operators. Impacts of the Proposed LUPA could be relatively higher than Alternative D due to more-restrictive caps (3 percent for the Proposed LUPA versus 5 percent for Alternative D).

Details about impacts under each alternative are provided below.

Alternative A—Under Alternative A, federal lands with GRSG habitat would remain open for grazing. Current employment and earnings trends in the planning area would not be affected.

Alternative B—Under Alternative B, grazing on federal lands with GRSG habitat is likely to be similar to Alternative A because all GRSG habitat would be kept open for grazing. However, under Alternative B, decisions on livestock movement, range improvements, and vegetation treatments may be subject to the conservation, enhancement, or restoration of GRSG habitat, potentially reducing forage available because permittees would be required to move livestock off-range if necessary to protect GRSG. Seasonal restrictions could also be imposed, requiring that permittees move their livestock elsewhere, with added costs to their operations.

Because it is unclear the extent to which these additional constraints would reduce grazing on federal lands, **Table 4.20** presents the mid-point between Alternatives A and C as a quantitative estimate for the impact of Alternative B on grazing. This estimate is provided to allow addition to the impacts of other resource areas on output, employment, and earnings for comparison of Alternatives, but should be understood as representing the range of potential impacts (between those of A and C).

Alternative C—Under Alternative C, ADH would be closed to livestock grazing. Livestock grazing on federal lands in the primary study area would be restricted to those with no GRSG habitat. The impact of Alternative C is reflected in the estimated loss of approximately 70 percent of the output, employment, and earnings expected to be supported by grazing on federal lands. The impact of Alternative C may also be greater than estimated, if the closure of federal lands makes some grazing operations no longer viable. In addition, permittees may incur fencing costs if desiring to prevent livestock from entering public lands in ADH.

Alternative D and the Proposed LUPA—Impacts from management under Alternative D and the Proposed LUPA are estimated to be similar to Alternatives A and B in that all GRSG habitat are estimated to be open for grazing. Some restrictions on range improvements to protect GRSG habitat, or seasonal restrictions could affect the availability of forage, but to a lesser extent than Alternative B. The resulting economic activity would fall between Alternatives A and B.

Table 4.20 presents the mid-point between Alternatives A and B as a quantitative estimate for the impact of Alternative D and the Proposed LUPA on grazing. As in the case of the estimate presented for Alternative B, this estimate is provided to allow addition to the impacts of other resource areas on output, employment, and earnings for comparison of alternatives, and should be understood as representing the range of potential impacts (between those of A and B).

Not shown in the impacts described above for Alternatives B, C, and D and the Proposed LUPA, are the potential impacts on grazing on private or state lands. Restrictions on grazing on public lands within GRSG habitat can sometimes have additional impacts on grazing by limiting access to adjacent private and public lands with no GRSG habitat.

Under Alternatives B, C, and D and the Proposed LUPA, the impact could be larger if livestock operators have no reasonable alternative to seasonal grazing on public lands. Livestock grazing on federal lands often occurs during the spring and summer seasons, with other feeding alternatives (hay) being used during fall and winter. If there are no grazing alternatives to federal lands during spring and summer, operators may need to reduce their operations and the resulting loss of output, jobs and earnings would be larger than currently estimated.

Torell et al. (2014) provide estimates of the potential impacts on model ranches in Idaho, Nevada, Oregon, and Wyoming of seasonal closures of federal lands for livestock grazing. The estimates are based on an economic model that assumes operators respond to the loss of availability of federal lands for grazing in several ways to maximize their profits (gross margins), including reducing the size of their operations. In this case, the socioeconomic impacts of closures of federal lands to grazing are larger than the estimates based only on the loss of

spring and summer AUMs. Although an estimate is not available for a typical livestock operation in Colorado, estimates for other states suggest the loss of AUMs may be just slightly larger than currently estimated in cases where only a small share of federal lands are closed to grazing, or may be several times larger in cases where livestock operators find it in their best interest to close operations. This may be more likely the case for smaller operations.

Under Alternatives B, C, and D and the Proposed LUPA, the impact may also be less than estimated. Billed AUMs can vary greatly as a share of active AUMs from one management area to another and from one year to another. Given the difference between active and billed AUMs, livestock operators may be able to absorb some of the loss in active AUMs by billing a greater proportion of the active AUMs remaining. This is less likely the case on National Forests than on BLM lands, because allotments on National Forests tend to have billed AUMs closer to active AUMs.

Table 3.88 shows that Jackson and Routt Counties have over 35 percent of their land area in farms. Moffat County has over 27 percent. In Jackson County, farm earnings are over 25 percent of total earnings, with over 72 percent of cash receipts being from livestock. Moffat County has almost 3 percent of its total earnings from farms and Grand County over 1 percent. **Figure 1.1** (**Appendix A**) shows how GRSG habitat covers considerable parts of these counties. Restrictions to grazing on public lands would likely affect these counties the most, particularly Jackson County.

Other Values Associated with Livestock Grazing

As described in **Chapter 3**, public land managed for livestock grazing provides both market values and nonmarket values; the latter include open space and western ranch scenery, which provide value to some residents and outside visitors, and ranches may also provide some value to the non-using public (e.g., the cultural icon of the American cowboy). Some residents and visitors also perceive nonmarket opportunity costs associated with livestock grazing; in addition, some of the lifestyle value of ranching is likely to be captured in markets (e.g., property values of ranches next to public lands).

The "Other Values" section in **Section 3.24**, Social and Economic Conditions (Including Environmental Justice), and **Appendix N**, Socioeconomics Data and Methodology, provide additional discussion of these values. Overall, the process for incorporating potential nonmarket values associated with the management of public land for livestock grazing into analyses of net public benefits remains uncertain, and the BLM and Forest Service did not attempt to quantify these values for the present study.

However, to the degree that there are net benefits associated with nonmarket values attached to livestock grazing and ranching, these would be similar in Alternatives A, B, and D and the Proposed LUPA as all of these alternatives are likely to result in similar levels of livestock grazing operations in the study area.

If the net nonmarket value associated with livestock grazing and ranching is positive, then that value would be lower under Alternative C, in line with the market impacts discussed immediately above.

Alternative A—Under Alternative A, the economic viability of livestock grazing and ranching activities would continue on current trends. To the degree that there is a positive net nonmarket value associated with livestock grazing and ranching, and to the extent that economic viability is critical for keeping the lands in ranching, those values would be greatest in Alternative A, and would be preserved in accordance with current trends.

Alternative B—Under Alternative B, grazing on federal lands with GRSG habitat is likely to be similar to Alternative A because all GRSG habitat would be kept open for grazing. However, management under Alternative B may affect forage availability supporting grazing on federal lands, which may adversely affect ranching activity. This could, in turn, result in impacts on any nonmarket values associated with keeping lands in ranching.

Alternative C—Management under Alternative C would result in the greatest impacts on the economic viability of livestock grazing in the study area. As a result, it would have the greatest impacts on nonmarket values associated with livestock grazing and ranching.

Alternative D and the Proposed LUPA—Management under Alternative D and the Proposed LUPA would have impacts on nonmarket values associated with livestock grazing that are similar to Alternatives A and B.

Impacts from Management Actions Affecting Recreation

Overall Employment, Earnings, Output, and Earnings per Job Impacted by Management Alternatives

As discussed in **Chapter 3**, service related sectors, including many typically linked to recreational activities such as the accommodation and food services industry, are important sources of employment and earnings throughout the primary study area. Management actions under the various alternatives may impact recreational activities with consequences for employment and earnings. The potential impacts of management alternatives affecting recreation on overall employment, earnings, and output were estimated quantitatively using IMPLAN.

Input on the potential impact of management actions on recreation activities was obtained from BLM and Forest Service recreation specialists. In addition, visits were estimated separately for local and nonlocal visits (see **Appendix N** for details).

Only nonlocal visits are considered in the quantitative impact estimates presented below. As explained in the assumptions previously listed, local

recreational expenditures would be spent locally regardless of the availability of federal lands for recreational purposes. Results are presented in **Table 4.21**.

Table 4.21
Average Annual Impact of Management Actions Affecting Recreation on Output, Employment, and Earnings by Alternative, Relative to Alternative A

	Alternative B	Alternative C	Alternative D and Proposed LUPA
Primary Study Area			
Output (2011 $)	-$7,061,086	-$15,378,049	-$8,651,18
Employment	-61	-134	-7
Earnings (2011 $)	-$2,134,373	-$4,655,666	-$259,344
Primary and Secondary Study Area			
Output (2011 $)	-$7,094,061	-$17,321,842	-$8,716,60
Employment	-62	-134	-8
Earnings (2011 $)	-$2,144,126	-$4,674,174	-$261,346

Source: Calculated using the IMPLAN model, as explained in the text and in **Appendix N**, Socioeconomics Data and Methodology

Restrictions on recreation activities imposed under Alternatives B, C, and D and the Proposed LUPA could limit permitted activities and motorized recreation activities, they would also favor recreation activities requiring less disturbed and more primitive or natural settings. This was one of the considerations made by the BLM and Forest Service recreation experts in considering the potential impacts of management alternatives on individual recreation sites (see **Appendix N** for details).

This is likely at least part of the reason why the economic impact of management alternatives through effects on recreation activities is expected to remain very similar regardless of alternative. In addition to the volume of recreation, the type of recreation also affects the local economic impact. In particular, overnight recreation visits tend to support more local spending and consequently support greater local job creation and earnings.

As noted in the recreation section, permits or authorizations that are in or near PHMA could be terminated or modified. That section describes SRPs and SUAs within PHMA, GHMA, and LCHMA that could be affected by these changes and the types of modifications that could occur.

Although specific permit modifications are not prescribed at the EIS level, potential adverse economic impacts could include loss of commercial revenue to recreation service providers and loss of permit-generated fee revenue for the managing agencies. Beneficial impacts could include reductions in user conflicts between different recreation users (either other permittees or the general public), and enhanced opportunities for GRSG-compatible recreation activities.

Alternative A—Under current management, Alternative A, fewer restrictions would be placed on permitted recreation activities than under Alternatives B, C, or D or the Proposed LUPA. Almost all economic impacts of recreational activities in the primary study area are estimated to be felt in the primary study itself, with little additional impact on the secondary study area. Alternative A would have the fewest impacts on business and agency revenue attributable to SRPs and SUAs, as it would result in no changes to current management.

Alternative B—Under Alternatives B and D and the Proposed LUPA, recreation would support more output, employment, and earnings than Alternative C, but less than Alternative A. Alternative B, along with Alternative C, would have the greatest impacts on business and agency revenue attributable to SRPs and SUAs, as it would have the most potential for modifying permit or authorization management. However, beneficial impacts could arise from enhanced opportunities for GRSG-compatible recreation activities.

Alternative C—Because the fewest areas available for surface-disturbing activities would be allowed under Alternative C relative to the other alternatives considered, this alternative imposes the most constraints on recreational opportunities and corresponding generation of employment and earnings. Annual jobs supported by recreation on federal lands are estimated to be approximately 134 less than under Alternative A. Alternative C, along with Alternative B, would have the greatest impacts on business and agency revenue attributable to SRPs and SUAs, as it would have the most potential for modifying permit and authorization management. However, beneficial impacts could arise from enhanced opportunities for GRSG-compatible recreation activities.

Alternative D and the Proposed LUPA—Because restrictions to recreation under Alternative D and the Proposed LUPA are the least after Alternative A, recreation-related employment and income generation would be higher but still similar to Alternatives B and C. Alternative D and the Proposed LUPA would have more impacts on business and agency revenue attributable to SRPs and SUAs than Alternative A, but not as much as Alternatives B or C. Some beneficial impacts could arise from enhanced opportunities for GRSG-compatible recreation activities.

Other Values Associated with Recreation

As described in **Chapter 3**, only a portion of the value of recreation on public lands is captured in the marketplace. Here, the concept of consumer surplus is used to measure the "nonmarket" portion of recreation value. As noted in **Chapter 3** and **Appendix N**, Socioeconomics Data and Methodology, these nonmarket values are not directly comparable to output, earnings, or jobs associated with various resource uses on BLM-administered and National Forest System lands, which are described elsewhere in this section (see **Appendix N** for more information on the distinction).

Whereas the analysis of recreation expenditures focuses on recreation activity of people who do not live within the planning area, the analysis of nonmarket values associated with recreation includes the activity of all people who recreate on the public lands regardless of whether they live within the planning area. This is another distinction between the analysis of expenditures and the analysis of nonmarket values; the nonmarket analysis applies to all recreation activity, whether or not it represents additional income to the regional economy.

The relative magnitude and direction of the results for the analysis of nonmarket recreation values are similar to that for recreation expenditures: current management, Alternative A, would result in the largest positive impact, while management under Alternative C would result in the largest decreases. However, the difference among the alternatives would be relatively small because of the offsetting effects of the restrictions to recreational activities imposed under Alternatives B, C, and D and the Proposed LUPA (potential benefits for certain kinds of recreational activities), described above. The changes in consumer surplus are calculated based on forecasted changes in recreation activities (differing by alternative), using the same methodology as described above and in **Appendix N** for impacts on employment, earnings, output, and earnings per job.

Alternative A—Recreation under Alternative A would be less subject to potential restrictions on permitted recreational activities than under Alternatives B, C, and D and the Proposed LUPA. Under Alternative A, recreation on federal lands is estimated to contribute an annual average consumer surplus value of about $219.1 million. As noted in **Chapter 3**, the current estimated nonmarket value of recreation on federal lands is about $193.8 million; the increase is in large part due to increasing population and resulting increases in recreational use.

Alternative B—Under Alternatives B and D and the Proposed LUPA, recreation would support more consumer surplus value than Alternative C, but less than Alternative A. Recreation on federal lands in Alternative B is estimated to contribute an annual average consumer surplus value of about $2.1 million less than under Alternative A.

Alternative C—As noted above, management under Alternative C would impose the most constraints on surface-disturbing activities and therefore would have the greatest potential impacts on certain kinds of recreation activity. Overall net impacts would still be somewhat similar to other alternatives. Recreation on federal lands under Alternative C is estimated to contribute an annual average consumer surplus value of about $4.5 million less than under Alternative A.

Alternative D and the Proposed LUPA—Under Alternative D and the Proposed LUPA, recreation would support more consumer surplus value than Alternative C and only slightly less than Alternative A. Recreation on federal lands in

Alternative D is estimated to contribute an annual average consumer surplus value of about $300,000 less than under Alternative A.

Impacts from Management of Oil and Gas Leases

Overall Employment, Earnings, Output, and Earnings per Job Impacted by Management Alternatives

The potential impacts of management alternatives affecting oil and gas drilling, completion, and production on overall employment, earnings, and output were estimated quantitatively using the IMPLAN model. In doing so, only new wells projected for a future 20-year horizon were considered and only the impact of leasing closures and NSO stipulations associated with federal minerals were taken into account. Additional potential impacts on oil and gas development are discussed qualitatively further below. Existing wells would not be impacted by GRSG habitat management alternatives.

Projections were made for two scenarios, a low drilling scenario and a high drilling scenario. The high drilling scenario is based on each BLM field office's current RFDS. The low drilling scenario adjusts RFDS expectations to current available information on drilling (see **Appendix N** for more details). Results are presented in **Table 4.22**.

In addition to the impact of closures of areas to fluid mineral development and of NSO stipulations, various measures affecting travel and investments in new ROWs could influence fluid minerals development in the planning area, if they make new or existing leases less accessible or increase costs of drilling and operations. These measures could particularly affect oil and gas development under Alternatives B and D and the Proposed LUPA and include the following:

- Stipulations that exclude or avoid new roads, new utility ROWs or other disturbance in PHMA or ADH, could reduce access or increase the cost of drilling and operating wells in new or existing leases.
- Stipulations that limit realignment or upgrades of roads or impose seasonal travel restrictions in PHMA or ADH could also affect the cost of drilling and operating wells in new and existing leases.
- To the extent that mandatory BMPs surpass what is applied under current practice, they could increase the cost and decrease the efficiency of oil and gas projects potentially affecting overall oil and gas development. Examples include restrictions on location of facilities or utilities, burying of electric distribution lines, noise limits or increased reclamation requirements.
- The 3 percent and 5 percent disturbance cap have the potential to limit access to new leases or increase the costs of individual projects.

Table 4.22
Average Annual Impact of Management Actions Affecting Oil and Gas on Output, Employment, and Earnings by Alternative, Relative to Alternative A

	Alternative B	Alternative C	Alternative D	Proposed LUPA
Low Scenario				
Primary Study Area				
Output (2011 $)	-$341,261,365	-$429,182,043	-$170,630,683	-$240,508,051
Employment	-925	-1,114	-463	-671
Earnings (2011 $)	-$50,981,363	-$61,259,788	-$25,490,682	-$36,991,775
Primary and Secondary Study Area				
Output (2011 $)	-$342,183,371	-$430,320,640	-$171,091,685	-$241,165,634
Employment	-931	-1,121	-465	-674
Earnings (2011 $)	-$51,226,524	-$61,561,993	-$25,613,262	-$37,166,829
High Scenario				
Primary Study Area				
Output (2011 $)	-$1,030,994,405	-$2,954,925,379	-$515,497,203	-$582,414,206
Employment	-2,941	-8,601	-1,470	-1,670
Earnings (2011 $)	-$162,565,877	-$475,653,653	-$81,282,939	-$92,330,502
Primary and Secondary Study Area				
Output (2011 $)	-$1,033,842,097	-$2,963,159,040	-$516,921,048	-$584,026,546
Employment	-2,958	-8,651	-1,479	-1,680
Earnings (2011 $)	-$163,324,730	-$477,849,553	-$81,662,365	-$92,760,250

Source: Calculated using the IMPLAN model as explained in the text and in **Appendix N**, Socioeconomics Data and Methodology
N/A: not applicable, as described in the text

Detailed descriptions of the potential impacts of management alternatives follow below.

Alternative A—Under Alternative A, restrictions on leasing and development would continue to be imposed to protect sensitive habitats, including that of the GRSG. Compared with Alternatives B, C, and D and the Proposed LUPA; however, these restrictions would result in the highest level of oil and gas related output, employment, and earnings.

Alternative B—Alternative B would no longer permit drilling and oil and gas production in GRSG PHMA. The extent of the impact of Alternative B depends somewhat on the extent to which oil and gas production would increase in private and state-owned minerals in response to the restrictions on federal minerals. Oil and gas production on federal minerals is estimated to support between 925 and 2,941 less annual jobs than under Alternative A. In addition, restrictions on the construction of access roads and other ROWs in PHMA and other restriction on surface disturbance, could increase costs of oil and gas activities through the need to realign roads and through overall increased costs of construction and operations. Specific impacts on leasing and development of currently unleased minerals cannot be estimated without project-specific

information on the size and configuration of such leases in relation to adjacent federal or private lands and existing or feasible new access routes. A 3 percent disturbance cap applied to PHMA could further limit future fluid minerals development.

Alternative C—Management under Alternative C would have the most economic impacts through restriction on oil and gas drilling and production. Oil and gas production on federal lands is estimated to support between 1,114 and 8,601 less annual jobs than under Alternative A. In addition, restrictions on the construction of access roads in ADH, and other ROWs, and restriction on surface disturbance, could create increased costs to oil and gas activities through realignments of roads and increased costs of construction and operations. Because these restrictions would apply to a larger area than under Alternative B, they would be more likely to burden oil and gas development projects and more likely to affect oil and gas development. In addition, under Alternative C, the 3 percent disturbance cap is applied to ADH, potentially having a greater impact on fluid minerals development than the cap applied under Alternative B.

Alternative D—This alternative would include an NSO stipulation on PHMA. The impact of management under this alternative would depend on the extent to which horizontal drilling could be used to reach the same oil reserves. If operators are able to access oil reserves using horizontal drilling, impacts would resemble those from Alternative A. If operators are unable to reach oil reserves using horizontal drilling, the economic impacts of Alternative D would resemble those of Alternative B.

To assess the extent to which federal minerals would remain accessible in PHMA under a NSO stipulation would require project specific knowledge, including the location and size of specific leases and their spatial relationship to other leases, intersection of any new utility and road corridors with existing ones and the location of GRSG leks and other critical habitats that facilities would be required to avoid, as well as the potential downhole geology of a specific lease in relation to the potential number of wells reachable from a single well pad. Even if accessible, development of federal minerals could be no longer viable depending on the extent to which the NSO stipulation adds costs to their development.

To allow comparison between alternatives of output, employment, and earnings affected by management of various resources, **Table 4.22** presents a quantitative estimate for Alternative D that is the mid-range between Alternatives A and B for the high drilling scenario, and adjusted based on current information for the low drilling scenario.

Additional costs for fluid mineral development, when compared to Alternative A, could derive from restrictions on access roads, other ROWs, and travel in PHMA. These restrictions would be generally less than under Alternatives B and

C. Alternative D would impose a 5 percent disturbance cap, applied only to ecological sites that support sagebrush within PHMA.

Proposed LUPA—PHMA would be under a NSO stipulation, as under Alternative D. In addition, areas within one mile of active leks would be closed to fluid mineral development and both PHMA and GHMA would be managed as avoidance for new access roads and other ROW development.

The expected economic impact would be slightly greater than that of Alternative D due to the added closures to fluid mineral development. Similar to Alternative D, project specific knowledge would be required to assess the extent of the impact of these added restrictions to fluid mineral development.

For this analysis, a quantitative estimate was provided based on that for Alternative D, with added impacts from the closure of areas within one mile of active leks. The result is adverse impacts slightly larger than those under Alternative D. The Proposed LUPA would also have a disturbance cap slightly more restrictive than under Alternative D, a 3 percent cap applied to PHMA.

The economic impact of decreases in oil and gas production in the primary study area under Alternatives B, C, and D and the Proposed LUPA are likely to be principally felt in the oil and gas producing areas and where workers and service providers reside. Garfield and Rio Blanco Counties are the main oil and gas producing counties in the primary study area, with commuters often residing in Moffat, Mesa, and Eagle Counties.

Impacts from Management of Other Minerals

Direct Economic Activity Dependent on BLM-administered and National Forest System Land and Resource Management

As described in **Chapter 3**, the primary study area produces coal and several salable and locatable minerals, including sodium, limestone, gypsum, and sand and gravel. GRSG habitat management alternatives would impose restrictions on development of mineral production, particularly under Alternatives B and C, where PHMA would be excluded from mineral development.

These restrictions would hamper employment generation that depends on these economic activities and on the overall level of economic activity derived from mining. Unfortunately, there is not enough information on the potential for mineral production throughout the primary study area to quantify the potential economic impacts of restrictions imposed by management alternatives.

Acreages for mineral exclusion or avoidance are reported in the various mining impacts sections (leasable, salable, and locatable). Some useful information on current production includes the following:

- Current gypsum production in Eagle County would not intersect with PHMA or ADH.
- Current coal and sodium production in the WRFO planning area would not intersect with PHMA or ADH.
- Current limestone production in the LSFO and CRVFO planning areas would not intersect with PHMA or ADH.
- Current sand and gravel production would not intersect with PHMA or ADH, with the exceptions of areas in the KFO that would intersect with PHMA and areas in the LSFO that would intersect mostly with ADH.
- Current coal production in the LSFO planning area would intersect with ADH.

The potential economic impact of management alternatives that affect mineral production is discussed qualitatively below.

Alternative A—Current management imposes the fewest restrictions on mineral production, and economic benefits associated with mining activities would continue current trends.

Alternative B—Alternative B would exclude PHMA from mineral production and avoid production on all other GRSG habitat. Economic impacts would depend on the extent to which future mineral production would otherwise occur in areas that intersect with GRSG habitat. Based on current sand and gravel production in the KFO planning area, withdrawal of acreage for mineral development in the planning area could restrict the development of sand and gravel. Travel management restrictions in PHMA could generate additional costs to mining activities.

Alternative C—Under Alternative C, PHMA would also be excluded from mineral development, resulting in similar economic impacts to Alternative B. Additional impacts could occur due to additional travel restrictions in ADH.

Alternative D—Under Alternative D, mineral development would be more restricted than Alternative A due to disturbance caps and increased costs of mitigation, such as seasonal restrictions and project design features. The disturbance cap under Alternative D would be 5 percent in ecological sites that support sagebrush within PHMA.

Proposed LUPA—Management of locatable minerals would be similar to Alternative D, except the disturbance cap would be 3 percent applied to PHMA. This would increase the likelihood of future restrictions to mineral development in PHMA when compared to Alternative D. Under the Proposed LUPA, management of salable and nonenergy leasable minerals would be similar to Alternative B. Overall, the Proposed LUPA would impose greater restrictions to

future growth of local employment and earnings than Alternatives A and D, but less than Alternatives B and C.

Impacts from Management Actions Affecting Land and Realty and Travel Management

Direct Economic Activity Dependent on BLM-administered and National Forest System Land and Resource Management

Management actions that affect development of infrastructure could have important hindering effects on the growth of economic activity in the area. Limitations on new ROWs for power lines, pipelines, and access routes or restrictions to route construction and to travel on existing roads could increase the cost of new economic investments or make them no longer economically viable. Additional information about changes in cost effectiveness and efficiency associated with restrictions on ROW, corridors, and treatments are discussed in the Land and Realty, as well as the Vegetation sections in **Chapter 4**. A qualitative discussion of the potential for economic impacts from restrictions to land use and transportation is provided below for each alternative.

Alternative A—Current management, Alternative A, places the fewest restrictions on ROW development and route construction and has the largest area open to travel.

Alternative B—Under Alternative B, new ROWs would be excluded or avoided in 95 percent of GRSG habitat. Motorized travel would be limited in PHMA and routes constructed in excess of a 3 percent disturbance cap would face increased costs with mitigation resulting from the loss of habitat. Alternative B would impose limitations and added costs to future economic investments in the primary study area compared with Alternative A.

Alternative C—Management under Alternative C would have similar impacts to Alternative B, with added restrictions: 100 percent of GRSG habitat would face ROW restrictions and route construction would require a 4-mile buffer from leks in ADH. Alternative C would impose the most limitations and added costs to future economic investments in the primary study area.

Alternative D—ROW development under Alternative D would also face restrictions, but these would be more limited than under Alternatives B and C, affecting approximately 53 percent of GRSG habitat. Route construction would face similar restrictions as Alternative B, but the increased cost of mitigation resulting from habitat loss would only be required for routes constructed in excess of a 5 percent disturbance cap applied to ecological sites that support sagebrush within PHMA. Restriction and costs to infrastructure development under Alternative D would be greater than under Alternative A but less than under Alternatives B or C.

Proposed LUPA—ADH would be managed as avoidance for ROW development. Additionally, no above-ground structures would be authorized within one mile of active leks. ROWs constructed in excess of a 3 percent disturbance cap applied to PHMA, would face increased costs with mitigation resulting from the loss of habitat. The Proposed LUPA would have a greater impact on the lands and realty program than Alternatives A and D, but less than Alternatives B and C. Travel management would be similar to Alternative D. Overall, the Proposed LUPA would impose limitations and added costs to future economic investments in the primary study area, when compared to current management and would impose greater restrictions to future growth of local employment and earnings than Alternatives A and D, but less than Alternatives B and C.

Members of the public who commented to the northwest Colorado GRSG Draft LUPA/EIS were concerned about the impacts of increased cost of construction of transmission lines on energy rate payers. Unit cost information for constructing transmission lines provides context for potential impacts to relocating or rerouting a transmission line.

A 2012 WECC study provides information on transmission line costs per mile, ranging from $927,000 to $2,967,000, depending on voltage and whether lines are single or double circuit. The same study provides cost multipliers for difficult terrains, reaching up to 2.25 in the case of forested lands (Western Electricity Coordinating Council 2012). According to the Energy Information Administration, transmission costs account for approximately 11 percent of the cost of energy bills, with the remaining being formed by power generation and distribution (Energy Information Administration 2013). Because utility providers allocate costs on to their rate base, per customer rate impacts would be greater where the ratepayer base is smaller. Areas with smaller, local utility providers with fewer ratepayers would be required to absorb a greater proportion of the costs of relocation or rerouting compared to areas serviced by larger, multi-state providers.

Impacts from Management Actions Affecting Special Status Species

Other Values Associated with Populations of GRSG

As described in **Chapter 3**, economists and policy makers have long recognized that rare, threatened, and endangered species have economic values beyond those associated with active "use" through viewing or hunting. **Chapter 3** and **Appendix N** document current methods to estimate these non-use values, including a description of the literature review that the BLM and Forest Service conducted to determine if there were existing non-use value studies for GRSG.

Although there are no existing studies on valuation specific to the GRSG, several studies published in peer-reviewed scientific journals for bird species with similar characteristics find average stated willingness-to-pay between $15

and $58 per household per year in order to restore a self-sustaining population or prevent regional extinction (see **Appendix N** for details). These values represent a mix of use and non-use values, but the non-use components of value are likely to be the majority share since the studies primarily address species that are not hunted.

Since GRSG protection is a public good available to all households throughout the intermountain west, if similar per-household values apply and if even a small portion of the per-household value represents a non-use value, then the aggregate regional non-use value could be substantial. However, the BLM and Forest Service did not quantify the aggregate value because of several factors, including uncertainty associated with the comparability of the existing studies to the GRSG context and the documented difference between stated and actual willingness-to-pay.

From a qualitative perspective, however, the non-use values associated with populations of GRSG would correspond to the degree of habitat protection associated with each alternative. The potential impacts associated with each alternative are documented immediately below.

Alternative A—Current management, Alternative A, provides the least amount of protection for GRSG in the planning area and consequently could result in the most impacts on GRSG. As a result, to the degree that there are non-use values associated with populations of GRSG, management under Alternative A would have the greatest adverse impacts on those values.

Alternative B—Management under Alternative B provides a greater level of protection for GRSG than Alternative A but would provide a lower level of protection than Alternative C. To the degree that there are non-use values associated with populations of GRSG, management under Alternative B would result in fewer adverse impacts on those values than Alternative A but more than in Alternative C.

Alternative C—Management under Alternative C would provide the most protection for GRSG. As a result, to the degree that there are non-use values associated with populations of GRSG, management under Alternative C would have the least adverse impacts (or the most beneficial impacts) on those values.

Alternative D and the Proposed LUPA—Management under Alternative D and the Proposed LUPA would provide more protection for GRSG than Alternative A but less protection than Alternatives B and C. To the degree that there are non-use values associated with populations of GRSG, management under Alternative D and the Proposed LUPA would have greater adverse impacts on those values than Alternatives B or C, but fewer adverse impacts than Alternative A.

The Proposed LUPA provides mechanisms that could improve the effectiveness of GRSG habitat protection or restoration efforts (e.g., 3 percent disturbance cap, adaptive management protocol, and triggers for prioritizing treatments) that could increase the effectiveness of GRSG habitat protection and restoration efforts, relative to other action alternatives. The suite of mechanisms under the Proposed LUPA would improve capability to focus conservation measures, design features, and restorative treatments in locations and land uses that achieve greater incremental GRSG conservation (and nonmarket) benefits in a more timely and effective manner than under Alternative D.

Impacts on Tax Revenues and Payments to States and Counties

County fiscal revenues in the primary study area are described in **Chapter 3**. They include tax revenues, intergovernmental transfers (including payments in lieu of taxes), charges for services, licenses and permits, and investment earnings. The largest impact of management alternatives on county fiscal revenues would be through taxes paid by the oil and gas sector.

Table 4.23 estimates federal royalties and state severance taxes paid by the oil and gas sector under each management alternative for the low and high drilling scenarios. Oil and gas production was assumed valued at 87.5 percent of its market price (Colorado Oil and Gas Association 2011). State severance tax rates depend on production value but are 5 percent for production valued over $300,000 (Colorado Oil and Gas Association 2011). **Appendix N** shows the calculation details.

Table 4.23
Average Annual Federal Royalty and State Severance Taxes on Oil and Gas by Alternative, Relative to Alternative A, 2011$ thousands

	Alternative B	Alternative C	Alternative D	Proposed LUPA
		Low Scenario		
Federal Royalties	-$23,082	-$29,892	-$20,366	-$24,646
State Severance Tax	-$9,233	-$11,957	-$8,146	-$9,858
Total	-$32,315	-$41,849	-$28,513	-$34,504
		High Scenario		
Federal Royalties	-$67,149	-$189,515	-$33,574	-$37,783
State Severance Tax	-$26,859	-$75,806	-$13,430	-$15,113
Total	-$94,008	-$265,321	-$47,004	-$52,896

Source: Calculated using the IMPLAN model as explained in the text and in **Appendix N**, Socioeconomics Data and Methodology
N/A: not applicable, as described in the text

As discussed in **Chapter 3**, 50 percent of federal leases from mineral revenues are distributed to the States, which in turn distribute 50 percent of what they receive to the counties of origin, with the rest going to the state school fund, the Department of Local Affairs and the Water Conservations Board.

Differences in distribution of federal royalties to counties among alternatives are partially reduced by payments in lieu of taxes that, according to the payments in lieu of taxes rule, are reduced by amounts received the previous fiscal year from several federal payments, including mineral federal royalties (31 USC Chapter 69). Fifty percent of state severance taxes are also distributed to counties, with 30 percent of that amount (15 percent of total) distributed directly to those counties impacted by mineral production (Department of Local Affairs 2012).

Other than fiscal revenues from federal royalties and state severance taxes, other revenue sources such as real property taxes, municipal sales and use taxes, revenues from leases and fees, whether through mining, recreation or grazing activities, would all tend to decrease with the lesser economic activity expected in the study area under Alternatives B, C, and D and the Proposed LUPA when compared to Alternative A, with the least revenues expected under Alternative C.

The decrease in fiscal revenues under Alternatives B, C, and D and the Proposed LUPA would likely affect those counties heavily reliant on oil and gas related revenues. As previously noted, Garfield and Rio Blanco Counties are the main oil and gas producing counties in the primary study area, with commuters often residing in Moffat, Mesa, and Eagle Counties.

In 2010, Garfield and Rio Blanco Counties received between 25 and 39 percent of their revenues from inter-governmental transfers, including federal royalties and state severance taxes (**Table 3.94**). Most of their revenues were from taxes, of which between 63 and 88 percent were property taxes, including property taxes associated with oil and gas development (**Table 3.95**). Restrictions to oil and gas development in these counties would have considerable impacts on their fiscal revenues. The impact would also be felt by counties linked to those dependent on oil and gas development through workers who may reside or work in those counties and earn or spend their income in those counties. In addition to county governments, other taxing districts such as schools and fire districts would be affected.

Alternative A—Under Alternative A, average annual federal royalty and state severance tax collections on oil and gas are estimated to be highest with just over 70 percent being federal royalties. Other fiscal revenues are also estimated to be highest under Alternative A.

Alternative B—Under Alternative B, average annual federal royalty and state severance tax collections on oil and gas are estimated to be approximately 89 percent of their levels under Alternative A. Other fiscal revenues would be lower than under Alternative A.

Alternative C—Under Alternative C, average annual federal royalty and state severance tax collections on oil and gas are estimated to be approximately 69

percent of their levels under Alternative A. Other fiscal revenues would likely also be lowest under Alternative C.

Alternative D—Quantitative estimates for average annual federal royalty and state severance tax collections on oil and gas under Alternative D would fall between those described for Alternatives A and B. To allow comparison between alternatives of output, employment and earnings affected by management of various resources, **Table 4.23** presents a quantitative estimate for Alternative D that is the mid-range between Alternatives A and B. Other fiscal revenues under Alternative D would likely be less than under Alternative A, but greater than fiscal revenues under Alternatives B or C.

Proposed LUPA—Quantitative estimates for average annual federal royalty and state severance tax collections on oil and gas would be slightly less than under Alternative D.

4.25.4 Social Impacts

Impacts from Management Actions Affecting Migration

Population

As previously discussed, the extent to which estimated job and income impacts would in fact happen depends on the extent to which oil and gas exploration would move from federal to private or state surface lands. Oil and gas drives approximately 94 percent of the employment impacts of management alternatives in the quantitative analysis conducted here. The decrease in employment opportunities in the primary study area that would accompany the action alternatives (B, C, and D and the Proposed LUPA) may impact the capacity of the primary study area to attract and retain its labor force, with possible consequences for population growth.

Specific counties and communities most likely affected would be those linked to oil and gas production. As previously discussed, the counties in the primary study area strongly linked to oil and gas production include Garfield and Rio Blanco Counties, as well as the adjacent counties of Moffat, Mesa, and Eagle. As shown in **Chapter 3**, Eagle County was the fastest growing county in the primary study area during the decade 2000 to 2010, Garfield County being the second.

Communities not linked to oil and gas production might also be affected by Alternative C if highly dependent on affected economic activities and surrounded by GRSG habitat. Walden, the county seat of Jackson County, is an example. Jackson County is the only county in the primary study area that faced a population decrease in the decade 2000 to 2010.

Alternative A—Under Alternative A, current management of GRSG habitat would continue and trends in population growth would not be affected by

changes in management of GRSG habitat. Compared with Alternatives B, C and D, this alternative has the lowest potential for impacts on population growth.

Alternative B—The potential for impacts on population trends from Alternative B is greater than Alternative A but less than Alternatives C and D and the Proposed LUPA. Because population impacts would be mostly driven by impacts on employment opportunities and those in the oil and gas sector would be the most impacted by management under Alternative B, the population impacts of Alternative B depend largely on the extent to which oil and gas production would grow on private and state-owned surface in response to the restrictions on federal surface and sub-surface. Increased oil and gas exploration on private and state lands would result in fewer impacts of Alternative B on population trends because fewer impacts on employment opportunities in the primary study area would be expected.

Alternative C—Management under Alternative C has the greatest potential for impacts on population growth among the alternatives considered. The impacts would be largest in those counties and communities most reliant on oil and gas employment opportunities for income. However, some communities highly dependent on cattle ranching could also be affected if highly dependent on GRSG habitat on public lands for grazing.

Alternative D—The impacts of Alternative D on population trends would fall between those described under Alternatives A and B. Similar to Alternative B, impacts on population are dependent on the extent to which oil and gas production on state and private surface compensate for a decline in federal production. In addition, as noted in the Economics section, if horizontal drilling results in better access to minerals under federal surface, this could also result in fewer impacts from Alternative D.

Proposed LUPA—The impact of the Proposed LUPA on population trends would be similar to those of Alternative D, with slightly greater potential for impacts, mainly due to closure of fluid minerals leasing of areas within one mile of active leks.

Housing and Public Services

Alternative A—Current management, Alternative A, may have the most impacts on population growth and, therefore, on the demand for housing and public services. Because this alternative would be a continuation of current management, no change in population growth in the study area would be expected and there would be no change in trends in demand for housing and public services that could not be serviced by local communities.

Alternative B—Management under Alternative B would be less favorable for economic and population growth than Alternative A. To the extent that Alternative B imposes restrictions on economic activities central to the generation of income of specific communities, the decrease in the capacity of

these communities to retain their current population could lead to hindering impacts on housing development.

Alternative C—Management under Alternative C would have similar impacts to Alternative B, but restrictions on population growth would be greater, and potential hindering impacts on housing development in some local communities would be more likely.

Alternative D—Impacts under Alternative D would be less than under Alternatives B and C, but more restrictive of population growth and demand for housing and public services than Alternative A.

Proposed LUPA—Impacts would be similar to those under Alternative D.

Impacts from Management Actions Affecting Specific Groups and Communities

Consistency with County Land Use Plans

The decision under consideration may result in amended BLM and Forest Service management and LUPs throughout northwest Colorado. The BLM and Forest Service management and LUPs must be consistent with state and local LUPs to the extent possible, and any amendments to be made would aim to maintain this consistency. This would be the case under all alternatives.

Interest Groups and Communities of Place

As described in **Chapter 3**, there is a range of interest groups in the primary study area with overlapping and divergent interests. Groups centered on recreation interests, grazing, mining, land development, infrastructure development, business development, and conservation of natural resources would be impacted differently by the management alternatives. Within these interest groups, there are more specific ones that could be particularly affected. Among the interest groups most likely to be affected by the choice of alternative are those associated with motorized and developed recreation, wildlife conservation, and business groups associated with oil and gas, grazing, and infrastructure development.

The BLM received public comments to the Draft LUPA/EIS expressing concern with impacts on individual counties and towns and BLM's characterization of impacts at a generally broad scale. Where feasible, the BLM added qualitative discussions regarding where specific impacts would likely occur.

The BLM recognizes that specific communities would not be impacted in the same way by the management alternatives. Communities with more diversified economies, and those less dependent on grazing or oil and gas, would likely be less impacted than those that do depend heavily on grazing or oil and gas. Although oil-and-gas-related economic impacts are estimated to be the most substantial in terms of employment and earnings effects, small communities

dependent on grazing for their livelihoods may be impacted by alternatives to the degree they are located within or next to GRSG habitat.

As noted in **Chapter 3**, the number and size of ranches is decreasing in Garfield, Grant, and Routt Counties in the primary study area. The county that relies on ranching as a major source of income is Jackson County, which is also the only county in the primary study area that lost population between 2000 and 2010. Communities in Jackson County—such as Walden, its county seat and the only incorporated municipality—are next to large swaths of GRSG habitat and could experience social impacts if grazing were no longer allowed in federally administered GRSG habitat, as would be the case in Alternative C. In addition, individual ranches may be impacted differently depending on the extent of their reliance on public lands for grazing.

Many of the draft LUPA/EIS public comments expressed concern with assessing the geographically localized impacts of management actions. Additional analysis will be needed during implementation of the Proposed LUPA to properly assess the geographically localized impacts of management actions.

Alternative A—Alternative A would maintain current management and would, therefore, not change current incentives or restrictions to one or another interest group, nor would it change trends faced by individual communities.

Alternative B—Alternative B would impose restrictions on land and infrastructure development interests and would impose additional costs to business in areas intersecting with GRSG habitat. Management under Alternative B would have beneficial impacts on groups associated with wildlife conservation, as well as other interests indirectly affected by habitat protection.

Alternative C—Management under Alternative C would have adverse impacts on groups associated with motorized and mechanized recreation and would have the most potential adverse impacts on land and infrastructure development interests. Alternative C would impose the greatest restrictions on business development interests and, as mentioned, could impact small communities whose livelihoods would be affected, such as small ranching communities surrounded by federally administered land that provides GRSG habitat. Management under Alternative C would have the most beneficial impacts on those groups associated with conservation interests, as well as other interests indirectly affected by habitat protection.

Alternative D—Impacts under Alternative D would be most like those of Alternative B, but the magnitude of these impacts would be somewhat less than in Alternative B. Because management under Alternative D would require fewer land use restrictions, it would not have severe impacts on small ranching-dependent communities in the same way as Alternative C.

Proposed LUPA—Impacts would be between those of Alternatives B and D.

Summary of Social and Economic Impacts

As noted in the discussion of planning issues in Chapter 1, there is concern about how this action can promote or maintain activities that provide social and economic benefit to local communities while providing protection for GRSG habitat.

Alternative actions evaluated in this FEIS consist of different packages of conservation measures that include land use restrictions, management practices or design features, habitat priorities or desired conditions, and monitoring protocols. These conservation measures, in aggregate, are intended to address threats to, and provide protection for GRSG (see Chapter 2 of this FEIS).

This section evaluated the social and economic impacts resulting from conservation measures that address threats associated with specific land and resource uses (e.g., grazing and minerals) which are easily linked to social and economic conditions (e.g., employment). There are other conservation measures included in the alternatives (to varying degrees) that address other threats, such as fire, invasive plants, and vegetation (e.g., pinyon-juniper) encroachment on GRSG habitat that would have direct impacts on local economies of communities. However, the extent of these impacts is not known at this planning stage and due to uncertainty (e.g., fire occurrence). Therefore, while the regional economic impact of these conservation measures were not evaluated in this section, they would not only play a critical and complementary role in helping meet the goal of effectively protecting GRSG from a full spectrum of threats, but also support local economic activity.

The discussion and tables below summarize the range of potential social and economic impacts that may occur as a result of the subset of conservation measures that affect land or resource uses linked to readily identifiable social or economic conditions.

Tables 4.24 and **4.25** summarize the quantitative analysis of the potential effects of management alternatives on employment, earnings, and earnings per job in the primary study area. The socioeconomic impacts quantified in this section are based on assumptions and best available information as described in this section and in **Appendix N**.

A substantial amount of uncertainty exists regarding the magnitude, location, and nature of impacts on resource uses during implementation. To the extent feasible, the BLM and Forest Service provided localized information on impacts. In addition, the socioeconomic impacts quantified in this section do not exhaust all the possible socioeconomic impacts that could arise during implementation; especially, those impacts that would be associated with agency expenditures. These impacts may be of more or less importance to individual communities and would be analyzed during implementation.

The quantitative analysis included earnings and employment affected by management impacts on grazing, recreation, and oil and gas, and these activities would jointly capture the majority of the economic impacts of the alternatives in the primary study area. Impacts on oil and gas captured in **Tables 4.24** and **4.25** reflect the mid-range between the low and high drilling scenarios analyzed. Although estimates are presented on an annual basis, they would persist over time (a 20-year period was used for the purposes of the socioeconomic analysis).

Table 4.24 shows that an annual average of 5,368 fewer jobs would be supported under Alternative C when compared with Alternative A. The range of impacts would actually be between 1,624 and 9,111 jobs if low and high drilling scenarios for oil and gas are considered. Under Alternative C, approximately $284 million less in labor earnings would be generated annually, when compared with Alternative A. The range of impacts would be between $77 million and $491 million if low and high drilling scenarios for oil and gas are considered. Alternatives B and D and the Proposed LUPA would have an impact in between these two estimates, with Alternative D and the Proposed LUPA supporting more jobs than Alternative B.

Table 4.24
Average Annual Impact on Employment and Earnings by Alternative, Relative to Alternative A, Primary Study Area

		Alternative B	Alternative C	Alternative D	Proposed LUPA
Employment relative to Alternative A[1]	Grazing	-188	-376	-94	-94
	Recreation	-61	-134	-7	-7
	Oil and Gas	-1,933	-4,858	-967	-1,171
	Total	**-2,182**	**-5,368**	**-1,068**	**-1,272**
Earnings relative to Alternative A (2011$)	Grazing	-$5,564,041	-$11,128,083	-$2,782,021	-$2,782,021
	Recreation	-$2,134,373	-$4,655,666	-$259,344	-$259,344
	Oil and Gas	-$106,773,620	-$268,456,721	-$53,386,811	-$64,661,139
	Total	**-$114,472,034**	**-$284,240,470**	**-$56,428,176**	**-$67,702,504**

Source: Calculated using the IMPLAN model as explained in the text and in **Appendix N**, Socioeconomics Data and Methodology
[1]Employment counted as a part-time or full-time position during a 1-year period.

Table 4.25 shows that a reduction in approximately 2.6 percent of the current employment in the primary study area would occur under Alternative C, when compared with Alternative A. Based on **Table 4.24**, approximately 90 percent of the employment impacts would be attributed to impacts on oil and gas development. The range of impacts would be between 0.79 percent and 4.44 percent of current employment if low and high drilling scenarios for oil and gas are considered. Labor earnings potentially affected by Alternative C are approximately 3.3 percent of the 2010 earnings in the primary study area less than they would be under Alternative A.

Table 4.25
Average Annual Impact on Employment and Earnings by Alternative, Relative to Alternative A, Percent of 2010 Baseline

	Alternative B	Alternative C	Alternative D	Proposed LUPA
Employment relative to Alternative A	-1.06	-2.62	-0.52	-0.62
Earnings relative to Alternative A	-1.32	-3.27	-0.65	-0.78

Sources: Impacts calculated using the IMPLAN model as explained in the text and **Appendix N**. Baseline values for employment and labor earnings are those presented in Chapter 3, Table 3.83, Employment by Industry Sector within the Socioeconomic Study Area, and Table 3.84, Labor Income by Industry Sector and Non-Labor Income within the Socioeconomic Study Area (2010 dollars), of Section 3.25, Social and Economic Conditions (Including Environmental Justice), respectively.

Earnings were deflated to 2010 dollars using the US Bureau of Labor Statistics Consumer Price Index Inflation Calculator for comparison with labor earnings values presented in Chapter 3 for 2010.

The range of impacts would be between 0.89 percent and 5.65 percent of current earnings if low and high drilling scenarios for oil and gas are considered. The higher potential impact on earnings than on jobs reflects the higher average earnings per job in the affected industries, when compared to the overall average in the primary study area. Estimated impacts would be considerably less under Alternatives B and D and the Proposed LUPA.

Not all impacts of management alternatives on oil and gas, recreation, and livestock grazing are reflected in the quantitative analysis above. As previously discussed various measures may have additional impacts that were not possible to quantify. For example, various management alternatives could have additional impacts on grazing through restrictions on movement of cattle, seasonal restrictions, impacts on rotation and others, as previously discussed.

Under current management (Alternative A), tax revenues would be highest. Alternative B would generate less tax revenues than Alternative A. Alternative C would provide the least tax revenues. Alternative D and the Proposed LUPA would generate tax revenues between Alternatives A and B.

Economic impacts through the management of other resources could not be quantified but were discussed qualitatively. In particular, impacts on ROW related construction, travel, and mining would be lowest under Alternative A, highest under Alternative C, between Alternatives A and C under Alternative B, and between Alternatives A and B under Alternative D and the Proposed LUPA.

Counties would be impacted differently. As previously discussed, Garfield and Rio Blanco Counties are the main oil and gas producing counties in the primary study area and would likely be affected the most by restrictions on oil and gas development and would likely face the most restrictions on their fiscal revenues. Jackson County would likely be affected the most by restrictions to livestock grazing, with other counties such as Moffat also being affected.

Management actions under Alternatives B, C, and D and the Proposed LUPA could result in limiting the attraction and retention of population in the primary study area. These impacts would be more severe under Alternative C than under Alternatives B or D or the Proposed LUPA. These impacts would not be homogeneous throughout the primary study area, but would be concentrated in specific communities where GRSG habitat intersects with resources important to social well-being. Communities with strong interest groups revolving around conservation and primitive recreational activities could experience benefits from Alternatives B, C, and D and the Proposed LUPA. Communities with strong interest groups focused on livestock grazing or oil and gas development would likely experience adverse impacts from Alternatives B, C, and D and the Proposed LUPA, but especially from Alternative C. See **Table 4.26**.

Table 4.26
Social Impacts

Indicator	Alternative A	Alternative B	Alternative C	Alternative D	Proposed LUPA
Population growth; demand for housing and public services	Current trend, highest	Between A and C	Lowest	Between A and B	Slightly below D
Consistency with county LUPs	No Impact	No Impact	No Impact	No Impact	No Impact
Impacts on interest groups and communities of place	Most benefit to business interests	Between A and C	Most benefit to conservation and primitive recreation groups	Between A and B	Same as Alternative D

Alternative A—Management under Alternative A would have the fewest impacts on the capacity of communities to attract and retain populations. This alternative would also result in the fewest adverse impacts on business interest groups and small communities dependent on resources in GRSG habitat.

Alternative B—Social impacts from management under Alternative B would include reducing population attraction and retention and business interest groups than under Alternative A but less than under Alternative C.

Alternative C—Management under Alternative C would have the most adverse impacts on communities to attracting and retaining populations. This alternative would also result in the most adverse impacts on business interest groups and small communities dependent on resources in GRSG habitat. Interest groups associated with conservation and primitive recreation would benefit the most from this alternative.

Alternative D and the Proposed LUPA—Social impacts from management under Alternative D and the Proposed LUPA would fall between those described for Alternatives A and B. Because Alternative D and the Proposed LUPA would not

result in dramatic changes to management of federal grazing lands, it would not have severe impacts on small ranching-dependent communities in the same way as Alternative C. In addition, impacts resulting from management under Alternative D and the Proposed LUPA could be moderated by the potential for oil and gas production on state and private surface to increase, and if horizontal drilling allows operators to access minerals under federal surface despite NSO stipulations.

Nonmarket benefits from this action would be derived from the ability of the full spectrum of conservation measures to conserve, enhance, and/or restore GRSG habitat by reducing, eliminating, or minimizing threats to GRSG habitat. The magnitude of benefits associated with stabilizing or improving GRSG populations or habitat has not been monetized or quantified. This is due to the absence of specific data on the values of nonmarket benefits of GRSG and uncertainty about quantifying projected responses of GRSG habitat and populations to conservation measures, with the exception of nonmarket values associated with recreation.

A qualitative evaluation of the benefits from potential changes in GRSG populations and habitat resulting from the subset of conservation measures addressing land and resource uses and extraction, as evaluated in this section, indicates alternatives have the following capability to protect or improve benefits from GRSG:

- Alternative A has the lowest capability.
- Alternative B has greater capability than A, but lower capability than Alternative C.
- Alternative C has the greatest capability.
- Alternative D has greater capability than A, but lower capability than B or C.
- The Proposed LUPA has slightly more capability than Alternative D.

In addition to the conservation measures directly associated with social or economic impacts considered in this section, there are other conservation measures that address other threats (e.g., fire, nonnative plants, and encroachment) that also contribute to GRSG and GRSG habitat protection and corresponding benefits that are not addressed here. As a consequence, for a complete description of potential improvements in GRSG habitat protection resulting from the full spectrum of conservation measures under each alternative, the reader is referred to the effects summary tables provided in Chapter 2. Social and economic impacts cannot be considered in isolation or exclusive of other impact indicators discussed in this EIS.

4.25.5 Environmental Justice Impacts

The BLM and Forest Service considered information on the presence of minority and low-income populations (from **Chapter 3**) along with additional information, described in this section, to assess the potential for the alternatives to result in disproportionately high and adverse impacts on minority or low-income populations. Although conservation measures would be implemented consistently across all identified habitat, with no discrimination over particular populations, environmental justice guidance requires agencies to consider also whether their actions could unintentionally result in disproportionately high and adverse effects.

To help guide the analysis of potential environmental justice impacts, the BLM and Forest Service considered the information gathered in the Economic Strategies Workshop that was conducted in June 2012. That workshop was convened to identify public concerns related to potential social, economic and environmental justice impacts that could result from the management alternatives.

None of the public comments received during that workshop called out a specific concern related to minority populations. One commenter in the Economic Strategies Workshop did call out a specific concern related to low-income populations. A resident of Walden, in Jackson County, provided the BLM with a copy of a comment letter he submitted in January 2012 on the Kremmling Draft RMP/EIS. That comment letter quoted several passages of the Draft EIS, noting in particular the relatively high poverty rates and declining economic opportunities in Jackson County, and encouraged the BLM to pay special consideration to the economic situation of many residents (BLM 2013b).

The BLM and Forest Service also reviewed the scoping report to identify any comments related to environmental justice issues received in the scoping phase. The only scoping comments identified that related to minority or low-income populations were several comments pertaining to the cultural significance of the GRSG to Native American tribes. Commenters note that native tribes in western Colorado used GRSG as a food source and that the bird also played a role in myths and inspiration for ceremonial dances. In this context, the preservation of GRSG habitat would result in beneficial effects for native tribes that place a cultural value on the bird (BLM and Forest Service 2012). However, as described in **Chapter 3**, no federally recognized Indian tribes are present in the primary study area.

Potential Impacts on Minority Populations

As discussed in **Chapter 3**, CEQ guidance identifies a community or a specific population group as a minority population when either minorities in the affected area exceed 50 percent of the total population or the percentage of minorities in the affected area is meaningfully greater than the percentage in the general population or appropriate unit of geographical analysis.

Based on the description of minority presence in the primary study area in **Chapter 3**, and based on definitions in relevant guidance, no minority populations were identified in the primary study area, with the possible exception of the counties of Eagle and Garfield, where the proportion of total minorities is about 1 to 2 percentage points greater than for the State of Colorado, and the Hispanic presence is between 7 and 10 percentage points greater than in the State of Colorado. Smaller communities where minority presence is "meaningfully greater" than in the state as a whole, although not identified in **Chapter 3**, may also exist in the primary study area, given its large geographic coverage.

The extent to which existing minority populations are disproportionately impacted by high and adverse human health or environmental effects depends on the existence of high and adverse human health or environmental effects from management alternatives on any of the resources analyzed, and whether minority populations are particularly vulnerable to these impacts or more likely to be exposed to such impacts. Adverse impacts of alternatives were identified under the various resources analyzed and are described in their respective sections of **Chapter 4**.

The BLM and Forest Service reviewed the impacts of alternatives described in the respective sections of **Chapter 4**. Based on available information about the nature and geographic incidence of impacts, the BLM and Forest Service did not identify specific minority populations that would be exposed to disproportionately high and adverse impacts under the management alternatives considered, nor ways in which minority populations would be particularly vulnerable to such impacts.

This conclusion is based on a review of all available impact information, but one impact is relevant to call out in particular: the possibility that adverse impacts on employment and earnings could disproportionately affect minority populations. If employment losses—such as the estimated reduction of 6,000 jobs in Alternative C relative to Alternative A—were to affect minority populations disproportionately, this could be considered a disproportionately high and adverse impact on minority populations. However, these job losses would occur over a wide geographic area, and over many different economic sectors, from mining (including oil and gas) to agriculture, construction, manufacturing, wholesale trade, retail trade, and others.

Given the sectoral and geographic dispersion of the impacts, and the fact that employment in these industries is not overly concentrated within any particular racial or ethnic group, the BLM and Forest Service find no evidence to support the idea that these job losses would affect minority populations disproportionately.

Potential Impacts on Low-Income Populations

The presence or absence of low income populations in the primary study area is discussed in **Chapter 3**. Because no communities were identified where there is a meaningfully greater presence of low-income people than that present in the state as a whole, no low-income communities were identified. It is possible, however, that there are small communities that do constitute low-income populations, given the large geographic coverage of this EIS. The extent to which low-income populations are disproportionately impacted by high and adverse human health or environmental effects depends on the existence of high and adverse human health or environmental effects from management alternatives on any of the resources analyzed, and whether low-income populations are specifically vulnerable to these impacts or more likely to be exposed to such impacts.

Accordingly, similar to the analysis for minority populations, the BLM and Forest Service reviewed the impacts of alternatives described in the respective sections of **Chapter 4**. Based on available information about the nature and geographic incidence of impacts, the BLM and Forest Service identified a potential concern about disproportionately high and adverse impacts on low-income populations in Jackson County, related to economic and social effects. In the county as a whole, the poverty rate (13.9 percent) is the highest of any county in the primary socioeconomic study area, though only slightly higher than the state (12.2 percent).

Jackson is also the only county in the primary study area, and one of the few counties in Colorado, that has experienced a decline in population in recent years, as reported in **Chapter 3**. Among the primary study area counties it also has the highest proportion of residents over the age of 65 (18.4 percent), which may indicate a relatively high number of residents who live on a fixed income. As noted elsewhere in this chapter, Jackson County is strongly dependent economically on oil and gas development and ranching and grazing—both industries that use public lands—and some communities in the county are nearly surrounded by federal lands, such as Walden, which has a 22 percent poverty rate according to the US Census Bureau.

With these considerations in mind, the BLM and Forest Service believe that Alternative C, in particular, could result in disproportionately high and adverse impacts on low-income populations in Jackson County, specifically related to impacts on employment and earnings. Impacts in Alternatives B and D would not be as severe. In particular, restrictions on livestock grazing and oil and gas, and associated economic and social impacts, would not be as great in Alternatives B and D, and therefore these alternatives would not have disproportionately high and adverse impacts on low-income populations in Jackson County.

The BLM and Forest Service also considered the possibility for employment losses to have disproportionately high and adverse effects on other communities. In particular, as in the analysis of effects on minority populations, the agencies considered the possibility that adverse impacts on employment and earnings—such as the estimated reduction of 6,000 jobs in Alternative C relative to Alternative A—could disproportionately affect low-income populations. In general, however, given the sectoral and geographic dispersion of the employment impacts, and the fact that employment in these industries is not overly concentrated within any particular income cohort, the BLM and Forest Service find no evidence to support the idea that these job losses would affect low-income populations disproportionately (with the exception of the impact identified above; see **Table 4.27**.)

Table 4.27
Environmental Justice Impacts

Indicator	Alternative A	Alternative B	Alternative C	Alternative D	Proposed LUPA
Disproportionately high and adverse impacts on minority populations	No Impact	No Impact	No Impact	No Impact	No Impact
Disproportionately high and adverse impacts on low-income populations	No Impact	No Impact	Disproportionately high and adverse impact related to employment	No Impact	No Impact

4.26 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Section 102(2)(C) of NEPA requires a discussion of any irreversible or irretrievable commitments of resources that would be involved in the proposal should it be implemented. An irretrievable commitment of a resource is one in which the resource or its use is lost for a period of time (e.g., extraction of any locatable mineral ore or oil and gas). An irreversible commitment of a resource is one that cannot be reversed (e.g., the extinction of a species or loss of a cultural resource site without proper documentation).

Implementation of the LUPA management actions for all alternatives except Alternative A would result in fewer surface-disturbing activities, mineral and energy development, and ROW development that result in loss of irreversible or irretrievable resources.

Although new soil can develop, it is a slow process. Soil erosion or the loss of productivity and soil structure might be considered irreversible commitments to resources. Surface-disturbing activities, therefore, would remove vegetation and accelerate erosion, which would contribute to irreversible soil loss. However, many of the management actions in the LUPA and RDF/SDFs are intended to reduce the magnitude of these impacts and to restore some of the soil and

vegetation lost. Such disturbances would occur to the greatest degree under Alternative A, which would allow many more surface-disturbing activities, compared to the action alternatives.

Laws protecting cultural and paleontological resources would mitigate irreversible and irretrievable impacts on cultural resources from permitted activity. OHV) use areas open to cross-country use could have some resources destroyed. This would be especially true in areas of high cultural sensitivity or areas containing vertebrate or scientifically significant fossil resources. Such destruction would be irreversible and irretrievable. Alternative A would have the greatest potential for a loss of cultural and paleontological resources information.

Development of mineral resources (e.g., oil, gas, coal, sand, and gravel) is irreversible. If these nonrenewable resources were extracted for consumption or use, they would be irreversibly removed. BLM Handbook H-1624-1, *Planning for Fluid Minerals*, acknowledges leasing of oil and gas resources as an irreversible commitment. As noted above, this would be most likely under Alternative A.

Implementation of the LUPA management actions for Alternatives B, C, and D and the Proposed LUPA would result in an increased commitment of irretrievable resources of socioeconomic value for the duration of management actions, to the extent that resources such as oil and gas, federal lands for grazing and recreation and other resources are no longer available to support employment and income generation. On the other hand, Alternatives B, C, and D and the Proposed LUPA would decrease the commitment of irretrievable resources for the support of nonmarket values associated with the GRSG, open spaces and associated activities such as primitive recreation.

Additional stipulations under the draft LUPA could reduce the potential for development, but the stipulations under Alternatives B, C, and D and the Proposed LUPA would provide an increasingly restrictive environment for such development and so a decreasing likelihood of this impact.

4.27 UNAVOIDABLE ADVERSE IMPACTS

Section 102(C) of the NEPA requires disclosure of any adverse environmental impacts that could not be avoided should the proposal be implemented. Unavoidable adverse impacts are those that remain following the implementation of mitigation measures or impacts for which there are no mitigation measures. Some unavoidable adverse impacts occur as a result of implementing the LUPA. Others are a result of public use of BLM-administered and National Forest System lands within the planning area. This section summarizes major unavoidable impacts discussions of the impacts of each management action (in the discussion of alternatives) and provides greater information on specific unavoidable impacts.

Planned activities would produce some level of air emissions, even with mitigation. However, none of the activities proposed in this LUPA/EIS would produce adverse impacts on the air quality resource, based on the definitions above.

Surface-disturbing activities would result in unavoidable adverse impacts under current BLM and Forest Service policies to foster multiple uses. Although these impacts would be mitigated to the extent possible, unavoidable damage would be inevitable.

Permanent conversion of areas to other uses, such as transportation and mineral and energy development or OHV use, would be unlikely under all of the action alternatives. This would most likely decrease erosion and increase the relative abundance of species within plant communities, the relative distribution of plant communities, and the relative occurrence of seral stages of those communities. Because large portions of the crucial big game habitats coincide with areas of high oil and gas potential, unavoidable wildlife habitat loss would be most likely to occur under Alternative A. These activities would also intrude on the visual landscape. This type of development is most likely to occur under Alternative A. The other action alternatives place many restrictions on many types of development, which would most likely result in fewer visual intrusions and fewer instances of unavoidable wildlife habitat loss.

Unavoidable damage to cultural and paleontological resources from permitted activities could occur if resources undetected during surveys were identified during surface-disturbing activities. In these instances, further impacts would be ceased on discovery of a resource, and the resource would be mitigated to minimize data loss. This scenario is most likely to occur under Alternative A since it would place the fewest restrictions on surface-disturbing activities. Unavoidable loss of cultural and paleontological resources would also occur, due to them not being identified, the lack of information and documentation, erosion, casual collection, and inadvertent destruction or use. Broad-scale sampling and classification of areas with a high likelihood of containing cultural and paleontological resources would greatly reduce the probability of unavoidable adverse impacts on the resource.

Wildlife, livestock, and wild horses would contribute to soil erosion, compaction, and vegetation loss, which could be extensive during drought cycles and dormancy periods. Conversely, unavoidable losses or damage to forage from development of resources under the LUPA would affect livestock, wildlife, and wild horses. Some level of competition for forage between these species, although mitigated to the extent possible, would be unavoidable. Instances of displacement, harassment, and injury could also occur. These types of scenarios are most likely to occur under Alternative A. The other action alternatives would place restrictions on many development and surface-disturbing activities,

which would make the likelihood that displacement, harassment, and injury would occur to be much lower than Alternative A.

Recreation, development of mineral resources, and general use of the LUPA decision area would introduce additional ignition sources into the planning area, which would increase the probability of wildland fire and the need for its suppression. These activities, combined with continued fire suppression, would also affect the overall composition and structure of vegetation communities; this could increase the potential for high-intensity wildland fires. Restrictions on development under all of the action alternatives would decrease the potential for ignitions in the decision area.

As recreation demand increases, recreation use would disperse, creating unavoidable conflicts between recreation users, such as those seeking more primitive types of recreation, and motorized users sharing recreation areas. In areas where development would be greater, the potential for displaced users would increase. Under all of the action alternatives, restrictions on development would reduce the potential for displaced recreational users.

Numerous land use restrictions imposed throughout the decision area to protect GRSG habitat and other important values, by their nature, affect the ability of operators, individuals, and groups who use the public lands to do so without limitations. Although attempts would be made to minimize these impacts, unavoidable adverse impacts in the number and miles of roads or trails available for recreational use could occur under all of the action alternatives. Minimization would include limiting them to the level of protection necessary to accomplish management objectives and providing alternative use areas for affected activities.

4.28 Relationship Between Local Short-Term Uses and Long-Term Productivity

Section 102(C) of NEPA requires discussion of the relationship between local, short-term uses of human environment and the maintenance and enhancement of long-term productivity of resources. As described in the introduction to this chapter, short-term is defined as anticipated to occur within the first 5 years of implementation of the activity; long-term is defined as following the first 5 years of implementation but within the life of the LUPA.

Short-term use of the air quality resource would not affect long-term productivity, except that air quality emissions in high enough concentrations could reduce vegetation and plant vigor. However, these types of impacts are not expected for any of the action alternatives since they would restrict development. Additionally, management actions would result in various short-term impacts, such as increased localized soil erosion, fugitive dust emission, and vegetation loss or damage and decreased visual resource quality. These impacts would be expected only under Alternative A, which it would allow the most surface-disturbing activities.

Other surface-disturbing activities, including transportation and utility line construction, and mineral resource development would result in the greatest potential for impacts on long-term productivity. Management prescriptions and RDFs/PDFs/SDFs (**Appendix I**) are intended to minimize the effect of short-term commitments and to reverse change over the long term. These prescriptions and the associated reduction of impacts would be greatest under Alternative C, with Alternatives B and D and the Proposed LUPA close behind for such resources as vegetation and wildlife habitat. However, BLM-administered and National Forest System lands are managed to foster multiple uses, and some impacts on long-term productivity might occur, despite the prescriptions intended to reduce impacts on GRSG habitat.

ROWs and short-term use of an area to foster energy and minerals would result in long-term loss of soil productivity and vegetation diversity. Impacts would persist as long as surface disturbance and vegetation loss continue. In general, the loss of soil productivity would be directly at the point of disturbance; even so, long-term vegetation diversity and habitat value could be reduced due to fragmentation and the increased potential for invasive species to spread from the developments or disturbances. Alternative A would have the greatest potential for short-term loss of productivity and diversity due to the high level of potential development and the lack of stringent mitigation and reclamation standards contained in Alternatives B, C, and D and the Proposed LUPA. Alternative C would provide the greatest long-term productivity by excluding development in many areas through closures or application of severe restrictions on development.

ROWs and the short-term use of GRSG habitat, big game severe winter range, birthing areas, and migratory corridors for energy and minerals could impair the long-term productivity of GRSG populations and big game populations. This would happen by displacing animals from primary habitats and removing components of these habitats that might not be restored for more than 20 years. These short-term uses could also affect the long-term sustainability of some special status species. The potential for these impacts would vary by alternative because long-term deterioration of GRSG habitat as a result of mineral activity would be more evident under Alternative A. Alternative C would provide the most protections to reduce the long-term losses due to the 3 percent surface disturbance caps in ADH.

The short-term resource uses associated with travel and transportation and mineral development (individual short OHV trips, oil and gas seismic exploration, natural gas test well drilling, and the noise associated with these activities) would have adverse impacts on the long-term productivity of GRSG populations. This would be the case if these resource uses were to infringe on GRSG winter habitat, brood-rearing habitat, and summer habitat. These activities, though short-term individually, could have collective long-term impacts on GRSG productivity and health if they were to increase in the long term.

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